The costs of crime victimisation in Aotearoa:

Evidence from the NZ Crime & Victims Survey linked to administrative data

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Published

New Zealand Policy Research Institute, Auckland, New Zealand

ISBN (PDF): 978-1-99-101150-3

2024

Suggested citation: Meehan, L., & Schober, T. (2024). *The costs of crime victimisation in Aotearoa: Evidence from the NZ Crime & Victims Survey linked to administrative data.* New Zealand Policy Research Institute, Auckland.

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Research report

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September 2024

Abstract

We use data from the New Zealand Crime and Victims Survey linked to administrative data to track individuals over time and estimate the consequences of victimisation. To address possible endogeneity, we employ a difference-in-differences method whereby victims are compared with those who do not report any victimisation. We find that victimisation leads to a decrease in employment and earnings, and that the effects are larger when we consider victims of interpersonal violence and serious offences. The decline in earnings and employment is mirrored by an increase in benefit receipt. The negative effects persistent even three years after the victimisation event. We also find increases in injury claims, but the effects tend to be short-lived.

Disclaimer

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

Acknowledgements

We would like to thank the Ministry of Justice for funding this research via the New Zealand Crime and Victims Research Fund. Thanks to Andrew Webber from the Social Wellbeing Agency, Petrina Hargrave from Manaaki Tāngata Victim Support, Juliane Hennecke from the Otto von Guericke University Magdeburg, and Felix Glaser from the Johannes Kepler University Linz for providing comments and project advice. Also thanks to Nick Bowden from the University of Otago for providing code on the identification of mental health problems using the IDI.

1 Introduction

This is the draft research report for the research project "The costs of crime victimisation in Aotearoa: Evidence from the NZ Crime & Victims Survey linked to administrative data" funded by the New Zealand Crime and Victims Research Fund. The project uses the NZ Crime and Victims Survey (NZCVS) linked to Stats NZ's Integrated Data Infrastructure (IDI) to track individuals over time and compare victims with non-victims. It examines a range of wellbeing outcomes such as physical and mental health, labour market status and benefit receipt.

Crime imposes direct and indirect costs on society. These costs are well-documented in terms of law enforcement and criminal justice spending, direct losses for victims (such as property losses), spending on private deterrence, the implicit costs of fear and suffering and the opportunity cost of time lost due to crime. For example, Anderson (2021) estimates that the annual net cost of crime in the US is \$2.86-\$3.92 trillion (more than 10 % of GDP), with crime victims bearing almost 60 % of the costs. However, the study only measures victims' costs in the form of psychic costs, transfers of assets from victims to criminals, and the cost of recovery (e.g. victims' medical costs, the costs of replacing damaged property etc.). For NZ, Roper and Thompson (2006) estimates the costs of crime in 2003/04 to be \$9.1 billion (about 6 % of GDP). However, like most other cost of crime studies, these studies do not take account of the full suite of costs to victims in terms of ongoing detrimental effects to mental and physical health, labour market outcomes and so forth. Indeed, there is an acknowledged knowledge gap on the consequences of crime for victims (Bindler et al., 2020).

Overall, there are few studies that empirically examine the cost of victimisation in terms of the subsequent outcomes of victims. In addition, only a small subset of existing studies attempt to make causal inferences about the impact of victimisation. Therefore, the availability of NZCVS, which includes both reported and unreported crimes, linked to the IDI provides an opportunity to make a significant contribution to the limited evidence base in this area.

This draft report provides an overview over the existing literature in Section 2. Section 3 describes the used data and the construction of the analysis data set. Section 4 shows descriptive statistics by documenting the prevalence of victimisation, analysing victim characteristics and comparing constructed administrative outcomes of victims and non-victims. Section 6 shows estimation results of the effect of crime on labour market and health outcomes. It provides both short- and medium-term analyses, as well as an assessment of potential effect heterogeneity. Section 7 concludes.

2 Literature review

2.1 Evidence from New Zealand

Several large-scale surveys in New Zealand show that victims of crime have poorer health, labour market and well-being outcomes. The New Zealand Crime and Victims Survey

(NZCVS) has been collecting nationwide data about the experience of crime since 2018. In six cycles until 2023, the NZCVS has interviewed more than 42,000 adults using a consistent methodology (Ministry of Justice, 2024). The survey shows that the level of victimisation is strongly associated with life satisfaction and feelings about safety. While there are some changes over time, the general patterns are consistent over time. For example, in cycle 5 (2021/22) of the survey, 41.3 % of adults with the lowest level of life satisfaction experienced victimisation, compared to 25 % of the most satisfied adults. In cycle 1 (2018) the corresponding prevalence rates were 42.8 % and 22.3 % (Ministry of Justice, 2023d). The perception of safety is also related to the number of experienced victimisations. Pooled data from the first five cycles show that 8 % of non-victims reported feeling the lowest levels of safety (between 0 and 6 out of 10), compared with 13 % of those who were victims of one crime, 23 % of those who were victims of multiple crimes, and 30 % of highly victimised respondents (4 or more incidents) (Ministry of Justice, 2023b).

Victims are also asked about the consequences of crime incidents. Around one in 11 incidents result in injury, and for one in ten incidents the victims need to take time off work. There is a notable difference with respect to the type of offence, where offences involving interpersonal violence are more likely to have negative consequences. Almost half of robbery and assault incidents resulted in injuries, and after 13 % of interpersonal violence incidents victims had to take time off work (Ministry of Justice, 2023a).

An important insight from the NZCVS is that the majority of victimisations are not reported to the police. Overall, only a quarter of all crime incidents get reported, with significantly lower rates for sexual assaults (7 %) and fraud and cybercrime (8 %). In contrast, thefts and burglaries are more often reported (NZCVS cycle 1 to 5 pooled data, Ministry of Justice, 2023c). When respondents are asked why they did not report incidents, the most common answers are that an incident was "too trivial/no loss or damage/not worth reporting", "police couldn't have done anything", "didn't have enough evidence to report it", and "dealt with the matter myself/ourselves" (Ministry of Justice, 2023c).

The New Zealand Crime and Safety Survey (NZCASS) was a predecessor of the NZCVS that ran from 2006 to 2014. Next to injuries and time taken off work, NZCASS also asked about emotional reactions of crime victims. Anger or annoyance were most commonly reported (77 %), but smaller fractions also reported more detrimental reactions such as depression (13 %), difficulty sleeping (12 %) and anxiety/panic attacks (9 %). The fraction of incidents resulting in victims taking time off work is similar to the NZCVS. Among those who reported that they took time off, 47 % took one day, 22 % more than one day and up to one week, and 31 % more than one week. Again, there is a large difference with respect to the type of offence. For personal offences where time off was taken, 54 % took more than one week off, versus 31 % for household offences (Morrison et al., 2010).[1]

In an earlier large-scale survey, Flett et al. (2002) relate the experience of crime to

[1] In NZCASS, personal offences included individual-level offences such as assaults, robberies, and thefts or damage of personal property and were restricted to events personally experienced by the respondent. Household offences included those in which all members of a household could be considered victims, such as burglary, motor vehicle thefts, and thefts or damage of household property (Morrison et al., 2010).

physical health outcomes. Victims of crime reported significantly more chronic symptoms, current physical symptoms, and chronic limitations in daily functioning. They also rated their overall health as poorer than those who did not experience crime in the past.

A number of additional surveys and studies on the consequences of victimisation in New Zealand focus on selected population groups or particular offences. The New Zealand Family Violence Study (NZFVS) asks respondents about lifetime intimate partner violence (IPV). IPV exposure is associated with adverse health outcomes including poor general health, recent pain or discomfort, and any diagnosed mental health condition in both women (Mellar et al., 2023b) and men (Mellar et al., 2023a), even after adjusting for socio-demographic characteristics (age, ethnicity, food security, employment status, and educational level). Mellar et al. (2023b) also find a dose-response association where women who experienced multiple IPV types reported poorer health outcomes. Similarly, Fanslow and Robinson (2004) and Fergusson et al. (2005) document worse health outcomes for victims of partner violence compared to non-victims among women in Auckland and Waikato and among young people in Christchurch. There is additional evidence from qualitative and smaller-scale studies, in particular in the area of interpersonal victimisation. Franklin (2021) explores South Asian immigrant women's experience of male-to-female partner violence in NZ. Acharya (2017) study peer victimisation among Indian schoolchildren in NZ and link it to anxiety and depression.

To sum up, the existing studies in New Zealand consistently show that victims have poorer health and other well-being outcomes compared with those who were not victimised. A related but different question is whether victimisation *caused* declines in well-being. Studies reporting on associations of victimisation typically control for available confounding variables. But victims and non-victims tend to be systematically different in many dimensions, including factors such as family background or preferences for risk which are usually unobservable to researchers (Bindler et al., 2020). If these characteristics affect the probability of victimisation and wellbeing outcomes, they bias estimations on the effects of crime. A related issue that is often difficult to address with cross sectional data is reverse causality. For example, a correlation of unemployment and victimisation may originate from job losses that change daily routines and related risks of becoming a victim, or conversely from victimisation causing health problems that render victims unable to work. To address these concerns, international studies on the causal effects of victimisation tend to rely on longitudinal surveys or administrative data, where becoming a victim of crime can be related to changes in individual outcomes.

2.2 International evidence

Several studies on the causal impact of crime use data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA is large household panel survey that asks respondents whether they were a victim of crime in the past 12 months. Participants are followed over time, enabling researchers to relate victimisation to changes in wellbeing while allowing for individual characteristics that are constant over time. HILDA

also includes measures of mental wellbeing. Cornaglia et al. (2014) and Mahuteau and Zhu (2016) find that violent crime victimisation decreases mental wellbeing. Cornaglia et al. (2014) investigate different components of mental health and find statistically significant effects in all analysed dimensions. Social functioning, which captures the ability to perform normal social activities without emotional problems, shows the largest decreases. In contrast to Cornaglia et al. (2014), Mahuteau and Zhu (2016) also find small but statistically significant effects of property crimes. This could be explained by the larger sample size resulting from the additional survey waves that Mahuteau and Zhu (2016) use.

Johnston et al. (2018) use HILDA to study the effects of victimisation on a different outcome - general life satisfaction. They estimate that violent crime victimisation decreases life satisfaction on average by 45 % (women) and 36 % (men) of the standard deviation of life satisfaction, and that the amount of monetary compensation that is required to compensate for this loss in life satisfaction is A$102,000 (women) and A$79,000 (men). Velamuri and Stillman (2008) use the same data to investigate employment, and find that violent crime victimisation decreases employment among men but not among women.

A drawback of much of the survey data is that it only includes limited information on the type of crime, so that it is difficult to explore heterogeneities in the effects on victims. Second, surveys only collect information on individual outcomes at few points in time, which complicates the study of dynamics in the response to victimisation. Recent studies therefore explore administrative data sources, which can provide a wider range of outcomes at a more granular level.

