He Kaupare. He Manaaki.
He Whakaora.
prevention. care. recovery.

ACC Clients' Transition to MSD Benefits

Phase 2

Authors: Matt Poynton, Fiona Dempsey, Paul Berry & Adam Malanchak

Published: June 2022

Disclaimer – ACC:

The information in the ACC Clients' Transition to MSD Benefits Report available on or through the ACC website is intended to provide general information to the public on the scale of transition from Accident Compensation Corporation (ACC) Weekly Compensation (WC) to Ministry of Social Development (MSD) main benefit receipt and the factors that might influence it and all reasonable measures have been taken to ensure the quality and accuracy of the information published. However, ACC makes no warranty, express or implied, nor assumes any legal liability or responsibility for the accuracy, suitability, correctness, completeness or use of any information in the ACC Clients' Transition to MSD Benefits Report. Nothing contained in the ACC Clients' Transition to MSD Benefits Report is or shall be relied on as a promise or representation by ACC on any of the matters considered in the ACC Clients' Transition to MSD Benefits Report.

Information contained in the ACC Clients' Transition to MSD Benefits Report is current as at the date of the Report (June 2022) and may not reflect any event or circumstances which occur after the date of the Report.

The ACC Clients' Transition to MSD Benefits Report does not necessarily represent the official view of ACC or represent ACC policy.

Disclaimer – Statistics New Zealand:

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/.

Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers.

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.

Copyright:

Acknowledgements:

Thanks to the Modelling and System Analytics team at the Ministry of Social Development for their technical expertise and for peer-reviewing this report.

Contents

Background

One of the Accident Compensation Corporation's (ACC) long-term outcomes is to rehabilitate injured people in New Zealand more effectively. This includes supporting our clients who were in the workforce pre-injury, to return to work. In order to check progress against this outcome, ACC undertook research on the rate at which these clients transition from weekly compensation[a] (WC) to selected Ministry of Social Development (MSD) benefits (rather than return to work), and the factors that might influence this transition.

Understanding the rate of transition from WC to an MSD main benefit is important because prolonged absence from the workforce can have a detrimental effect, including on a person's confidence, skill, and motivation, and on prospective employers' perception of that person[1]. In New Zealand, quality, sustainable employment is associated with lower rates of poverty and higher rates of good financial and overall wellbeing[2].

Many people on a benefit face multiple barriers to finding and sustaining paid work, including loss of self-esteem, confidence and motivation, less employment history, lower qualifications, disadvantage during childhoodand, and a lack of appropriate employment for their skill set[3]. Māori, Pacific People, and people with health conditions and disabilities are more likely to face barriers[4].

Further, there is evidence of intergenerational effects. Research has found that 9 out of 10 individuals on a youth benefit were from families whose primary income was a benefit. Similarly, nearly three quarters (74%) of all beneficiaries up to age 25 had a parent on a benefit when they were a teenager[5] and long-term beneficiary families are 1.5 times more likely to have a history of youth justice or criminal convictions[6]. These results point to how improved employment outcomes for families today can lead to better outcomes for future generations.

Research investigating return to work outcomes[a] following injury has identified a variety of factors associated with individuals' successful or unsuccessful attempts to re-join the workforce. These factors can be roughly grouped into personal (eg, age, sex), work-related (eg, education, job type), and injury-related (severity, frequency) factors. This research adds to the body of knowledge by identifying which factors are more likely to affect individuals' transition from ACC WC to MSD main benefits.

Purpose

The purpose of this report is to investigate the rate at which ACC clients transition from WC to an MSD benefit between July 2011 to December 2021, whether there have been any changes (ie increases/ decreases) in this rate during this time period, and whether there are any differences in transition rates between subpopulations. This report also aims to identify factors that might influence the likelihood of transitioning from WC to an MSD benefit[b] and to determine whether existing ACC administrative data can be used to monitor the rate of transition.

[a] Outcomes following injury or illness describing the duration or extent to which an individual is consequently unable to work.

[b] The definition of MSD benefit in this report does not include payments made under the government's COVID-19 Wage Subsidy Scheme.

Four research questions were investigated:

1. How many people transition from ACC WC to main MSD benefits (Jobseeker Support[c]; Sole Parent Support[d]; Emergency Benefit[e]; Supported Living Payment[f]; Other[g], excluding pensions)?
    i. What are the trends in transition rates over a 10-year period (July 2011 to December 2021[h])?
    ii. Do these trends differ by sub-population? (Sub-population includes: ethnicity; gender; type of benefit; length of time on WC; type of work.)
2. What are the risk factors for transitioning from WC to MSD main benefit receipt?
3. What are the protective factors that prevent individuals from transitioning from WC to MSD main benefit receipt?
4. Do the findings of this research indicate the need to amend the questions in the ACC quarterly return to work survey (called the Outcomes After Injury Survey) to more effectively tap into the constructs underlying the factors correlated with transitioning from WC to MSD main benefit receipt?

Method

Factors associated with returning to paid work following injury were identified in a scan of the published literature. This scan was used to inform which variables would most likely influence the transition from WC to MSD main benefit receipt and were, therefore, included in the analysis. Please refer to Appendix A for the full list of variables included in the analysis.

Analysis was conducted in Statistics New Zealand's Integrated Data Infrastructure (IDI). We looked at ACC clients who ceased WC[i] in the 10-year period between July 2011 and June 2021 and followed up the next 6 months to see if they received an MSD benefit.

We conducted a logistic regression to investigate which factors were most strongly associated with transitioning from ACC WC to an MSD benefit, while controlling for other factors in the model. Please refer to Appendix B for a full description of the analysis.

---

[c] The Job seeker Support benefit is a weekly payment that supports people until they find paid employment. The Supported Living Payment benefit is a weekly payment to support people who have, or are caring for someone with, a significant health condition, injury, or disability meaning that suitable paid employment is unlikely within the next two years.

[d] Sole Parent Support has been included in this analysis on the advice of MSD staff. If ACC clients have primary care of a child under 14 when they leave WC and go on to receive a benefit, it's likely this would be Sole Parent Support rather than Jobseeker Support.

[e] Emergency Benefit is an income and asset tested benefit payable to people who are in hardship and who: are unable to earn enough income for themselves (and any dependent family) and cannot receive another benefit.

[f] The Supported Living Payment benefit is a weekly payment to support people who have, or are caring for someone with, a significant health condition, injury, or disability meaning that suitable paid employment is unlikely within the next two years.

[g] Other includes: Independent Youth Benefit; Jobseeker Student Hardship; Unemployment Benefit Student Hardship; Widows Benefit; Youth Payment or Young Parent Payment.

[h] The 10-year period refers to 10 years of people coming off ACC WC, and 6 months follow up for MSD benefits.

[i] Ceasing WC is defined as someone having at least 3 months since their last payment. Three months is the minimum amount of time in the IDI that we can confirm that someone hasn't been on WC, due to the data being summarised into 3-month blocks.