Ornstein (2017) use Swedish administrative data to examine the effects of assaults on health and finds that an assault decreases the life expectancy of the victim and increases their uptake of sick leave. The study also finds a 25 % decrease in earnings for female assault victims and a 14 % decrease for males. However, the analysis is limited to identifying victimisation via hospital visits that list assault as the reason for the visit, and thus is restricted to assaults of a severity that needed hospital treatment. In contrast, Bindler and Ketel (2022) examines the labour market effects of victimisation using Dutch police records linked to labour market data. They estimate that earnings decrease by about 8 % for men and 13 % for women one year after the incident, and earnings losses continue even four years post-victimisation. The study also finds shorter-lived increases in health expenditure.[2]

Bhuller et al. (2023) focus on the effects of domestic violence using Norwegian registry data. They find a large increase in mental health diagnoses of victims, including mood, depression, sleep and anxiety disorders. They also investigate the children of victims, and show that both mental health and schooling are negatively affected.

A closely related strand of literature analyses the effects of local crime rates on residents' wellbeing and other outcomes, rather than the effects on an individual of being a victim of crime. These are interpreted as indirect costs of crime, through inflicting fear of crime

[2]There is ongoing related but as yet unpublished work for NZ using the IDI to examine the effects of criminal victimisation. Focusing on victims' mental health, Bindler et al. (n.d.) identify crime victims via NZ Police records, and measure mental health using MoH's Programme for the Integration of Mental Health Data (PRIMHD). Using similar data, Mertz et al. (n.d.) study the effects of violent assaults on youth victims and their parents.

and associated changes in behaviour. Dustmann and Fasani (2016) show that crime causes considerable mental distress for residents in England, primarily driven by property crime. Cornaglia et al. (2014) find similar effects of local-area violent crime on some measures of mental health using Australian data. Janke et al. (2016) also study England and find that local level of violent crime has a significant effect on walking and physical activity.

Overall, the international studies using longitudinal survey data have limitations in that they do not include much information on the type of crime and only collect information on individual outcomes at a few points in time. While international studies using administrative data have richer, more frequent time-series information, they are limited to examining reported crimes. Our study uses survey data to identify information about whether individuals experienced crime victimisation regardless of whether or not it was reported to the police, as well as details of the type of crime experienced, linked to survey data, allowing for individuals' outcomes to be tracked at frequent intervals over time.

3 Data

We use data from the Integrated Data Infrastructure (IDI), a large research database managed by Stats NZ. It holds micro-data from various government agencies, organisations, and surveys with longitudinal information on education, income, health and other life events that can be linked at the individual level (Stats NZ, 2020).

The IDI is linked to the New Zealand Crime and Victims Survey (NZCVS), allowing us to track individuals over time to study the consequences of victimisation. The NZCVS is a repeated cross-sectional survey that collects information about New Zealanders' experiences of crime (Ministry of Justice, 2019c).

In the main analysis, we use the first four NZCVS cycles with interviews between 2018 and 2021.[3] We use the data to examine short-term effects of victimisation at a quarterly level up to five quarters after victimisation. We further analyse medium-term effects using only the first two cycles, where we can follow victims and non-victims for up to four years after they participated in NZCVS.

A total of 29,737 people participated in NZCVS cycles 1 to 4 (Ministry of Justice, 2021). Of these participants, 27,669 1.) agreed to have their survey responses linked to the IDI and 2.) were successfully linked to the IDI spine using Stats NZ's probabilistic record linkage, so that their outcomes can be analysed in the available administrative data sources.[4] The high linkage rate of over 93 % ensures that we can observe a large sample of respondents, and that the linked data should be largely representative of the underlying population of interest.

We use the linked NZCVS participants from cycles 1 to 4 to construct a quarterly panel of adults residing in New Zealand. This is done by excluding people who are overseas using information on international border movements and a small number of respondents who

[3]This provides a sufficient observation period after the interviews, allowing us to track the respondents' outcomes. We also include additional data from the fifth NZCVS cycle in a sensitivity analysis.

[4]Note that all counts referring to the IDI are randomly rounded to base 3 in accordance Stats NZ confidentiality rules. Further information on the IDI linking methodology is available at Stats NZ (2014).

died during the study period. In supplementary analyses we use a yearly panel based on the smaller sample of respondents from NZCVS cycles 1 and 2, which we can track over an extended time period.

We examine health outcomes based on data from the Ministry of Health. This includes hospital admissions and non-admitted secondary care events such as emergency department visits. It also includes mental health outcomes based on mental health referrals, hospitalisations due to mental health events and prescription data (e.g. prescriptions for mental health issues such as anxiety medications, as developed in Bowden et al. (2020) and applied in numerous studies, such as Meehan et al. (2022)). Additional data on injuries comes from the Accident Compensation Corporation (ACC). We examine employment and earnings outcomes using taxable income data from Inland Revenue (IR). IR also provides information on benefit receipt. Table 1 provides a detailed list of outcome variables and corresponding data sources.

Table 1: Description of outcome variables and data sources

Outcome	Description
Income and employment	
Earnings	Sum of wages, salaries and income from self-employment, adjusted to 2020 prices using the consumer price index (Inland Revenue (IR) derived income data).
Employed	Indicator for having any earnings (IR).
Months receiving earnings	Number of months receiving any earnings (IR).
Benefits	Sum of taxable benefit payments from the Ministry of Social Development (IR).
Physical health	
Hospitalisation	Indicator for publicly funded hospital events (Ministry of Health (MoH) National Minimum Dataset).
Emergency department visits	Emergency department event types (MoH National Non-Admitted Patient Collection (NNPAC)).
Other outpatient visits	Outpatient and community referred events (NNPAC).
Injury	Indicator for injuries after accidents (Accident compensation corporation (ACC) injury claims).
Mental health	
Any mental health issue	Any mental health related drug prescription, hospital diagnosis, and any service or activity captured by the Programme for the Integration of Mental Health Data (PRIMHD) (MoH).
Mental health services	Utilisation of any service related to mental health (PRIMHD, MoH).
Specific mental health issues (emotional problems, depression, sleep problems, anxiety, substance abuse)	Indicators for mental health issues using various data sources in the IDI following Bowden et al. (2020), including pharmaceutical prescriptions, hospitalisations, death causes, and PRIMHD.

4 Descriptive statistics

4.1 Prevalence of victimisation

Table 2 summarises the prevalence of victimisation in New Zealand using linked NZCVS data from cycles 1 to 4.[5] It shows that 31 % of adults in New Zealand are the victims of at least one crime over the course of 12 months, and that the prevalence of victimisation has remained relatively stable over time. This is consistent with results using the complete survey data that includes respondents that were not linked to the IDI, where the percentage of adults victimised lies between 29-31 % in Cycles 1 to 4 (Ministry of Justice, 2022).

Table 2: Prevalence of different types of victimisation

	(1) Cycle 1	(2) Cycle 2	(3) Cycle 3	(4) Cycle 4	(5) Cycle 1–4
Any victimisation	31.3	31.7	30.7	30.4	31.0
Violent interpersonal offences	7.5	7.2	6.9	7.2	7.2
Offences by family member	2.0	2.1	2.2	1.8	2.0
Intimate partner violence	1.1	1.3	1.6	0.9	1.2
Victim of serious offence	9.8	10.7	9.9	8.8	9.8
N	7503	7629	6774	5760	27669

Notes: This table summarises the prevalence rates for different types of victimisation in NZCVS cycles 1 to 4. The estimates are based on weighted data to account for the survey design (see Ministry of Justice, 2019a).

Table 2 further reports the prevalence of different types of offences. Following the NZCVS categorisation, violent interpersonal offences is a group of offences combining sexual assault, other assault, harassment and threatening behaviour, robbery (regardless of the relationship between the offender and victim), and damage of personal or household property (if the offender is known to the victim) (Ministry of Justice, 2020). More than 7 % of adults experienced violent interpersonal offences during the 12 months before the interview. Prevalence rates for Cycle 1 (7.5 %) to Cycle 4 (7.2 %) are again similar and match the reported prevalence rates from the complete survey data (Ministry of Justice, 2019b, 2020, 2022).

Around 2 % of adults experienced offences committed by family members. Family members include a current partner, ex-partner, or other family member (parent or step-parent; parent's partner, boyfriend or girlfriend; son or daughter including in-laws; sibling or step-sibling; other family members including extended family). The prevalence for intimate partner violence (IPV) is 1.2 %. In the NZCVS, IPV includes robbery, assault, harassment and threatening behaviour, and also damage to motor vehicles and property damage where the offender is a current partner or ex-partner (Ministry of Justice, 2020).

The small share of the population experiencing family or intimate partner violence translates into sizeable absolute numbers of victims. For example, based on NZCVS Cycle 5 data 74,000 adults were victims of offences by family members, and 56,000 experienced IPV (Ministry of Justice, 2023e). In addition to incidents in the 12 months before the survey, NZCVS further asks about lifetime experience of victimisation. The results suggests that

[5] All estimates in this section are based on weighted data to account for the survey design, using the original NZCVS weights without any reweighting.

over half a million adults or 18 % of the adult population experienced one or more incidents of IPV at some point during their lives (Ministry of Justice, 2023e).

Almost 10 % of adults were victims of an offence that they perceived as serious. In the survey, victims are asked to rate the seriousness of the incident on a scale of 0 (not serious at all) to 10 (very serious). In the following analysis, we classify victims of serious offences as those who report an incident with a seriousness rating of 8 or higher.

4.2 Victim characteristics

Table 3 compares characteristics of victims to those that have not been victimised in the 12 months before NZCVS. Victims are, on average, five years younger than non-victims and the difference is statistically significant. This finding is consistent with previous results suggesting younger adults are significantly more likely to experience crime compared with older people, both in NZ (Ministry of Justice, 2020) and internationally (Kesteren et al., 2014). The share of women is slightly higher among victims. More detailed previous research regarding the experience of crime by demographic factors using the NZCVS also found little difference in the likelihood of general victimisation between women and men. However, women were significantly more likely than men to experience IPV and offences by family members (Ministry of Justice, 2020). The survey also records household size and shows that, on average, victims live in slightly larger households. Furthermore, victims tend to live in more deprived neighbourhoods based on the NZ Deprivation index. The index measures the level of socioeconomic deprivation of small geographical areas using information from the census and is scaled to have a mean of 1000 and standard deviation of 100 (Atkinson et al., 2020).

Table 3: Characteristics of victims and non-victims

	(1) Victims	(2) Non-victims	(3) Difference	(4) p-value
Age (years)	42.7	47.7	-5.0	0.000
Female (%)	52.3	50.2	2.1	0.022
Household size	3.1	2.9	0.2	0.000
NZ Deprivation index	1007.4	993.8	13.6	0.000
Ethnicity (%)				
European	71.6	70.0	1.7	0.038
Māori	17.3	12.9	4.4	0.000
Asian	12.4	15.4	-3.0	0.000
Pacific peoples	6.7	7.3	-0.6	0.161
Other	2.3	2.1	0.1	0.651

Notes: This table summarises characteristics of victims (column 1) and non-victims (2) in NZCVS cycles 1 to 4. Column 3 shows the difference between groups, Column 4 shows the p-value testing the equality of the characteristics. The estimates are based on weighted data to account for the survey design (see Ministry of Justice, 2019a).

Table 3 reveals that there are differences in the distribution by ethnicity. The share of Māori is higher among victims compared to non-victims. In contrast, Asian people are underrepresented among victims. These results confirm previous research showing that Māori

are significantly more likely to experience crime compared with the NZ average (Ministry of Justice, 2020).

In Table A.1 in the appendix, a comparison is made between victims and non-victims using data exclusively from cycles 1 and 2 of the NZCVS. Notably, the characteristics of these two groups closely resemble those observed when analysing data from the first four cycles. This suggests that over the past years, a similar demographic of individuals has been experiencing victimisation.

4.3 Comparison of outcomes

This section compares outcomes of victims and non-victims derived from the linked administrative data, which allows an analysis of labour market and health indicators before and after participation in NZCVS. We first assess potential differences between the groups five quarters before the survey. Given that NZCVS captures incidents in the 12 months before the survey, these measures therefore predate reported victimisation. Differences in labour market or health outcomes must therefore be due to different underlying characteristics between victims and non-victims (including past victimisations that are not recorded in NZCVS). Furthermore, we visually depict the evolution of selected outcomes over a span of five quarters preceding the survey and five quarters following it (Figures 1-6). This implies that these graphs encompass the period during which victimisation occurred (quarters -4 to 0) as well as the period afterwards.

Table 4: Labour market outcomes before victimisation

	(1) Victims	(2) Non-victims	(3) Difference	(4) p-value
Earnings (NZ$)	9949.1	9114.0	835.1	0.001
Employed (%)	60.0	54.0	5.9	0.000
Months employed	1.7	1.5	0.2	0.000
Benefits (NZ$)	429.3	250.0	179.3	0.000
Any benefits (%)	10.5	6.4	4.1	0.000

Notes: This table compares labour market outcomes of victims (column 1) and non-victims (2) five quarters before participation in the NZCVS. Column 3 shows the difference between groups, Column 4 shows the p-value testing the equality of the outcomes. The estimates are based on weighted data to account for the survey design (see Ministry of Justice, 2019a).

Table 4 summarises the labour market outcomes and shows that five quarters before participating in the survey, victims have $835 higher earnings and a six percentage point higher employment rate compared to non-victims. This can likely be attributed to the fact that, on average, non-victims are five years older and are, therefore, more likely to have exited the labour market.

Figure 1 shows that level of employment is relatively stable over the period from five quarters before to five quarters after the NZCVS interview. Thus, victims have a higher employment rate throughout the analysed time period. While the share of employed victims stays close to 60 %, those of non-victims seems to increase slightly from 54 % before to 55 %

five quarters after the interview. Figure 2 also shows that victims have higher earnings compared with non-victims. For both groups, however, earnings tend to increase over time.

For the smaller sample of respondents from NZCVS cycles 1 and 2, who we can track over an extended time period, Figures A.16 and A.17 in the appendix reveal similar trends. Over the three years preceding the survey and the subsequent three years, the employment rate and earnings of victims exceed those of non-victims.

We also find that victims receive higher benefit payments. The share of recipients is 10.5 % among victims and only 6.4 % among non-victims. These benefits include all taxable working-age welfare payments from the Minstry of Social Development (sometimes called main benefits) such as Jobseeker Support, Sole Parent Support, and Supported Living Payment. While it may seem counter-intuitive that victims have both higher average earnings and higher benefit payments than non-victims, this is likely because more non-victims do not qualify for working-age benefits and instead receive NZ Superannuation, and/or that victims are more likely to have dependent children, given the younger average age of victims. Figure 3 shows that the higher benefit receipt for victims is persistent throughout the period examined (from five quarters before to five quarters after the survey). For both groups, the average amount of benefit receipt tends to increase over time. Figure A.18 in the appendix shows similar trends in the yearly analysis of respondents from NZCVS cycles 1 and 2, suggesting an even stronger increase in the years after the survey.

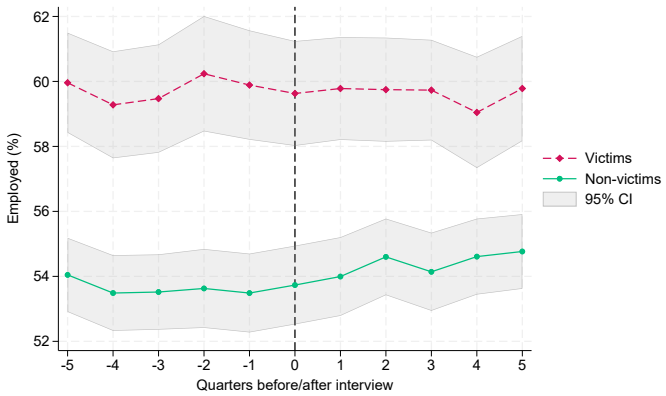

Figure 1: Percentage of employed victims and non-victims

Table 5 compares health outcomes of victims and non-victims five quarters before participation in the NZCVS. Victims have a higher injury rate (+ 2.2 percentage points) and more visits to emergency departments (+ 0.8 percentage points). In contrast, there are no statistically significant differences with respect to hospitalisations and other outpatient visits.

Figures 4 and 5 take a closer look at injuries and emergency department visits by following victims and non-victims over time. For both health outcomes, we find higher rates among victims for the entire analysed time period five quarters before to five quarters after the NZCVS interview. Interestingly, we find the highest rates of emergency department visits for victims in the quarters before the survey—during the time period where the reported victimisation occurs. For NZCVS cycle 1 and 2 respondents, Figures A.19 and A.20 in

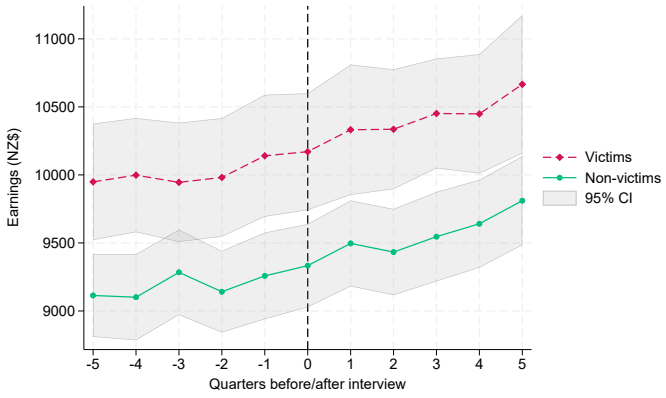

Figure 2: Earnings of victims and non-victims

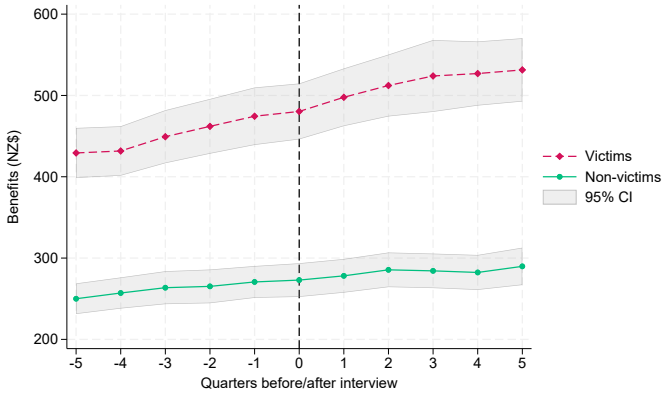

Figure 3: Benefit payments of victims and non-victims

the appendix show the same outcomes three years before to three years after the survey. Again, we find that both injury rates and emergency department visits are higher for victims throughout the observed time period. Similar to the quarterly analysis, we also find the highest percentage of injuries and emergency department visits in the year of the interview or the preceding year, which coincides with the time of victimisation.

Regarding mental health, Table 5 suggests that there are substantial differences before the victimisation reported in NZCVS occurred. About 13.5 % of victims have any mental health issue, compared with 11.5 % of non-victims. This broad indicator includes any mental health related drug prescription, hospital diagnosis, and any service or activity captured by the Ministry of Health's mental health and addiction information collection PRIMHD. The variable should therefore not be equated with a clinical diagnosis of a mental health issue. For example, many drugs that are classified under mental health are also used for other purposes. Figure 6 illustrates that a higher proportion of victims, compared with non-victims, experience mental health problems both before and after the interview. Additionally, it shows that the prevalence of mental health issues increases over time for both groups. Figure A.21 in the appendix shows similar trends for the time period three years before to three years after the interview.

Looking at mental health service use alone in Table 5 shows that victims significantly more likely (2.3 % vs. 1.4 %) to use services. We further analyse specific mental health

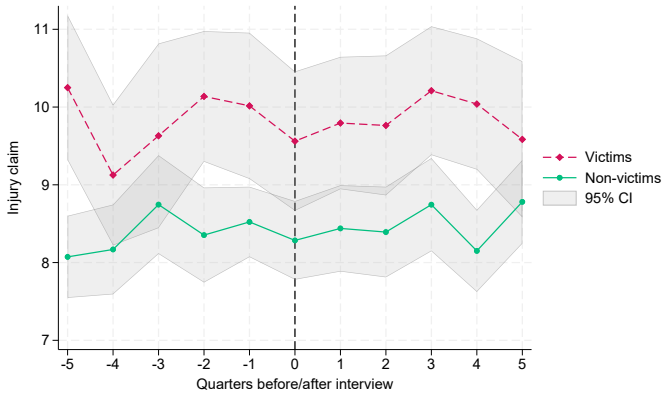

Figure 4: Percentage of victims and non-victims with injuries

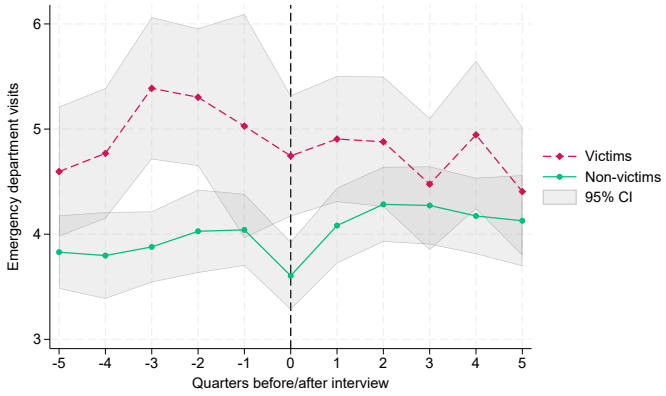

Figure 5: Percentage of victims and non-victims with emergency department visits

problems following the case identification of mental health problems in Bowden et al. (2020). It combines several data sources in the IDI to classify probable cases of mental health and related problems.[6] Due to the rarity of some mental health problems, we limit the analysis to the five most common problems. The comparison suggests that victims, even before the reported victimisation, suffer more often from specific mental health problems. There is a statistically significant difference for emotional problems (+1.6 percentage points), and substance abuse problems (+0.5 percentage points).

5 Method

The main challenge when analysing the effects of victimisation is endogeneity. Victimisation is not random in the population, so victims and non-victims can be expected to differ in observable and unobservable characteristics such as personality traits, social networks or risk preferences. These characteristics may also impact health and labour market outcomes.

The existing empirical literature on the causal effects of victimisation therefore relies on panel data with repeated observations on the same people (e.g., Bindler et al., 2020; Cornaglia et al., 2014; Johnston et al., 2018). This makes it possible to relate victimisation to changes

[6] A limitation is that Bowden et al. (2020) aimed at identifying problems in children and young people aged 0-24, while the NZCVS covers adults aged 15 and over.