There are features of this work that limit the conclusions that can be drawn. The first limitation is the amount of available data in the IDI. Previous research has found a negative association between victimisation and re-entering the workforce following injury. We, therefore, intended to include victimisation as a variable in the analysis as this would have resulted in a more comprehensive model and potentially highlighted an area for future intervention and/or focus. However, New Zealand Police data was only available for part of the study period.

The second limitation is also related to data. This research relied upon existing administrative data. Using this data, our analysis revealed that we are unable to accurately predict who will transition from ACC WC to an MSD benefit. ACC's 'Measuring What Matters' (MWM) project gives us the opportunity to develop measures that are more closely aligned to the outcomes of ACC clients who receive WC and would, therefore, have greater predictive accuracy (MWM is described below).

Key Findings

The Transition Rate from ACC WCC to an MSD Main Benefit over a 10-year Period is Relatively Constant

Figure 1. *Proportion of ACC WC clients transitioning to an MSD benefit over a 10-year period*

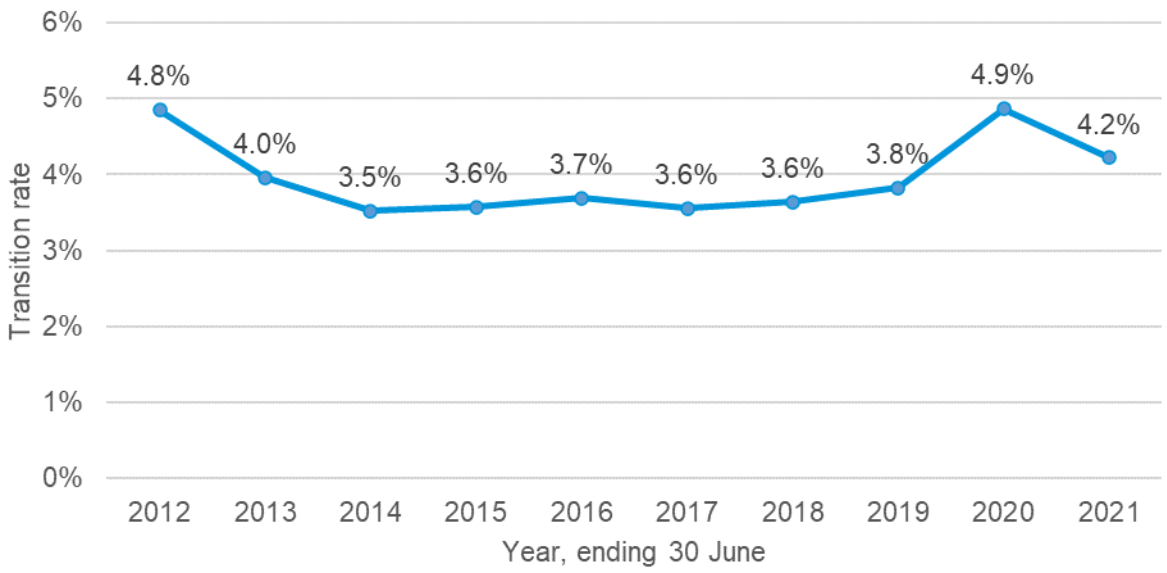


Figure 1 shows the rate of people transitioning from ACC WC to an MSD benefit is relatively stable at 3.6% between July 2013 to June 2019. The peaks in the graph at 2012 (4.8%) and 2020 (4.9%) may be due to welfare reform legislation (resulting in a fewer people on welfare from 2013) and economic impacts from the COVID-19 pandemic, though further analysis is needed to identify these as influencing factors. This results in an average rate of transition of 4% over the 10-year period (July 2011 to December 2021). This graph follows a similar trend to the business cycle since 2012.

A scan of the literature was conducted to investigate whether similar research on transitions from WC to main benefit receipt has been conducted in other countries to provide some context for the findings of this report. However, meaningful comparisons with other jurisdictions are not feasible due to the uniqueness of the ACC scheme.

The Transition Rate is Highest in the First 2 Weeks after Ceasing WC

Figure 2: *Rate of ACC WC clients transitioning to an MSD benefit over a two-year period*

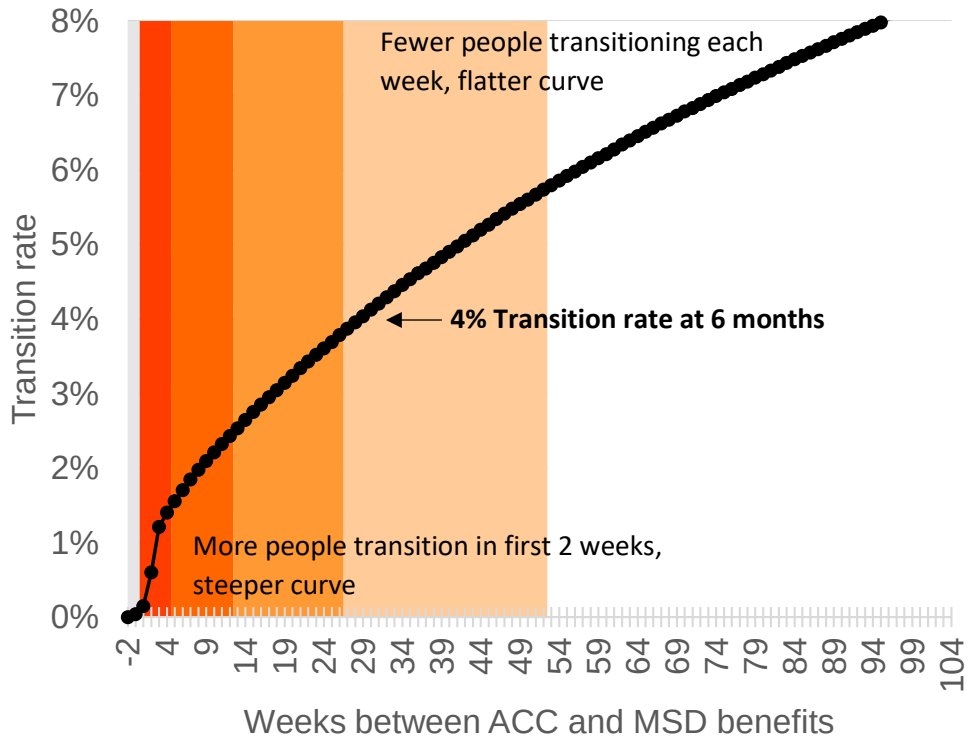


Figure 2 illustrates the rate of ACC clients transitioning to an MSD benefit. The cadence of the follow-up period from ceasing WC payments has an impact on the rate of transition, which is greatest in the first two weeks following the cessation of WC. However, the rate of people who transition from WC to an MSD main benefit each week decreases as the length of time since ceasing WC payments increases.

The rate of transition at 2 weeks following the cessation of WC payments is 1.2%. This rate doubles to 2.5% at 3 months (this rate is consistent with the range of 2.7% to 5.1% that MSD found at 3 months (unpublished analyses undertaken in 2016)).

The rate of transition at 6 months following the cessation of WC payments is 4% and is only 8% at 2 years following the cessation of WC payments.

The transition rate at 1 year follow-up in our analysis was 5.8% for the population coming off WC. This is lower than the annual transition rate of the working age population onto a main benefit (6.5%)[j]. We would expect that individuals, who have recently ceased receiving WC, would have a lower transition rate than the NZ working population as they are/have recently been employed (at point of injury), thus, reducing the likelihood of accessing an MSD main benefit. This finding suggests that transitions after one year of coming off the benefit are unlikely to be due to an increased risk caused by being on WC.

[j] Between 2012 and 2019, 2.9 million working-age New Zealanders started a Jobseeker Support, Sole Parent Support, Emergency Benefit, Supported Living Payment, or 'Other' benefit. This is an average of 190,000 individuals per year. Benefit reforms in 2013 resulted in MSD clients being moved onto different benefits, thus, inflating the number of new starts. This year was therefore excluded from calculations of the number of people in the general population transitioning to MSD benefits.

Please note, the findings in this report are based on the number of people who transition from ACC WC to MSD benefits, within 6 months of finishing WC[k].

Transition Rates Differ by Sub-Population

Type of benefit

Figure 3. *Proportion of ACC WC clients transitioning to an MSD benefit over a 10-year period, by MSD benefit type.*

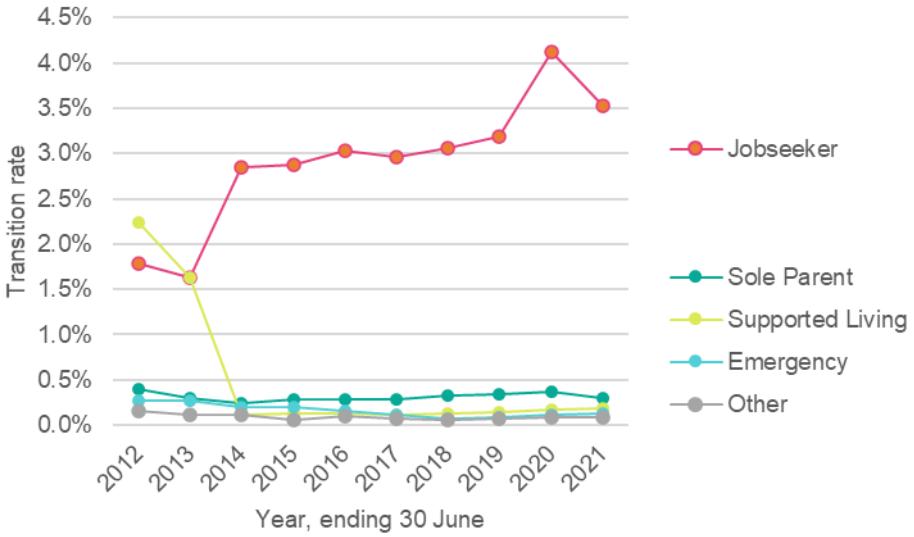


Figure 3 shows that most of the ACC WC clients who transitioned to an MSD benefit, went on to Jobseeker Payment. The fall in Supported Living and increase in Jobseeker Payment in 2013 can be explained by MSD welfare reforms in that year. The increased rate of people ceasing WC and starting Jobseeker Payments during 2020 is also seen in the general population; this steep increase can be explained by people losing their jobs due to the impact of COVID-19 on businesses.

[k] In Phase 1, we used a method that grouped the data into 3-month blocks. People were included in the analysis if they had up to one 3-month period without receiving either ACC WC or MSD Benefit; the resulting average follow-up period was 6 months. Further analysis conducted in Phase 2 of this project has confirmed that 6 months is an appropriate follow-up period.

Ethnicity

Figure 4. *Transition rates by ethnicity*

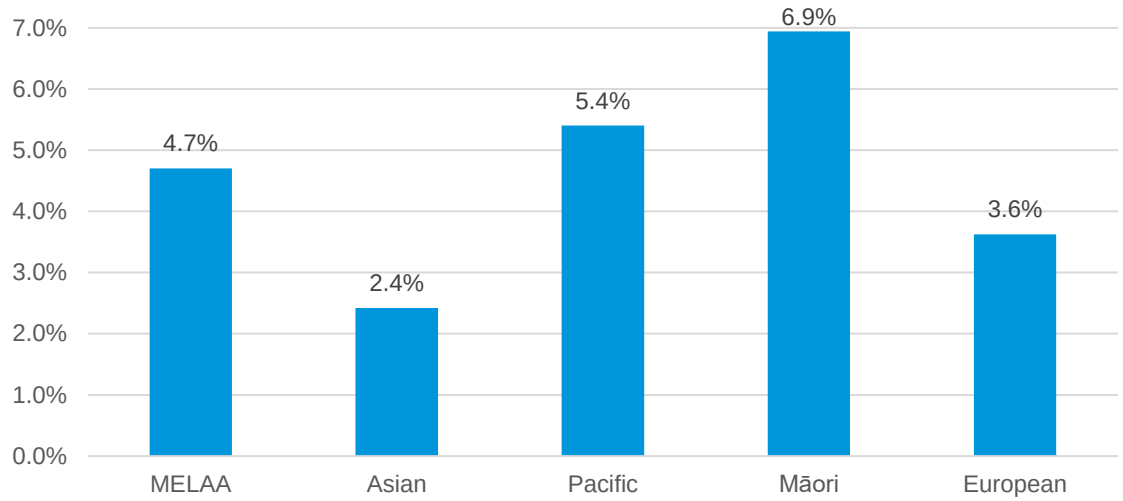


Figure 4 shows Māori have a higher incidence of transitioning from WC to MSD main benefit receipt than other ethnicities. This higher rate for Māori is reflected in all benefit categories but is highest for the Emergency Benefit. Asian peoples have the lowest incidence of transitioning in each of the five benefit categories, except the Emergency Benefit.

Sex

Figure 5. *Transition rates by sex*

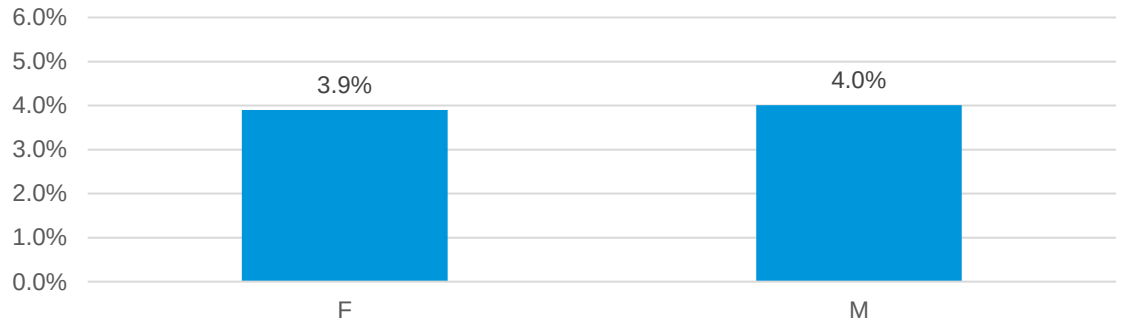


Figure 5 shows that male and female clients have approximately the same rate of transition, even though the total number of male clients on WC is approximately twice that of female clients. Transition to the Sole Parent Benefit is significantly higher for females (0.64% vs 0.15%); this difference is balanced by males being more likely to transition to Jobseeker Payment (3.20% vs 2.57%).