Table 5: Health outcomes before victimisation

	(1) Victims	(2) Non-victims	(3) Difference	(4) p-value
Physical health (%)				
Injury claim	10.2	8.1	2.2	0.000
Hospitalisation	4.5	4.6	-0.0	0.940
Outpatient visit	15.5	14.7	0.8	0.247
Emergency department visits	4.6	3.8	0.8	0.036
Other outpatient visits	12.4	12.4	-0.0	0.974
Mental health indicators (%)				
Any mental health problem	13.5	11.5	2.0	0.001
Any mental health service use	2.3	1.4	0.9	0.000
Emotional problems	6.3	4.7	1.6	0.000
Depression	2.8	3.0	-0.2	0.526
Sleep problems	2.5	2.6	-0.1	0.836
Substance	0.9	0.4	0.5	0.000
Anxiety	1.4	1.0	0.3	0.052

Notes: This table compares health outcomes of (column 1) and non-victims (2) five quarters before participation in the NZCVS. Column 3 shows the difference between groups, Column 4 shows the p-value testing the equality of the outcomes. The estimates are based on weighted data to account for the survey design.

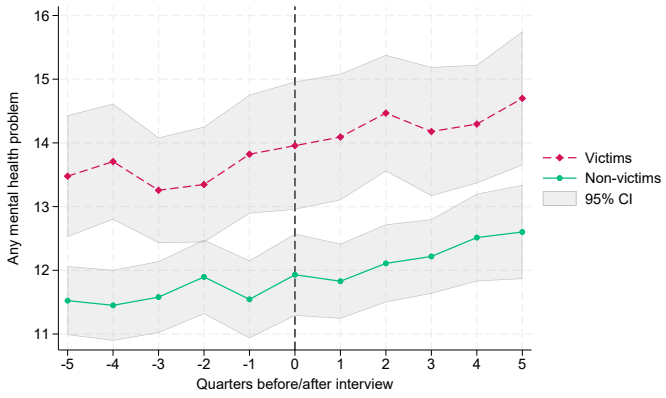

Figure 6: Percentage of victims and non-victims with mental health problems

in outcomes over time, which accounts for any time-invariant individual characteristics.

We follow this literature and use a difference-in-differences (DiD) approach to estimate the effects of victimisation, comparing changes in outcomes of victims to those of non-victims. Because we use multiple cycles of the NZCVS and victimisation occurs at different points in time, our setup corresponds to a staggered DiD where the treatment (victimisation) varies in time. Recent advances in econometric theory suggest that in such settings standard DiD regression often does not provide valid estimates of average treatment effects of interest when there is treatment effect heterogeneity (Roth et al., 2023). To address this issue, Callaway and Sant'Anna (2021) suggest an approach that estimates cohort-time-specific treatment effects: A cohort is the group of units that is treated in the same period:

$$ATT(g,t) = \mathbb{E}\left[Y_{i,t} - Y_{i,g-1} \mid G_i = g\right] - \mathbb{E}\left[Y_{i,t} - Y_{i,g-1} \mid G_i = g'\right],$$

where the expected change in outcome Y for unit i of cohort g (treated in period g) between periods $g-1$ and t is compared to the expected change in outcome of a control group g'. If victims have experienced multiple victimisations, we use the quarter of the first incident reported in the NZCVS as the treatment date. Callaway and Sant'Anna (2021) consider using only never-treated units or all not-yet-treated units as control groups. We use respondents who do not report any victimisation as the control group in our main analysis, and provide an alternative not-yet-victimised control group in a robustness check. With many cohorts and time periods, this approach results in many treatment effects, so the $ATT(g,t)$ can be aggregated in event-study parameters that provide average treatment effects at different periods after treatment, or an average treatment effect for the entire period.

Similar to the canonical DiD approach, the identifying assumption is that the treated and the control group would have followed parallel trends in absence of the treatment. Callaway and Sant'Anna (2021) further discuss an alternative conditional parallel trends assumption, and propose estimators that are valid conditional on observed covariates. Victims and non-victims differ markedly in observable characteristics such as age, which has a large impact on individual labour market trajectories. We therefore use regression adjustment to control for age and sex in the main analysis, and provide alternative approaches in robustness checks.

We analyse three different types of victimisation. The first and largest group is those who experience any form of victimisation. Second, we analyse victims of interpersonal violence, as this type of crime is particularly interesting due to its potentially higher individual consequences compared with other forms of victimisation. Third, we use the self-perceived seriousness of the incidents, and analyse the effects of serious offences. As noted above, we classify incidents as serious if they are rated as 8 or higher on a scale ranging from 0 (not serious at all) to 10 (very serious). Victims are always compared to the same control group of respondents who did not report any victimisation.

6 Results

6.1 Effects on labour market outcomes

Table 6 summarises the average effects of victimisation on labour market outcomes. Being victimised (column 2) results in a \$126 drop in quarterly earnings. This is a small but statistically significant effect of 1.4 % compared to the average earnings before victimisation of \$9114 reported in Table 4. Columns 4 and 6 show that the effects are much larger when we consider victims of interpersonal violence and serious offence, where the average effect is \$429 (4.7 %) and \$238 (2.6 %). As these are average effects over five quarters after victimisation, the loss of earnings due to interpersonal violence would accumulate to more than \$2100 (5 $\times$ \$429) over this period. We also find negative effects on employment and the number of months employed, although the point estimates are not always statistically significant at the 5% level. For example, a serious offence leads to a decrease in employment of 1.3 percentage points.

The decline in earnings and employment is mirrored by an increase in benefit receipt.

Being a victim of any crime leads to an average increase of $28 in quarterly benefit receipt, which is a 6.5 % increase compared with the average benefit receipt before victimisation ($429, Table 4). Again, we find larger effects for victims of interpersonal violence ($86) and serious offences ($56). All analysed types of victimisation also increase the probability to receive any benefits.

Table 6: Labour market - average effects

	Victim		Interpersonal vio.		Serious offence	
	(1) Pre-trend p-value	(2) Estimate (S.E)	(3) Pre-trend p-value	(4) Estimate (S.E)	(5) Pre-trend p-value	(6) Estimate (S.E)
Earnings	0.543	-126.2 (61.9)**	0.308	-428.7 (132.8)***	0.551	-237.8 (73.0)***
Employed	0.087	-0.004 (0.003)	0.244	-0.011 (0.006)*	0.751	-0.013 (0.005)***
Months employed	0.889	-0.018 (0.008)**	0.344	-0.038 (0.017)**	0.580	-0.044 (0.013)***
Benefits	0.519	27.6 (8.0)***	0.874	86.2 (20.4)***	0.278	55.6 (15.8)***
Any benefits	0.315	0.004 (0.002)**	0.858	0.014 (0.005)***	0.923	0.012 (0.003)***

Notes: This table summarises effects of different types of victimisation on labour market outcomes. Each cell in columns 2, 4, and 6 shows the aggregated average treatment effect from a separate DiD model, where the treatment is either any victimisation (column 2), victim of interpersonal violence (4), and victim of a serious offence (6). The different outcome variables are indicated on the left. Columns 1, 3, 5 provide a test of the parallel trend assumption by showing the p-value of a joint test on the significance of the pre-treatment coefficients. N=26,580. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Estimates are based on unweighted data (see 'Robustness check' subsection below for estimates based on weighted data).

Figures 7, 8 and 9 show the dynamic effects of victimisation on earnings and benefit receipt in the form of event-study plots. Here, the cohort-time-specific treatment effects are aggregated to parameters at different periods relative to the victimisation (four quarters before to four quarters after the quarter of victimisation) to analyse how the impact evolves over time. For victims of any crime, Figure 7 shows that earnings already decrease in the quarter of victimisation, but are only statistically significant in the next quarter. The effect on earnings is similar in the subsequent quarters, although the point estimates are not statistically significant at the 5 % level in the last two quarters. In contrast, the effect of victimisation on benefit receipt tends to increase over time and is largest four quarters after victimisation (with around $40).

Figure 7 further suggests that there are similar trends in earnings and benefits between victims and non-victims before victimisation. None of the pre-treatment effects is statistically significant. Columns 1, 3, and 5 in Table 6 also provide the p-value of a joint test of these coefficients and shows that they are not statistically significant. This finding supports the validity of the identification assumption of parallel trends, and suggests that the documented changes in earnings and benefits are actually caused by the victimisation experience.

Figures 8 and 9 show dynamic effects for victims of interpersonal violence and serious offences. As with the average treatment effects in Table 6, we find larger impacts for these types of victimisation. The results suggest that the decrease in earnings and increase in

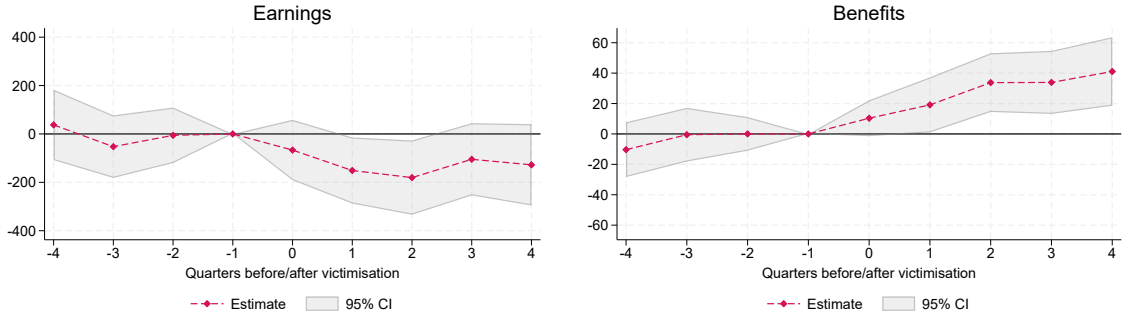

Figure 7: Dynamic labour market effects - any victimisation

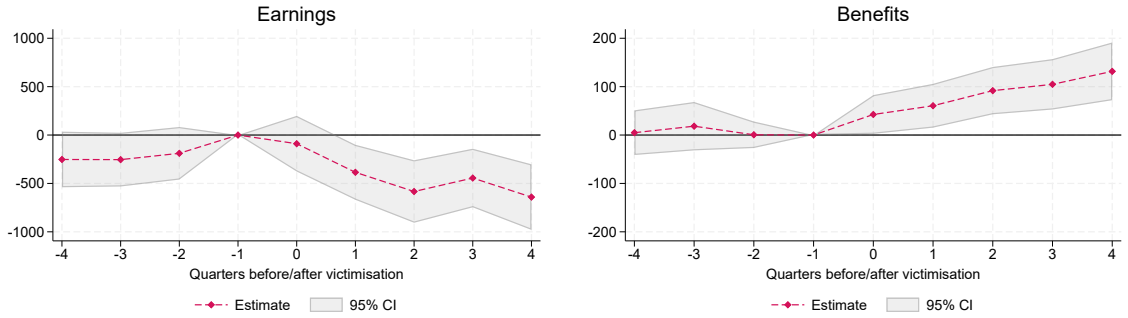

Figure 8: Dynamic labour market effects - interpersonal violence

benefit receipt are persistent, with effects being statistically significant 4 quarters after the quarter of victimisation.