Age

Figure 6. *Transition rates by age (at claim lodgment)*

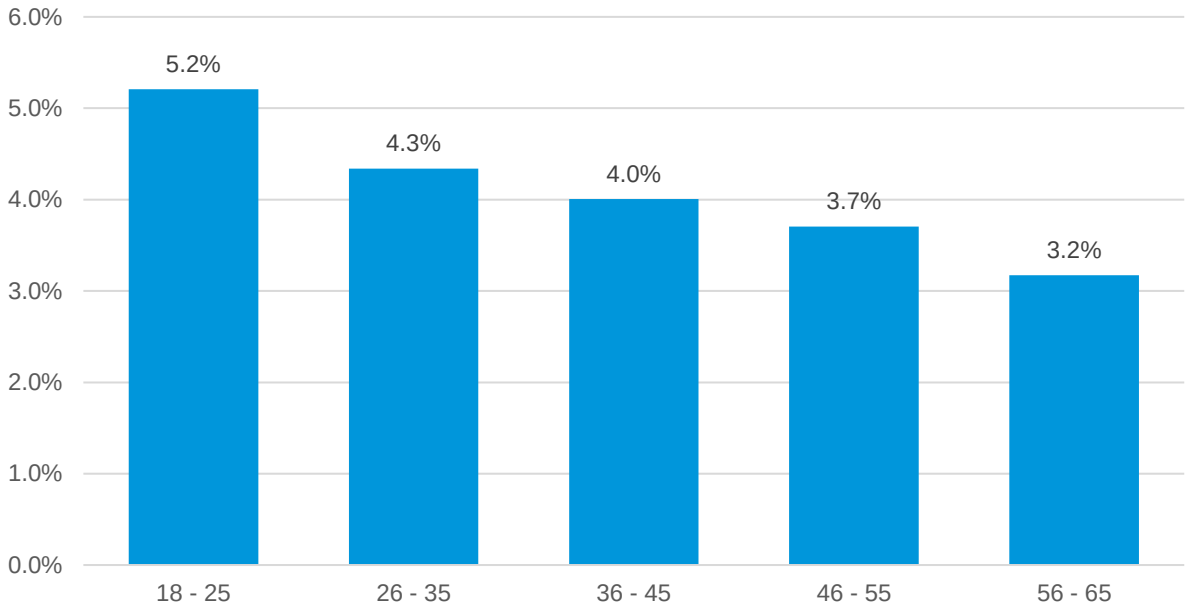


Figure 6 shows a steady decrease in transition rates as age increases. There are a small number of clients outside of the 18-65 age range, mostly under 18 years transitioning to the Student Hardship benefit (this benefit is grouped under the 'Other' benefit type in earlier sections).

Length of time on WC

Figure 7. *Transition rates by length of time on WC*

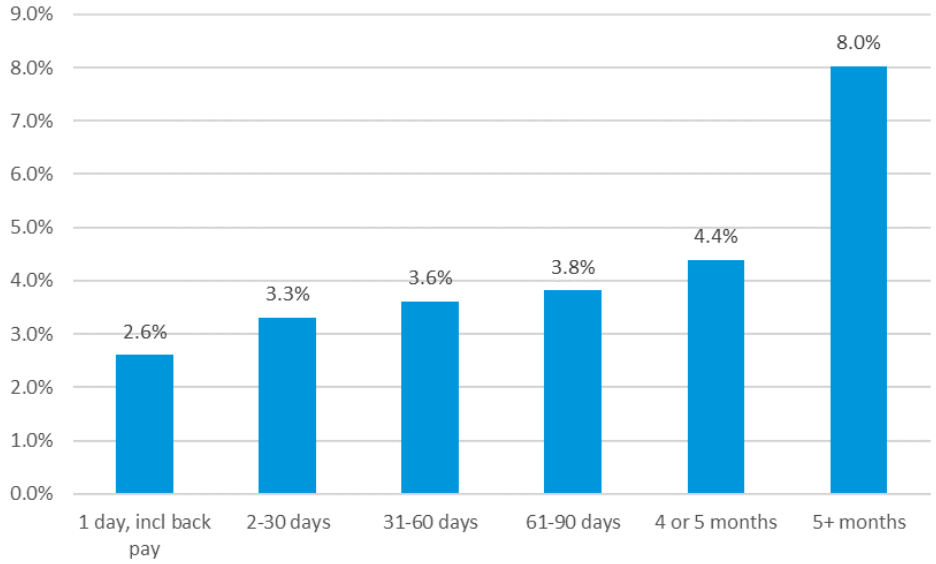


Figure 7 shows an increased likelihood of transition as time on WC increases.

Type of work

Figure 8. *Transition rates by work physicality (at time of injury)*

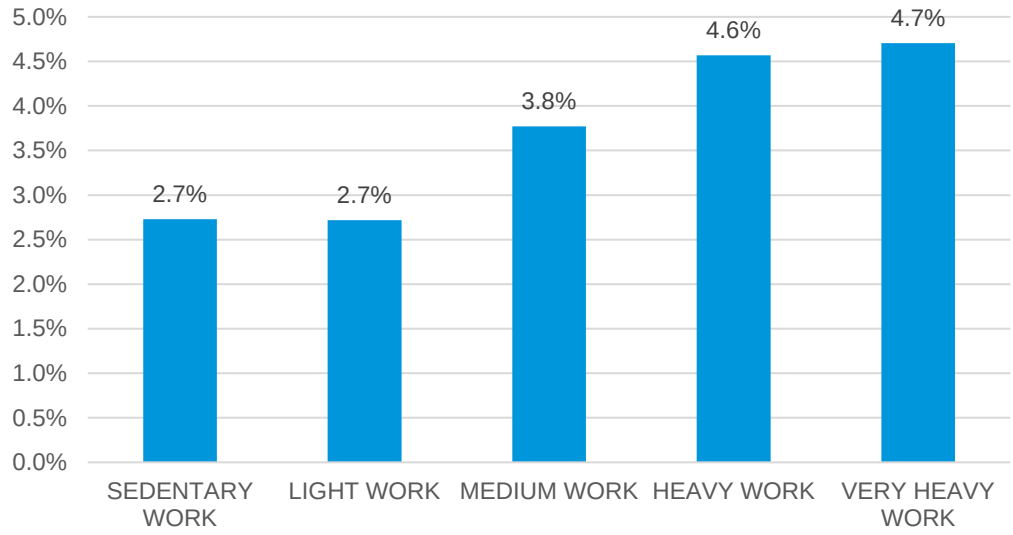
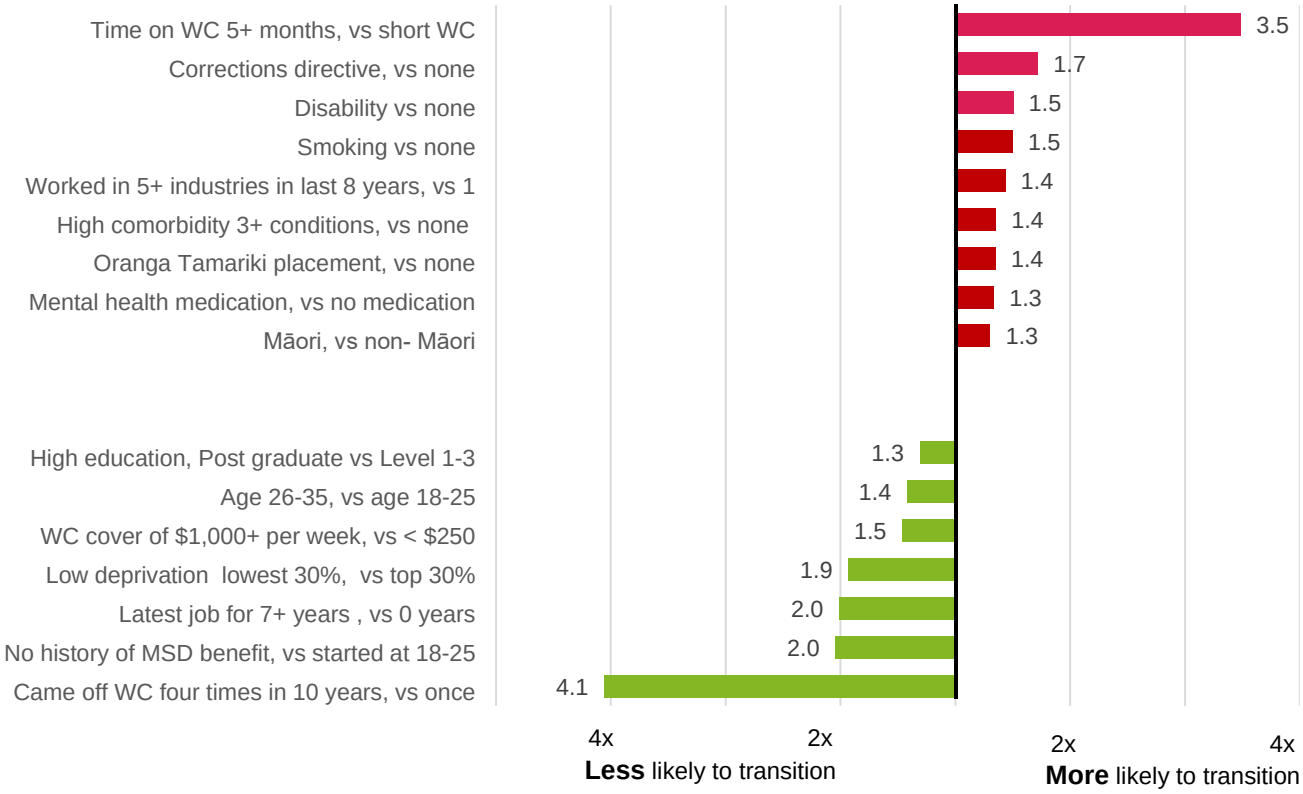


Figure 8 shows an increased likelihood of transition with increasingly physical work. However, when other variables we have data for are controlled for, physicality of work had very little impact on the transition rate. This indicates that it is other factors associated with physical work that are driving the differences in transition rate (see next section).

There are a range of Risk and Protective Factors associated with Transitioning from WC to an MSD Main Benefit

Figure 9. *Top risk and protective factors for transitioning from ACC WC to an MSD benefit*



We estimated how much a range of factors modified the risk of someone transitioning from ACC WC to an MSD benefit, while controlling for other factors. Figure 9 illustrates the strongest risk and protective factors for transitioning from WC to an MSD benefit. The strongest risk factor and protective factor both relate to ACC WC experience.

The strongest risk factor was the amount of time spent on ACC WC before transitioning to an MSD benefit. Individuals who spent five or more months on WC were 3.5 times more likely to transition to an MSD benefit. This suggests people find it more difficult to return to work the longer they are on WC.

The factor that most strongly protected against transitioning from ACC WC to MSD main benefit receipt was the number of WC claims in a 10-year period. Individuals who came off WC four or more times between July 2011 to December 2021 were 4.1 times less likely to transition to a benefit.

The remaining significant risk and protective factors are not related to injury or ACC WC, but to non-injury factors such as:

- previous interaction with other government agencies, ie history with MSD, Ara Poutama Aotearoa, Oranga Tamariki; no previous history with MSD halves the risk of transitioning[l]
- health status, ie disability, smoking, co-morbidities, and mental health

[l] As in ACC's unpublished 2019 analyses, injured workers with a history of being on a benefit are more likely to transition from WCC to an MSD benefit.

- education and job, ie highest educational achievement, number of industries worked in, income level, job tenure
- demographics, ie age, deprivation, and ethnicity, specifically identifying as Māori.

Other factors included in the analysis include history with ACC, other ethnicities, type of work (eg heavy vs sedentary). A complete list of the risk and protective factors is included in Appendix C.

Future monitoring of ACC clients' transition to MSD benefit

As noted above, ACC is working on MWM, a project exploring what measures ACC should use to measure performance as we develop our new Enterprise Strategy. MWM seeks to identify and implement a suite of organisational measures that enable ACC to monitor our performance against our new strategic priorities and direction over the next 5-10 years. This will enable us to tell our performance story clearly and concisely and provide a clear line of sight between our day-to-day operational activities and what we are accountable for.

MWM will explore the feasibility of collecting and trialing measures related to non-injury factors that influence outcomes after injury, including through our existing survey research programme (eg the Outcomes After Injury survey). This research has informed the identification of key drivers of outcomes after injury, specifically risk and protective factors for transitioning to an MSD benefit. While most significant risk and protective factors identified through this research sit beyond ACC's control, others (such as time spent on WC) are currently reported in our regular performance monitoring.

The IDI could be used in the MWM programme of work as the IDI has the potential to measure some outcomes (eg employment) that ACC does not directly collect. This research has shown the potential of using IDI data to monitor ACC clients' transition from WC to an MSD benefit on an annual basis. Based on the available IDI data, the model has limited predictive power to enable us to identify which clients will transition to an MSD benefit.