Robustness checks We explore various alternative empirical methods to assess the robustness of these findings. We first experiment with variations of the Callaway and Sant'Anna (2021) DiD estimator. Table 7 summarises the corresponding results for the effects of serious offences. In our baseline regressions, we do not use the sampling weights provided in the NZCVS. Solon et al. (2015) discuss the question whether to apply weighting when the purpose is to estimate causal effects (instead of descriptive statistics). They note that weighting does not usually mean that an estimate represents the population average effect, and recommend to contrast between weighted and unweighted estimates. Table 7 compares the results using sampling weights (column 2) to the baseline results (column 1) and shows

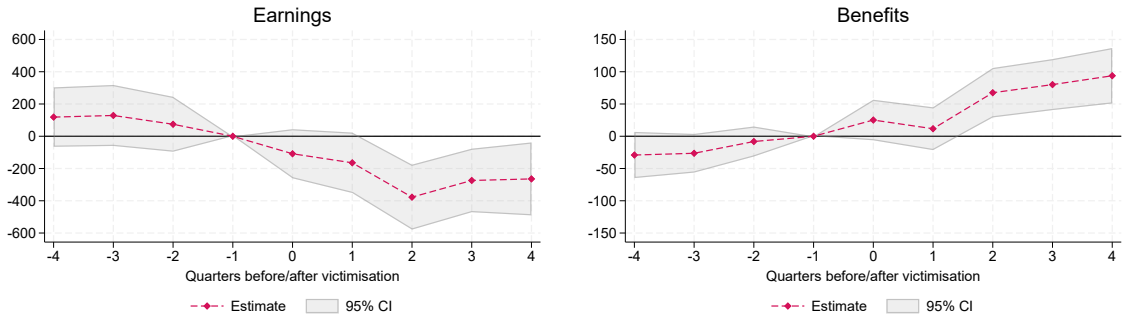

Figure 9: Dynamic labour market effects - serious offence

Table 7: Robustness checks for labour market outcomes after serious offences

	(1) Baseline results	(2) Sampling weights	(3) Balanced panel	(4) Doubly robust	(5) Victims only
Earnings	-237.8	-271.8	-226.3	-239.5	-747.4
	(73.0)***	(118.0)**	(78.8)***	(73.0)***	(478.4)
Employed	-0.013	-0.020	-0.015	-0.014	-0.031
	(0.005)***	(0.006)***	(0.005)***	(0.005)***	(0.020)
Months employed	-0.044	-0.058	-0.048	-0.045	-0.092
	(0.013)***	(0.018)***	(0.014)***	(0.013)***	(0.069)
Benefits	55.6	58.5	58.1	55.0	277.4
	(15.8)***	(15.0)***	(18.1)***	(15.8)***	(153.6)*
Any benefits	0.012	0.013	0.015	0.012	0.062
	(0.003)***	(0.004)***	(0.004)***	(0.003)***	(0.033)*

Notes: This table summarises various robustness tests. Each cell shows the aggregated average effect of a serious offence from a separate DiD model. Column 1 reproduces the baseline results. Column 2 uses person weights to account for the non-random sampling in NZCVS. Column 3 restricts the analysis to a balanced panel of individuals who are observed in each quarter. Column 4 applied the doubly robust estimation method of Callaway and Sant'Anna (2021). Column 5 excludes non-victims and compares victims to those who are victimised at a later date. The different outcome variables are indicated on the left. $^{*}\, p < 0.1$, $^{**}\, p < 0.05$, $^{***}\, p < 0.01$.

that results are very similar in terms of statistical and economic significance. In column 3, we restrict the sample to a balanced panel of observations that are in the analysis data set in each quarter in order to rule out compositional changes of the sample. Again, the point estimates are very similar to the baseline results.

Column 4 of Table 7 shows the results when we implement the doubly robust DiD estimator by Callaway and Sant'Anna (2021). While the regression adjustment used in the baseline model relies on a correct specification of the outcome evolution of the comparison group, the doubly robust approach additionally models the propensity score, i.e. the conditional probability of being in the treatment group based on observable characteristics. The doubly robust estimator is valid if either the outcome model or the propensity score model is correctly specified. Column 4 suggests that the estimates are very similar compared to the baseline results. Column 5 excludes non-victims from the analysis and compares victims to those who are victimised at a later date. Here, the estimates point in the same direction as the baseline results, but none of the effects are statistically significant at the 5 % level, which could be related to the smaller sample size in this approach.

Furthermore, we check the robustness of our findings when using two different estimation approaches. Borusyak et al. (2024) propose a 'imputation' DiD estimator that imputes untreated potential outcomes for each treated observation to derive treatment effects for each treated unit. Similar to the Callaway and Sant'Anna (2021) approach, these treatment effects can be aggregated to various summary parameters. We apply this estimator and incorporate unit-specific time trends to address disparities in age between victims and non-victims, as these age differences influence individual labour market trajectories. We also adopt a more traditional approach that combines matching with DiD. Here, our treatment group consists of all victims, and we construct a control group of non-victims with similar

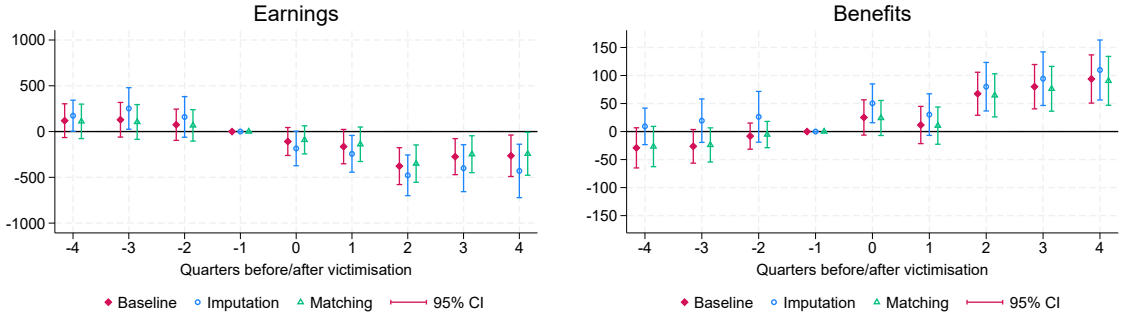

Figure 10: Different estimation approaches for labour market effects after serious offences

characteristics via nearest neighbour (1:1) matching using the Mahalanobis distance. As individual characteristics we include sex, age, ethnicity, deprivation score, date and time of the interview. We then estimate a dynamic DiD model using only the matched sample.

Figure 10 shows corresponding estimates for the effects of serious offences on earnings and benefits. We find similar patterns for the imputation approach and the matching approach compared to the baseline results. Victimisation leads to a decrease in earnings. The point estimates are statistically significant from the second quarter after victimisation onwards for all three approaches. The imputation estimator points towards statistically significant effects already in the first quarter after victimisation. Likewise, each estimation approach shows an increase in the benefit receipt.

To sum up, these sensitivity checks demonstrate the robustness of our results across different estimation approaches. While the similarity in effects is not entirely unexpected, given that all methods employed rely on some form of the conditional parallel trends assumption, the consistency of findings strengthens our confidence in the results.

Longer-term effects Our analysis thus far has utilised data from the first four cycles of the NZCVS matched to administrative data. To complement this, we conduct an additional analysis focusing solely on respondents from the first two cycles, allowing us to track victims and non-victims over an extended time frame. We use the same DiD method as above and outlined in Section 5, but this time based on a yearly (instead of a quarterly) panel to estimate effects from three years before to three years after the year of the victimisation. We restrict the discussion to the aggregated event-study parameters to assess potential dynamic effects over the medium term.

Figure 11 shows the effects of victimisation on earnings and benefit receipt. While we do not find statistically significant effects on earnings for this sample, the receipt of benefit income increases from year one onwards. By the third year, this increase amounts to $240. This is an increase of approximately 16 % compared to the average yearly benefits before victimisation of $1500 (Figure A.18).

We also analyse the longer-term effects for victims of interpersonal offences and serious offences. Analogous to the short-term analysis, we find substantially larger effects for these offences. The yearly benefit receipt increases up to $390 (interpersonal violence) $480 (serious offences) after victimisation. For serious offences, we also find significant effects on earnings,

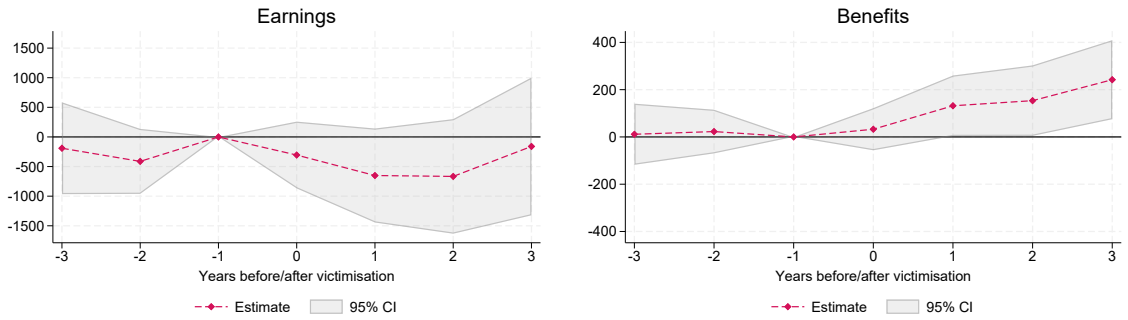

Figure 11: Longer-term labour market effects - any victimisation

which decrease by $2500 in the third year after victimisation (see Figure A.22 and Figure A.23 in the appendix).

Overall, the results of the longer-term effects are consistent with the quarterly analysis using the first four cycles of the NZCVS. However, the estimates are less precise due to the smaller sample size.

6.2 Effects on health outcomes

Table 8 summarises the average effects on health outcomes. Victimisation leads to an increase in injury claims. There is a one percentage point increase in the probability of having an injury claim per quarter, which is equivalent to a 10 % increase compared to the quarterly pre-victimisation mean of 10.2 % (Table 5). For interpersonal violence and serious offences, we also find positive point estimates, but the effect is only statistically significant for serious offences.

Figures 12, 13, and 14 show the dynamic effects. For victims of interpersonal violence and serious offences, the probability of an injury claim increases markedly in the quarter of victimisation, and there is no statistically significant effect in the subsequent quarters. A plausible explanation for the immediate effects is that the victimisation lead to some form of physical harm which then resulted in subsequent injury claims. For any victimisation, the effect seems to be smaller in size but more persistent.

For the remaining health outcomes, Table 8 shows mixed findings. We find a significant increase in hospitalisations after serious offences, and an increase in outpatient visits for interpersonal violence victims. Outpatient visits can be further divided into emergency department visits and other visits, and we find that this increase is driven by emergency department visits.

With regard to mental health, the DiD results suggest no changes after victimisation. For the general indicator of any mental health problem, as well as for the five analysed specific mental health problems, the point estimates are small and statistically insignificant.

Some effects of victimisation, especially related to mental health, may only materialise in the long term and not be visible in the short-term analysis. As for the labour market outcomes, we therefore utilise solely respondents from the first two NZCVS cycles who we can follow over an extended time frame.