Conclusions

Between July 2011 to December 2021, the transition rate from ACC WC to an MSD benefit has remained relatively constant at an average of 4% per year. Some of these people may have accessed a benefit irrespective of ceasing WC. It is therefore difficult to estimate what proportion of the 4% would have accessed an MSD main benefit had they not received WC payments.

While the weekly rate of transition from ACC WC to an MSD benefit is much higher in the first two weeks after ceasing WC payments than the rate of the general population starting an MSD benefit, this rate decreases over time to the point where it is lower than the benefit rate of the working-age population.

There were a range of risk and protective factors associated with transitioning from ACC WC to an MSD benefit. These factors were consistent with those reported in the academic literature. While the strongest risk factor was ACC related, most other significant risk factors largely pre-date an individual's injury and are health and work-related. This research highlights that most of the significant risk and protective factors associated with transitioning from ACC WC to MSD main benefit receipt are not related to injury or ACC WC, but to non-injury factors. MWM will explore the feasibility of collecting and trialing measures related to non-injury factors that influence outcomes after injury.

In conclusion, the rate of transition from ACC WC to MSD main benefit receipt has remained relatively stable over the last 10 years, with the exception of 2013 and 2020. This research highlights the impact

that legislation and situational factors, such as COVID-19, has on people's lives. The risk factors associated with transitioning from ACC WC to MSD main benefit receipt are mostly non-injury related and largely pre-date the injury.

References

1. Carrington, L. (2016). A qualitative phenomenological study of employee perceptions of the impact of layoffs. [Unpublished PhD thesis]. Walden University. https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=3903&context=dissertations
2. Ray, K., Sissons, P., Jones, K., & Vegeris, S. (2014). Employment, pay and poverty. Evidence and policy review. Joseph Rowntree Foundation.
3. Ministry of Social Development. (2021). Why are benefit numbers still high, relative to the low unemployment rate? Why are benefit numbers still high, relative to the low unemployment rate? - Ministry of Social Development (msd.govt.nz)
4. Singley, S. G. (2003). *Barriers to employment among long-term beneficiaries: A review of recent international evidence.* Ministry of Social Development.
5. Work and Income. 2014 Benefit system performance report for the year ended 30 June 2014 [Internet]. Wellington (NZ): Ministry of Social Development; 2014. https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/evaluation/investment-approach/2014-benefit-system-performance-report.pdf
6. Ministry of Social Development. Valuation of the benefit system for working-age adults as at 30 June 2016. Wellington (NZ): Ministry of Social Development; 2014. Available from https://www.msd.govt.nz/documents/about-msd-and-our-work/newsroom/media-releases/2017/valuation-of-the-benefit-system-for-working-age-adults-2016/valuation-of-the-benefit-system-for-working-age-adults-2016.pdf
7. Stanley J, Doughty RN, Sarfati D. A pharmaceutical dispensing–based index of mortality risk from long-term conditions performed as well as hospital record–based indices. Medical Care [Internet]. 2020 [cited 2022 June 26];58(2):e9-16.

Appendix A: Variables Included in the Analysis

The Integrated Data Infrastructure (IDI) is a large research database maintained by Statistics New Zealand (Stats NZ). It holds microdata about people and households.

The data is about life events, like education, income, benefits, migration, justice, and health. It comes from government agencies, Stats NZ surveys, and non-government organisations (NGOs). The data is linked together, or integrated, to form the IDI.

Multiple measures were tested, and, from these, a short list of variables was included in the analysis underpinning this report. For example, we tested a range of measures for MSD benefit history that looked at the duration of benefit over a range of time periods. We found that the most useful measure to estimate transitions from ACC WC to MSD benefits was the age someone first received a benefit. Research and evidence presented in this paper was informed from the following data sources in the IDI.

Explanatory variables

Variable name	Description	Source
Number of days receiving WC	Length of time from the date of first WC payment to the last	Accident Compensation Corporation
Distinct periods receiving WC	Derived variable. A single period of WC reflects an uninterrupted period where the client receives payments where any gaps in payment are under 3 months	Accident Compensation Corporation
Sex	Derived by Stats NZ in the IDI from a range of data sources	Statistics New Zealand
Ethnicity	Derived by Stats NZ in the IDI from a range of data sources. People are included in an ethnic group if any of their ethnicities identified are in that group, therefore people can be represented in multiple ethnic groups	Statistics New Zealand
Client age at ACC claim lodgement	Birth date derived Stats NZ in the IDI from a range of data sources. Age is calculated based on the date of ACC claim lodgement	Statistics New Zealand and Accident Compensation Corporation
P3 mental health and comorbidities	Identified based on medicines dispensed to the person in the year prior to them lodging a claim. 32 comorbidities are identified using the methods by Stanley et al 2020[7] in their 'P3'	Ministry of Health

	index. Mental health was identified as people in the comorbidity groups: Anxiety and tension; Depression; and Psychotic Illness.	
Minimum age at first MSD benefit payment	Derived variable. Measure of the applicable age group the client was when they first received their first MSD benefit payment. Those without MSD benefit data in the IDI (going back to 1995) were assumed to have no history of MSD benefit.	Ministry of Social Development
Oranga Tamariki (Ministry for Children) placement as a child	Derived variable. Flag representing whether the client was placed in Oranga Tamariki care at any point in their life	Oranga Tamariki (Ministry for Children)
2018 Census indicators	2018 Census responses which indicates whether the ACC client was a regular smoker, whether they had a disability, and their highest education status (none, 5-6, 7+)	Statistics New Zealand
2018 Census Deprivation Index (NZDep)	NZDep is an area-based measure of socioeconomic deprivation in New Zealand. Higher levels of socioeconomic deprivation are associated with worse health outcomes. There are also connections between socioeconomic deprivation and environmental risk	Statistics New Zealand Ministry of Health University of Otago
'At Work' injury indicator	Indicates whether the accident occurred in the workplace as defined in the Accident Compensation Act	Accident Compensation Corporation
Work-type at injury	Indicates the labour intensiveness of work the client was involved in at the time the accident occurred. Note - this variable doesn't inform whether the client was working at the time of their injury	Accident Compensation Corporation
Vocational rehabilitation service flag	Derived variable. Indicates whether the client had received vocational rehabilitation services	Accident Compensation Corporation

	during their recovery from injury. Derived for each individual period on WC	
Mean (average) WC payment	Derived variable. Calculated average WC for each individual period a client receives WC	Accident Compensation Corporation
Total historical WC payments over the prior eight years	Derived variable. For a given claim we have calculated the total amount of WC payments for all prior claims over the prior eight years. Indicator of rehabilitation risk and dependency on support	Accident Compensation Corporation
Total historical medical treatment payments over the prior eight years	Derived variable. For a given claim we have calculated the total amount of medical treatment payments for all prior claims over the prior eight years. Indicator of rehabilitation risk and dependency on support	Accident Compensation Corporation
Tenure in main occupation at ACC claim lodgement	Derived variable. Informed by the latest main occupation tax record within six months prior to claim lodgement. Lag accounts for seasonal, sole traders, consultants and part-time workers who tend to submit annual tax statements or records. Workers who are less experienced in their occupation at accident may be at risk of job loss or dependency on support	Accident Compensation Corporation Inland Revenue Department
Count of ANZSIC06 level 1 industries worked over the prior eight years at ACC claim lodgement	Derived variable. Informed by main occupation tax records over the prior eight years at ACC claim lodgement. This measure seeks to count the number of high-level industries the client was engaged in over the prior eight years. This acts as an indicator of employment transience	Accident Compensation Corporation Inland Revenue Department
Corrections directive	Derived variable. Indicates that the client had a sentence or order imposed by the court at some point before claim lodgement. Includes for example	Department of Corrections

	imprisonment, home detention, supervision, community work.

Appendix B: Method

Defining individual periods or 'stints' receiving WC

ACC manages the rehabilitation and recovery of clients following an accident. The focal point of this research is to inform characteristics associated with transitioning from ACC WC to an MSD benefit. There are three key scenarios that we have considered when defining a specific period or stint when receiving WC:

1. ACC client seeks support and compensation as a result of an accident, receives WC, returns to work and then transitions to MSD benefit
2. ACC client seeks support and compensation as a result of an accident, returns to work, reinjures and recommences WC, then later returns to work, and then transitions to MSD
3. ACC client seeks support and compensation as a result of an accident, returns to work, has an unrelated injury, seeks support and compensation from ACC (second claim), returns to work, and then transitions to MSD.

The three scenarios highlighted above involve a period in which:

1. The ACC client ceases WC, returns to work and doesn't transition to MSD benefit
2. The ACC client is between the conclusion of their ACC WC payment and the start of an MSD benefit payment
3. The ACC client is between the conclusion of an ACC WC payment for one claim/accident and the start of ACC WC for a second claim/accident.

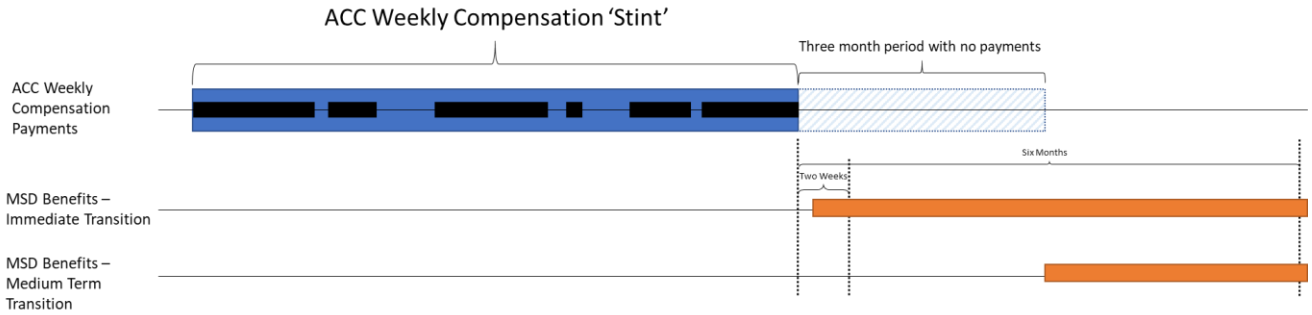
To account for these scenarios, we have applied the following definitions:

- ACC WC period/stint: Consistent period of WC payments with a gap in payment no more than three months

- MSD benefit transition – Immediate Transition: Whether the ACC client has transitioned to MSD benefit within the first two weeks after their last ACC WC payment

- MSD benefit transition – Medium Term Transition: Whether the ACC client has transitioned to MSD benefit within the first six months after their last ACC WC payment

Figure 10. *Definition of transition from ACC WC to MSD benefits*



Statistical method and results – Logistic regression

Logistic regression is a process of modelling the probability or likelihood of a discrete outcome given an input variable. The most common logistic regression models a binary outcome, something that can take on two values such as true/false or yes/no. The purpose of this research is to inform characteristics associated with transitioning from ACC WC to an MSD benefit. This means our discrete outcome is measured by whether the client transitioned or did not transition for a given period or stint when a claim has ceased receiving WC.

Binning/weight of evidence

Weight of evidence (WOE) coding of a nominal/numerical or discrete/categorical variable is widely used when preparing predictors or explanatory variables in binary logistic regression models. When using WOE coding, an important preliminary step is binning of the levels of the predictor to achieve parsimony without giving up predictive power. Assessing the weight of evidence for each explanatory variable was undertaken to statistically separate risk factors and the scale of risk embedded in our modelling approach.

Table 1. *Model fitting coefficient table*

Explanatory variables	Estimate	Std. Error	z value	P-value (>|z|)	
(Intercept)	-2.763722	0.063003	-43.866	< 0.0000000000000002	***
time_on_WC1-30 days	0.10294	0.028619	3.597	0.000322	***
time_on_WC31-60 days	0.318121	0.031474	10.108	< 0.0000000000000002	***
time_on_WC61-90 days	0.407914	0.036991	11.027	< 0.0000000000000002	***
time_on_WC91 -150 days	0.594144	0.035596	16.691	< 0.0000000000000002	***
time_on_WC>150 days	1.249152	0.033063	37.78	< 0.0000000000000002	***
acc_WC_stints2	-0.46864	0.034817	-13.46	< 0.0000000000000002	***
acc_WC_stints3	-0.768279	0.099327	-7.735	1.0353E-14	***
acc_WC_stints4+	-1.400459	0.246787	-5.675	1.38868E-08	***
sexM	-0.193598	0.020846	-9.287	< 0.0000000000000002	***
european	-0.158298	0.026383	-6	1.97182E-09	***
maori	0.265637	0.02251	11.801	< 0.0000000000000002	***
pacific	0.011684	0.03465	0.337	0.735962	
asian	-0.219541	0.04554	-4.821	1.42964E-06	***
MELAA	0.219754	0.072439	3.034	0.002416	**
age_band_at_lodge0 - 18	-0.194915	0.120975	-1.611	0.107136	
age_band_at_lodge26 - 35	-0.351747	0.030657	-11.474	< 0.0000000000000002	***
age_band_at_lodge36 - 45	-0.206299	0.045395	-4.544	5.50663E-06	***
age_band_at_lodge46 - 55	-0.04393	0.047743	-0.92	0.357503	
age_band_at_lodge56 - 65	-0.138028	0.051555	-2.677	0.007422	**
age_band_at_lodge66+	-3.991548	0.325961	-12.245	< 0.0000000000000002	***
p3_mental_health	0.290199	0.02445	11.869	< 0.0000000000000002	***
p3_count1	0.080482	0.023614	3.408	0.000654	***
p3_count2	0.201246	0.028634	7.028	2.09049E-12	***
p3_count3+	0.303127	0.031102	9.746	< 0.0000000000000002	***