Table 8: Health - average effects

	Victim		Interpersonal vio.		Serious offence	
	(1) Pre-trend p-value	(2) Estimate (S.E)	(3) Pre-trend p-value	(4) Estimate (S.E)	(5) Pre-trend p-value	(6) Estimate (S.E)
Injury claim	0.323	0.010 (0.003)***	0.586	0.005 (0.007)	0.592	0.012 (0.006)**
Hospitalisation	0.153	0.001 (0.002)	0.771	-0.007 (0.005)	0.155	0.009 (0.004)**
Outpatient visit	0.426	0.005 (0.004)	0.222	0.018 (0.008)**	0.503	0.006 (0.007)
Emergency department visits	0.244	0.005 (0.003)*	0.627	0.004 (0.006)	0.820	0.006 (0.005)
Other outpatient visits	0.304	0.004 (0.003)	0.227	0.017 (0.007)**	0.241	0.004 (0.006)
Any mental health problem	0.057	0.004 (0.002)	0.292	0.000 (0.006)	0.595	0.004 (0.004)
Emotional problems	0.240	0.001 (0.002)	0.726	0.004 (0.004)	0.751	-0.000 (0.003)
Depression	0.623	0.001 (0.001)	0.760	-0.001 (0.003)	0.326	-0.000 (0.002)
Sleep problems	0.247	0.000 (0.001)	0.805	-0.002 (0.003)	0.357	0.002 (0.002)
Substance	0.464	0.001 (0.001)	0.933	0.002 (0.002)	0.517	0.001 (0.002)
Anxiety	0.199	0.000 (0.001)	0.264	-0.001 (0.002)	0.048	-0.001 (0.002)

Notes: This table summarises effects of different types of victimisation on health outcomes. Each cell in columns 2, 4, and 6 shows the aggregated average treatment effect from a separate DiD model, where the treatment is either any victimisation (column 2), victim of interpersonal violence (4), and victim of a serious offence (6). The different outcome variables are indicated on the left. Columns 1, 3, 5 provide a test of the parallel trend assumption by showing the p-value of a joint test on the significance of the pre-treatment coefficients. N=26,580. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Estimates based on unweighted data.

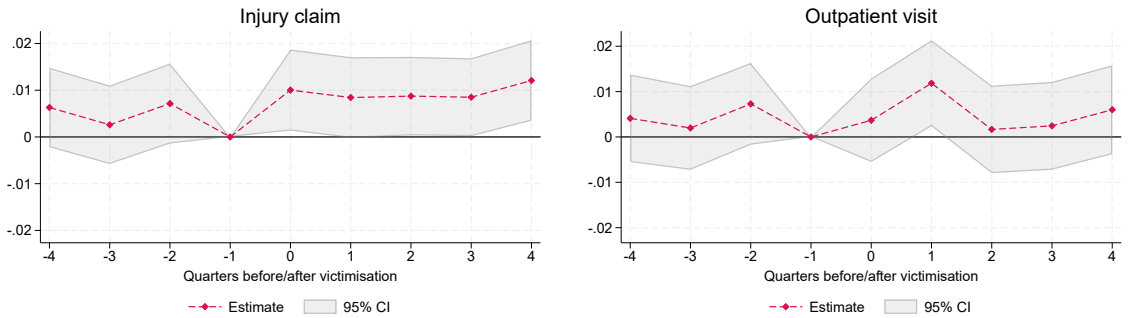

Figure 12: Dynamic health effects - any victimisation

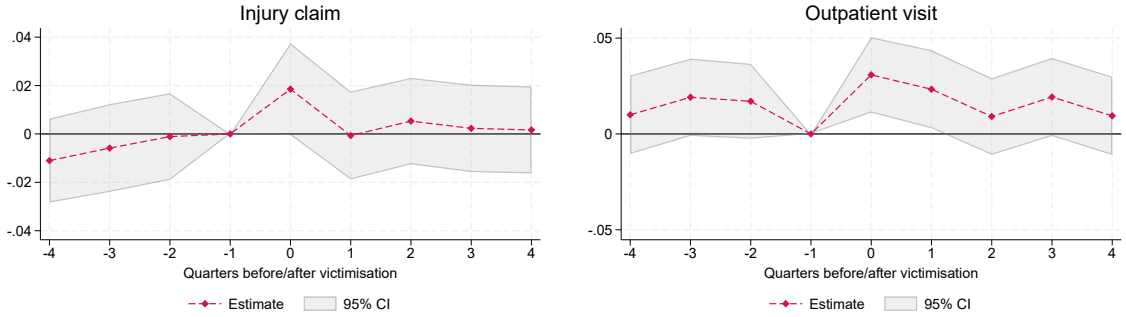

Figure 13: Dynamic health effects - interpersonal violence

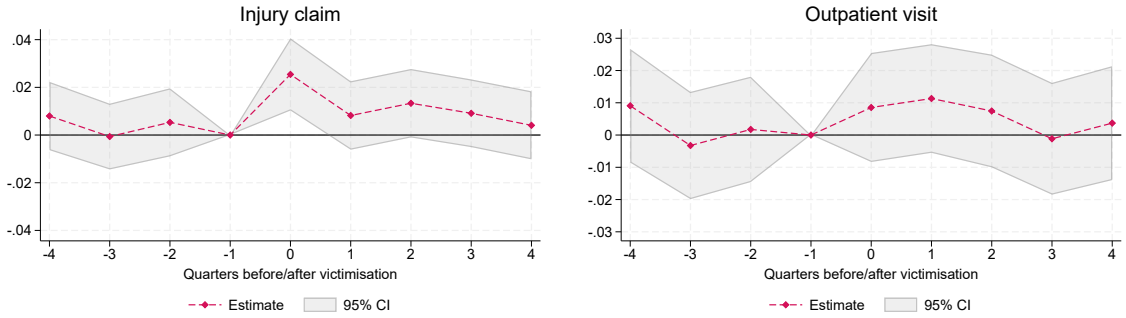

Figure 14: Dynamic health effects - serious offence

Figure 15 show the dynamic effects for victims of any offence for the four main health outcomes. There is no statistically significant effect on the probability to have injury claims, outpatient visits, mental health problems, and hospitalisation. The results are similar when we analyse the effects of interpersonal violence and serious offences (Figure A.25 and A.24 in the appendix). The exception is a statistically significant increase in mental health problems after serious offences in the year of the victimisation and the subsequent year by around two percentage points. In years two and three, the point estimates are again not statistically significant.

6.3 Effect heterogeneity

We begin by analysing differences in the consequences of victimisation related to gender, as previous research indicates that women and men experience different types of victimisation. Table 9 shows average treatment effects for female and male victims separately. While effects are similar for serious offences, we find significantly larger effects for male victims of interpersonal violence. For general victimisation, there is no statistically significant effect on female earnings. In contrast, we find an increase in benefits for both sexes and all types of victimisation, and the effects are similar for male and female victims.

Regarding health outcomes, we find an increase in injury claims for male victims The effects for serious offences is only statistically significant at the 10 % level. For female victims, we find an increase in outpatient visits after interpersonal violence incidents, and an increase in hospitalisations after serious offences. Again, we do not find any statistically significant effect on mental health problems.

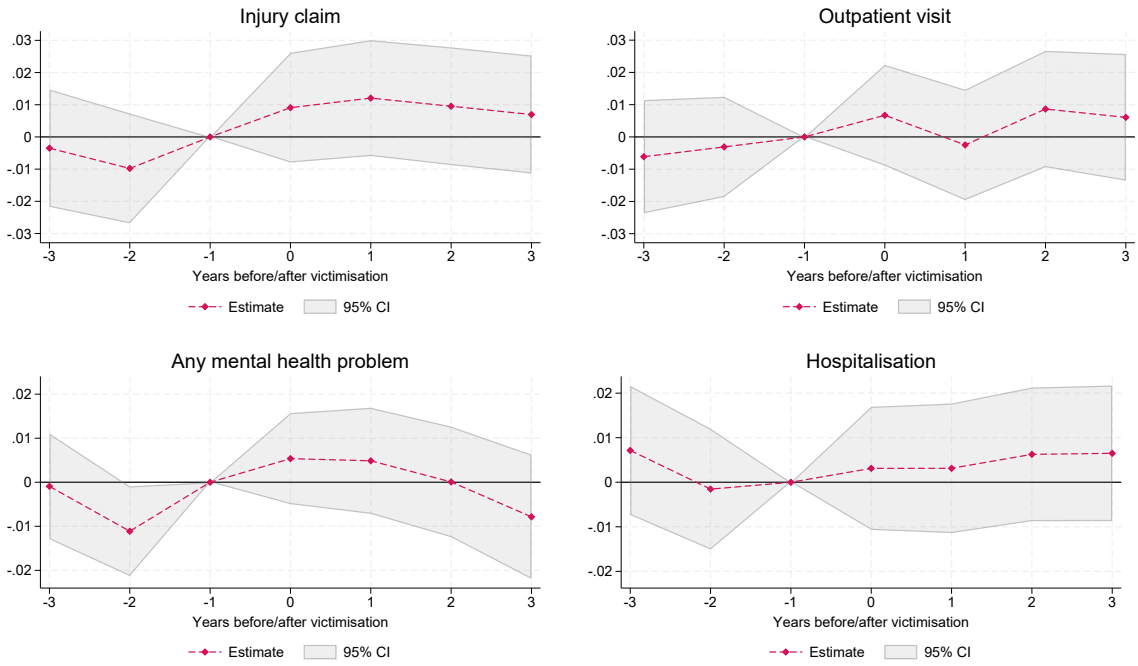

Figure 15: Longer-term health effects after any victimisation

Table 9: Effect heterogeneity: average effects for female and male victims

	Victim		Interpersonal vio.		Serious offence	
	(1) Female	(2) Male	(3) Female	(4) Male	(5) Female	(6) Male
Labour market outcomes						
Earnings	-35.0	-248.4	-270.7	-674.2	-239.1	-231.8
	(59.1)	(122.7)**	(111.5)**	(295.3)**	(84.4)***	(134.9)*
Employed	0.000	-0.010	-0.003	-0.022	-0.011	-0.016
	(0.004)	(0.004)***	(0.007)	(0.010)**	(0.006)*	(0.007)**
Benefits	28.7	26.1	98.1	67.3	57.2	52.8
	(11.9)**	(9.6)***	(27.0)***	(30.9)**	(22.1)***	(20.3)***
Health outcomes						
Injury claim	0.006	0.014	0.009	-0.000	0.009	0.016
	(0.004)	(0.005)***	(0.009)	(0.012)	(0.007)	(0.009)*
Outpatient visit	0.003	0.008	0.021	0.013	0.006	0.005
	(0.005)	(0.006)	(0.011)**	(0.012)	(0.009)	(0.011)
Hospitalisation	0.002	0.001	-0.010	-0.001	0.012	0.005
	(0.004)	(0.003)	(0.008)	(0.008)	(0.006)**	(0.007)
Any mental health problem	0.006	-0.000	0.001	-0.001	0.004	0.005
	(0.004)*	(0.003)	(0.008)	(0.008)	(0.006)	(0.006)

Notes: This table compares effects for female and male victims. Each cell shows the aggregated average treatment effect from a separate DiD model, where the treatment is either any victimisation (column 1-2), victim of interpersonal violence (3-4), and victim of a serious offence (4-6). The different outcome variables are indicated on the left. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Effect heterogeneity: average effects for young and old victims

	Victim		Interpersonal vio.		Serious offence	
	(1) Old	(2) Young	(3) Old	(4) Young	(5) Old	(6) Young
Labour market outcomes						
Earnings	-147.7	-102.4	-793.1	-298.1	-7.3	-398.6
	(114.4)	(70.1)	(382.7)**	(113.0)***	(95.0)	(107.1)***
Employed	-0.003	-0.004	-0.018	-0.009	-0.004	-0.019
	(0.003)	(0.004)	(0.008)**	(0.008)	(0.006)	(0.007)***
Benefits	4.5	43.4	50.4	98.4	6.9	94.0
	(9.7)	(11.6)***	(34.6)	(25.0)***	(18.6)	(24.1)***
Health outcomes						
Injury claim	0.011	0.008	-0.003	0.008	0.012	0.012
	(0.005)**	(0.004)*	(0.014)	(0.008)	(0.008)	(0.008)
Outpatient visit	0.003	0.007	0.009	0.022	0.011	0.003
	(0.007)	(0.005)	(0.017)	(0.009)**	(0.011)	(0.009)
Hospitalisation	0.006	-0.002	-0.007	-0.006	0.008	0.011
	(0.004)	(0.003)	(0.011)	(0.006)	(0.007)	(0.006)**
Any mental health problem	0.002	0.005	-0.005	0.002	0.005	0.004
	(0.004)	(0.003)	(0.010)	(0.007)	(0.006)	(0.006)

Notes: This table compares effects for old and young victims. Each cell shows the aggregated average treatment effect from a separate DiD model, where the treatment is either any victimisation (column 1-2), victim of interpersonal violence (3-4), and victim of a serious offence (4-6). The different outcome variables are indicated on the left. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Age influences not only the types of experienced victimisation, but also the labour market trajectories and health status of people. We therefore also examine whether victimisation has different effects on young and old people. We classify people as young when they are below the age of 50 at the time of the interview, and label the residual group of people as old.

Table 10 shows that there significant labour market effects for both old and young victims, but there are some noticeable differences. Young victims suffer earnings losses after interpersonal violence incidents and serious offences. For older victims, we only find significant effects after interpersonal violence. Likewise, among young people, victimisation leads to an increase in the receipt of benefit income for all analysed types of victimisation. In contrast, there are no significant effects on benefits for older victims.

Effects on health outcomes are again less clear and often not statistically significant. For young victims, we do find increases in the probability of outpatient visits after interpersonal violence, and increases in hospitalisations after serious offences. For older victims, we find an increase in injury claims only for general victimisations.

We further investigate potential effect heterogeneity related to ethnicity in Table 11. We use the 'total response' approach where people with multiple ethnicities are included in all relevant categories. Regarding earnings, we find consistent negative effects for those of European ethnicity for all analysed victimisation types. As above, the impact of interpersonal violence and serious offences is larger than those for any victimisation. Effects for Māori, Pacific Peoples and Asians are not statistically significant, likely due to the smaller sample

sizes compared with Europeans.

We do find statistically significant increases for benefit receipt for all population groups except Pacific Peoples. For general victimisation, there are substantially larger effects for Māori and Asian victims compared with European victims. For interpersonal violence and serious offences, the effects tend to be more similar.

Again, we find fewer statistically significant effects among the analysed health outcomes. There is a consistent increase in injury claims for Asian victims for all analysed victimisation types. The effects are larger for interpersonal violence and serious offences compared with any victimisation. For European victims, there is a significant increase for any victimisation, but the effect is not statistically significant for the other victimisation types.

Table 11: Effect heterogeneity: average effects by ethnicity

	Victim				Interpersonal vio.				Serious offence			
	(1) European	(2) Māori	(3) Pacific P.	(4) Asian	(5) European	(6) Māori	(7) Pacific P.	(8) Asian	(9) European	(10) Māori	(11) Pacific P.	(12) Asian
Labour market outcomes												
Earnings	-153.3	-187.7	-13.5	-178.0	-423.2	-526.0	142.6	-480.7	-258.1	-130.6	-337.3	-394.3
	(76.3)**	(125.4)	(174.6)	(186.9)	(132.3)***	(271.8)*	(346.8)	(433.9)	(95.3)***	(114.2)	(211.8)	(290.5)
Employed	-0.004	-0.005	-0.011	-0.012	-0.009	-0.020	0.001	-0.008	-0.010	-0.012	-0.044	-0.003
	(0.003)	(0.005)	(0.012)	(0.009)	(0.007)	(0.010)*	(0.028)	(0.025)	(0.006)*	(0.008)	(0.017)***	(0.014)
Benefits	28.9	46.4	17.3	45.6	84.7	91.3	-96.2	108.5	63.2	69.4	6.4	38.7
	(9.1)***	(16.6)***	(44.8)	(16.3)***	(22.3)***	(38.7)**	(105.6)	(50.7)**	(20.2)***	(28.2)**	(66.1)	(22.1)*
Health outcomes												
Injury claim	0.012	0.006	-0.017	0.025	0.006	-0.010	-0.038	0.047	0.011	0.006	-0.028	0.040
	(0.004)***	(0.006)	(0.013)	(0.009)***	(0.009)	(0.012)	(0.028)	(0.023)**	(0.008)	(0.009)	(0.019)	(0.013)***
Outpatient visit	0.001	0.012	0.004	0.006	0.013	0.017	0.029	-0.014	0.004	0.006	0.003	0.002
	(0.005)	(0.007)*	(0.016)	(0.011)	(0.010)	(0.013)	(0.032)	(0.028)	(0.009)	(0.012)	(0.023)	(0.017)
Hospitalisation	0.000	0.000	0.005	0.002	-0.011	-0.011	0.010	-0.002	0.010	0.011	0.006	0.009
	(0.003)	(0.005)	(0.010)	(0.007)	(0.007)*	(0.009)	(0.022)	(0.014)	(0.006)*	(0.008)	(0.014)	(0.010)
Any mental health problem	0.002	0.005	-0.001	0.010	-0.002	0.012	0.003	-0.006	-0.004	0.005	-0.003	0.011
	(0.003)	(0.004)	(0.008)	(0.006)*	(0.007)	(0.009)	(0.021)	(0.013)	(0.006)	(0.007)	(0.012)	(0.010)

Notes: This table compares effects by ethnicity. Each cell shows the aggregated average treatment effect from a separate DiD model, where the treatment is either any victimisation (column 1-2), victim of interpersonal violence (3-4), and victim of a serious offence (4-6). The different outcome variables are indicated on the left. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

7 Conclusion

This paper uses the New Zealand Crime and Victims Survey (NZCVS) linked to Stats NZ's Integrated Data Infrastructure (IDI) to track individuals over time and compare the labour market and health outcomes of victims with non-victims. It adds to the limited empirical evidence on the cost of crime victimisation in terms of the subsequent outcomes of victims. To address possible endogeneity, it employs a difference-in-differences method whereby victims are compared with those who do not report any victimisation.

It finds that being victimised results in a statistically significant decrease in quarterly earnings of $126, or 1.4% compared to average earnings before victimisation. The effects are larger for victims of interpersonal violence (4.7%) and offences that the victim perceived as serious (2.6%). We also find negative effects on the employment rate and number of months employed. The decline in earnings and employment is mirrored by an increase in benefit receipt. Quarterly benefit payments rise by $28, representing a 6.5% increase compared to the pre-victimisation average of $429. The negative effects persistent even three years after the victimisation event.

In terms of health outcomes, victimisation leads to a 1 percentage point increase in injury claims per quarter, equivalent to a 10% rise, with the share of people reporting injury claims increasing from 10% to 11%. For victims of interpersonal violence and serious offences, the probability of an injury claim increases markedly in the quarter of victimisation, and there is no statistically significant effect in subsequent quarters. This likely reflect that victimisation leads to some form of physical harm which then results in an injury claim.

For other health outcomes, the findings are mixed. There is an increase in hospitalisations after serious offences and an increase in emergency department visits for victims of interpersonal violence. For mental health outcomes, the results are generally not statistically significant. However, an exception is that the longer-term analysis which follows people for four-years after victimisation shows that there is a statistically significant increase in mental health problems after serious offences in the first two years after victimisation.

This project is a first step to understanding the costs of victimisation in New Zealand in terms of the subsequent labour market and health outcomes of victims. Future work could explore other outcomes, such as educational outcomes for young victims. In addition, whether victimisation increases the probability of future victimisations could be examined, at least for reported victimisations, using police data.

One of the possible reasons why we found few effects on health could be because these are currently measured as binary outcomes. Future work could also examine the intensity of health service utilisation by, for example, considering the number of services accessed.

Another limitation of the current study is that past victimisations are not taken into account. Thus, future work could involve taking account of past reported victimisations (based on police data). Unfortunately, data limitations mean that we do not have information on whether victims experienced previous unreported victimisations. For example, in the alternative matching method we considered, the matching variables could be expanded to include past reported victimisations. Another possibility is to limit the analysis of victimisations,

particularly serious victimisations, to those for whom it is a first victimisation (i.e. those who do not have a previous police-reported victimisation).

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A Appendix

Table A.1: Characteristics of victims and non-victims in NZCVS cycles 1 and 2

	(1) Victims	(2) Non-victims	(3) Difference	(4) p-value
Age (years)	42.3	47.9	-5.6	0.000
Female (%)	52.3	50.8	1.5	0.225
Ethnicity (%)				
European	70.9	70.6	0.3	0.770
Māori	17.4	12.7	4.7	0.000
Asian	12.6	15.1	-2.6	0.008
Pacific peoples	6.5	6.6	-0.1	0.924
Other	2.0	2.0	0.0	0.990

Notes: This table summarises characteristics of victims (column 1) and non-victims (2) in NZCVS cycles 1 and 2. Column 3 shows the difference between groups, Column 4 shows the p-value testing the equality of the characteristics. The estimates are based on weighted data to account for the survey design (see Ministry of Justice, 2019a).