min_msd_age0 - 18	0.101631	0.036072	2.817	0.00484	**
min_msd_age26 - 35	-0.186359	0.040802	-4.567	4.93847E-06	***
min_msd_age36 - 45	-0.116169	0.046218	-2.513	0.011954	*
min_msd_age46 - 55	-0.037509	0.061248	-0.612	0.540263	
min_msd_age56 - 65	0.082327	0.107357	0.767	0.443172	
min_msd_age66+	S	S	S	S	S
min_msd_ageNo history	-0.715341	0.024375	-29.347	< 0.0000000000000002	***
ot_placementtoo old for data	-0.076019	0.036196	-2.1	0.035709	*
ot_placementYes	0.30045	0.062694	4.792	1.64827E-06	***
cen_smoke_regular	0.404439	0.019076	21.202	< 0.0000000000000002	***
cen_disability	0.409674	0.03307	12.388	< 0.0000000000000002	***
cen_highest_edu_groupLevel 5 - 6, Diploma or Grad cert	-0.031316	0.032968	-0.95	0.34217	
cen_highest_edu_groupLevel 7+	-0.270829	0.035595	-7.609	2.7703E-14	***
cen_highest_edu_groupNo qualification	0.070085	0.019959	3.511	0.000446	***
deprivationLow	-0.658116	0.027317	-24.092	< 0.0000000000000002	***
deprivationMedium	-0.324988	0.019565	-16.61	< 0.0000000000000002	***
acc_cla_at_work_indY	0.238468	0.018585	12.831	< 0.0000000000000002	***
acc_cla_work_type_textLIGHT WORK	-0.085838	0.037067	-2.316	0.02057	*
acc_cla_work_type_textMEDIUM WORK	-0.041809	0.021548	-1.94	0.052342	.
acc_cla_work_type_textNOT STATED	0.265912	0.160435	1.657	0.097431	.
acc_cla_work_type_textSEDENTARY WORK	-0.089257	0.037057	-2.409	0.01601	*
acc_cla_work_type_textVERY HEAVY WORK	-0.082359	0.027482	-2.997	0.002728	**
VRS_flag	-0.116032	0.023464	-4.945	7.61116E-07	***
WC_payment_mean>$1000	-0.380662	0.037073	-10.268	< 0.0000000000000002	***
WC_payment_mean$250 - $499	0.133738	0.02459	5.439	5.3651E-08	***
WC_payment_mean$500 - $999	0.00294	0.026264	0.112	0.91088	
TOT_WC_L8Y_group1 - 2,000	0.175817	0.027315	6.437	1.22097E-10	***
TOT_WC_L8Y_group2,001 - 10,000	0.141635	0.026808	5.283	1.26831E-07	***
TOT_WC_L8Y_group>10,000	0.140233	0.033021	4.247	2.169E-05	***
TOT_MED_L8Y1 - 500	0.009728	0.035748	0.272	0.785521	
TOT_MED_L8Y501 - 2000	-0.083322	0.036748	-2.267	0.023367	*
TOT_MED_L8Y>2000	-0.200707	0.039841	-5.038	4.71029E-07	***
work_tenure_years1+ - 3	-0.183345	0.023732	-7.726	1.1141E-14	***
work_tenure_years3+ - 7	-0.477133	0.029064	-16.417	< 0.0000000000000002	***
work_tenure_years7+	-0.698644	0.034892	-20.023	< 0.0000000000000002	***
work_tenure_yearsnone	-0.255705	0.02718	-9.408	< 0.0000000000000002	***
ANZSIC06_L1_L8Y_group2	0.180499	0.025063	7.202	5.94726E-13	***
ANZSIC06_L1_L8Y_group3-4	0.285135	0.025114	11.354	< 0.0000000000000002	***
ANZSIC06_L1_L8Y_group5+	0.362381	0.03364	10.772	< 0.0000000000000002	***
ANZSIC06_L1_L8Y_groupnone	-0.450366	0.056106	-8.027	9.99E-16	***
corrections_directive	0.542637	0.024529	22.122	< 0.0000000000000002	***

Table 2. *Variable importance table*

Variable	Importance value
time_on_WC1-30 days	3.6
time_on_WC31-60 days	10.1
time_on_WC61-90 days	11.0
time_on_WC91 -150 days	16.7
time_on_WC>150 days	37.8
acc_WC_stints2	13.5
acc_WC_stints3	7.7
acc_WC_stints4+	5.7
sexM	9.3
european	6.0
maori	11.8
pacific	0.3
asian	4.8
MELAA	3.0
age_band_at_lodge0 - 18	1.6
age_band_at_lodge26 - 35	11.5
age_band_at_lodge36 - 45	4.5
age_band_at_lodge46 - 55	0.9
age_band_at_lodge56 - 65	2.7
age_band_at_lodge66+	12.2
p3_mental_health	11.9
p3_count1	3.4
p3_count2	7.0
p3_count3+	9.7
min_msd_age0 - 18	2.8
min_msd_age26 - 35	4.6
min_msd_age36 - 45	2.5
min_msd_age46 - 55	0.6
min_msd_age56 - 65	0.8
min_msd_age66+	S
min_msd_ageNo history	29.3
ot_placementtoo old for data	2.1
ot_placementYes	4.8
cen_smoke_regular	21.2
cen_disability	12.4
cen_highest_edu_groupLevel 5 - 6, Diploma or Grad cert	0.9
cen_highest_edu_groupLevel 7+	7.6
cen_highest_edu_groupNo qualification	3.5
deprivationLow	24.1
deprivationMedium	16.6
acc_cla_at_work_indY	12.8
acc_cla_work_type_textLIGHT WORK	2.3

acc_cla_work_type_textMEDIUM WORK	1.9
acc_cla_work_type_textNOT STATED	1.7
acc_cla_work_type_textSEDENTARY WORK	2.4
acc_cla_work_type_textVERY HEAVY WORK	3.0
VRS_flag	4.9
WC_payment_mean>$1000	10.3
WC_payment_mean$250 - $499	5.4
WC_payment_mean$500 - $999	0.1
TOT_WC_L8Y_group1 - 2,000	6.4
TOT_WC_L8Y_group2,001 - 10,000	5.3
TOT_WC_L8Y_group>10,000	4.2
TOT_MED_L8Y1 - 500	0.3
TOT_MED_L8Y501 - 2000	2.3
TOT_MED_L8Y>2000	5.0
work_tenure_years1+ - 3	7.7
work_tenure_years3+ - 7	16.4
work_tenure_years7+	20.0
work_tenure_yearsnone	9.4
ANZSIC06_L1_L8Y_group2	7.2
ANZSIC06_L1_L8Y_group3-4	11.4
ANZSIC06_L1_L8Y_group5+	10.8
ANZSIC06_L1_L8Y_groupnone	8.0
corrections_directive	22.1

Appendix C: Risk & Protective Factors

Figure 11. *Complete list of risk and protective factors and their adjusted odds ratios.*