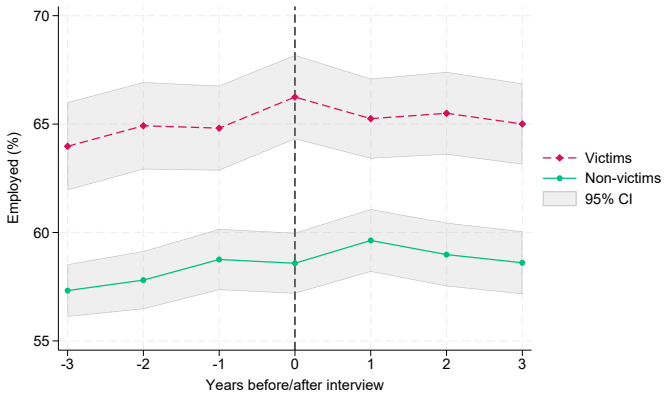

Figure A.16: Percentage of employed victims and non-victims

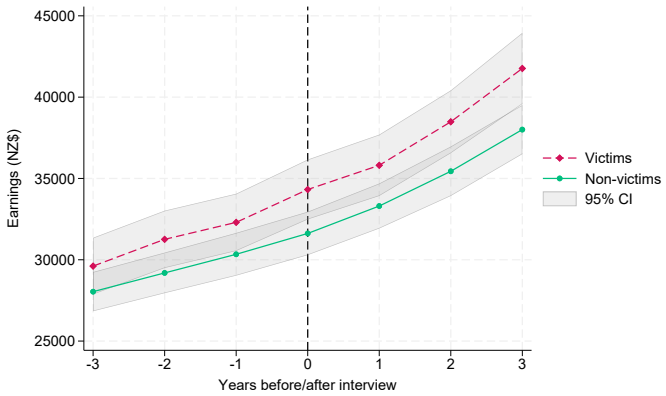

Figure A.17: Earnings of victims and non-victims

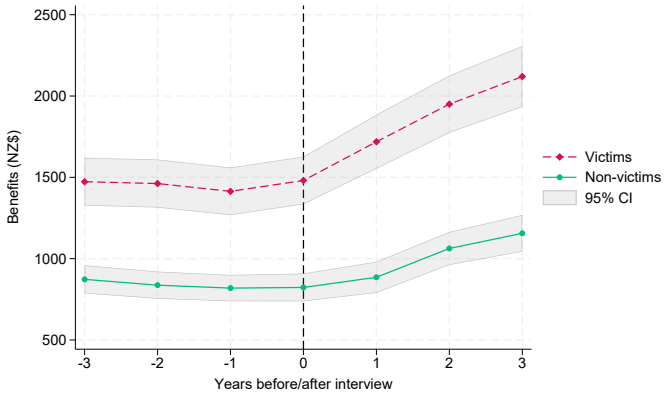

Figure A.18: Benefit payments of victims and non-victims

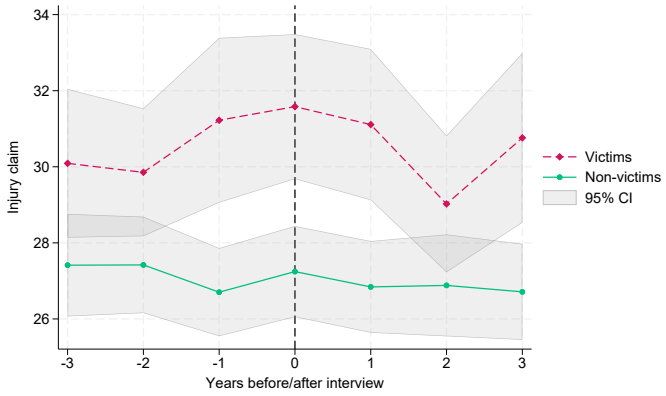

Figure A.19: Percentage of victims and non-victims with injuries

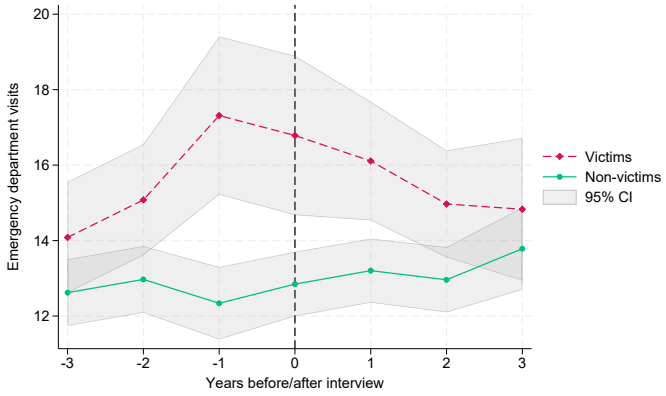

Figure A.20: Percentage of victims and non-victims with emergency department visits

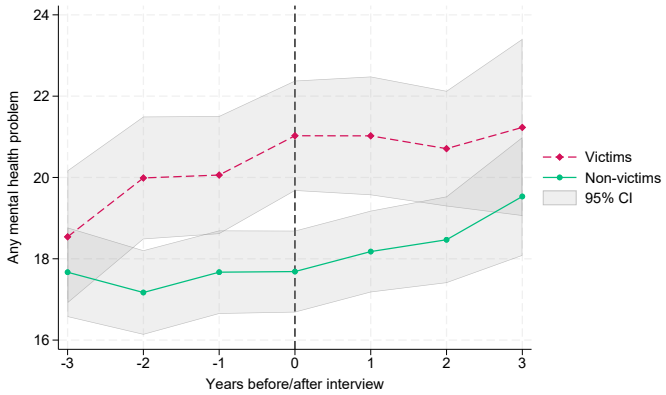

Figure A.21: Percentage of victims and non-victims with mental health problems

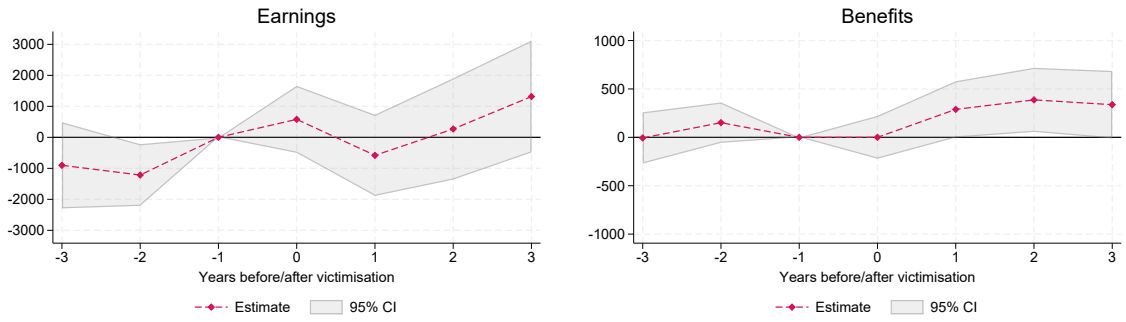

Figure A.22: Longer-term labour market effects - interpersonal violence

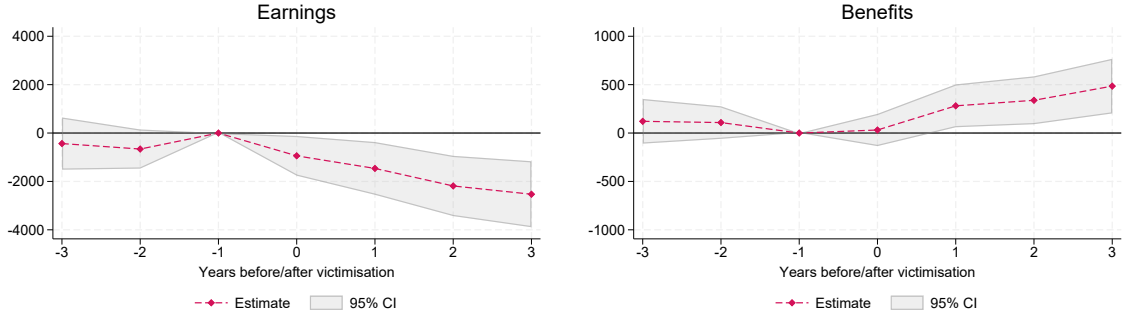

Figure A.23: Longer-term labour market effects - serious offence

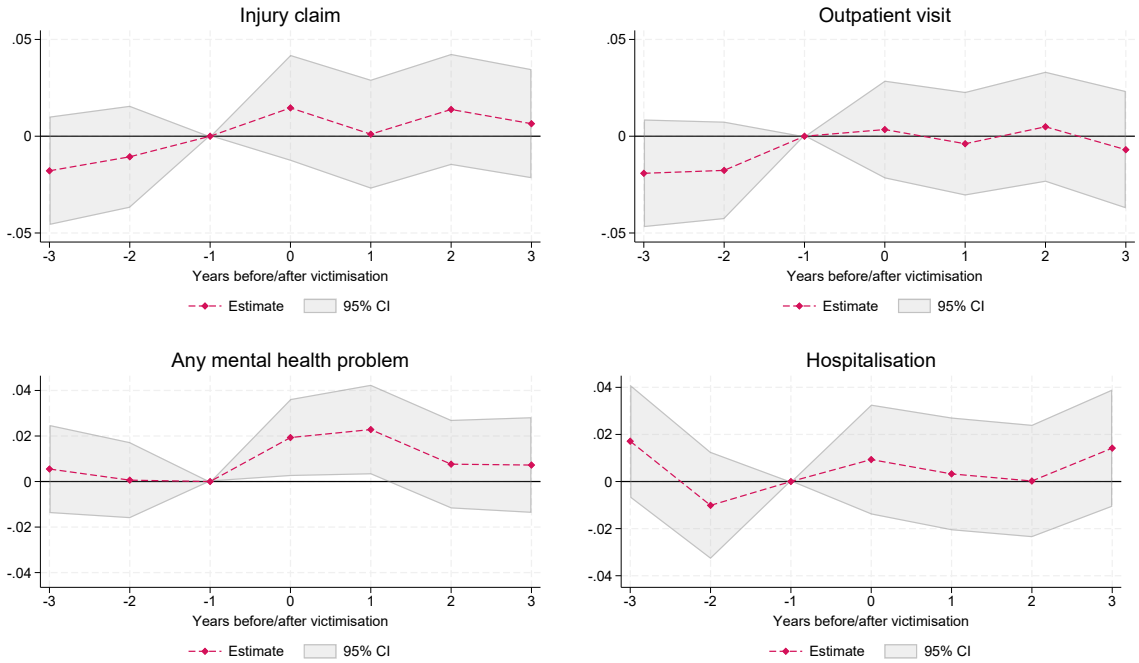

Figure A.24: Longer-term health effects after serious offences

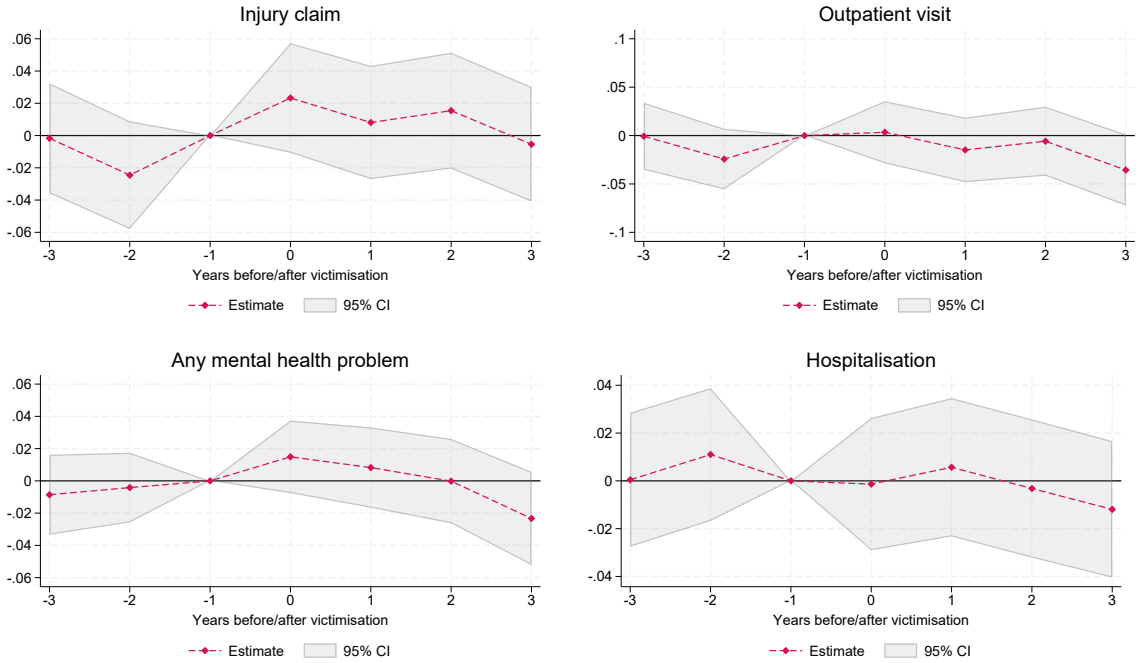

Figure A.25: Longer-term health effects after interpersonal violence

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