



New Zealand's Prospective Outcomes of Injury Study—10 years on (POIS-10): descriptive outcomes to 12 years post-injury

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Published Online First 9 January 2024

ABSTRACT

Background The 'Prospective Outcomes of Injury Study—10 years on' (POIS-10) aims to contribute to improving long-term disability, health and well-being outcomes for injured New Zealanders. This brief report describes recruitment, characteristics and key outcomes to 12 years post-injury.

Methods Between 2007 and 2009, the study recruited 2856 people, including 566 Māori, from New Zealand's Accident Compensation Corporation's entitlement claims register. People experienced a range of injury types, causes and settings; 25% had been hospitalised for their injury. POIS-10 data were primarily collected via interviewer-administered structured questionnaires.

Results Of the original participants, 2068 (92%) were eligible for follow-up in POIS-10. Of these, 1543 (75%) people participated between March 2020 and July 2021, including 240 Māori. Half of the participants (n=757; 50%) reported ongoing problems attributed to their injury 12 years earlier. Most reported difficulties with items assessing disability (WHO Disability Assessment Schedule II). For health-related quality of life (HRQoL), measured using the EQ-5D-5L, the prevalence of problems was higher 12 years post-injury compared with 12 months post-injury for four of five dimensions. Importantly, the prevalence of problems did not reduce to pre-injury levels for any HRQoL dimension.

Discussion POIS-10 highlights the importance of early post-injury interventions to improve health, disability and well-being outcomes of injured New Zealanders.

INTRODUCTION

In Aotearoa me Te Waipounamu (New Zealand; NZ) between 2020 and 2021, the country's no-fault universal injury insurer, the Accident Compensation Corporation (ACC), had over 2 million new injury claims and spent almost \$6 billion supporting injured people.¹ Studies have found adverse outcomes can be experienced up to, and beyond, 24 months post-injury; however, findings have been limited to specific injury types (eg, traumatic brain injury or spinal cord injury)² or causes (eg, transport accidents).³ Few studies report longer-term outcomes among non-specific injury types.^{4,5}

The Prospective Outcomes of Injury Study (POIS), a longitudinal cohort study, explored injury and health rehabilitation, and social and economic factors leading to disability, health and well-being outcomes at 3, 12 and 24 months after injury among New Zealanders. POIS-10 has followed

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Specific injuries (eg, traumatic brain injury or spinal cord injury) are associated with adverse outcomes for people beyond 24 months.
- ⇒ Little is known about longer-term outcomes among injured people experiencing a diverse range of injury types and severities.

WHAT THIS STUDY ADDS

- ⇒ Ongoing problems attributed to an injury that occurred 12 years ago are prevalent.
- ⇒ High proportions of injured participants reported problems with disability and health-related quality of life 12 years post-injury.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Internationally, the 'Prospective Outcomes of Injury Study—10 years on' (POIS-10) contributes by adding to limited evidence about long-term post-injury outcomes.
- ⇒ In New Zealand, POIS-10 provides unique information to support the Accident Compensation Corporation's work focused on preventing injury and improving long-term outcomes, including specifically for Māori.

participants to approximately 10 years since their last POIS interview (ie, 12 years post-injury).⁶ This short report aims to describe characteristics of the POIS-10 cohort followed to 12 years post-injury and participants' key disability, health and well-being outcomes.

METHODS

Between 2007 and 2009, 2856 POIS participants were recruited via ACC's entitlement claims injury register, including n=566 Māori.⁷ ACC entitlement claimants had experienced injuries likely to require earnings-related compensation, or rehabilitation or social supports for their injury. Participants had a range of injury types, causes and settings; 25% were hospitalised for their injury; the injury leading to recruitment to POIS is hereafter referred to as the 'sentinel' injury. People experiencing self-harm or sensitive claim injuries (eg, sexual assault) were ineligible. Recruitment continued until 20% of the cohort were Māori.⁸ Participants completed telephone or postal questionnaires 3, 12 and 24 months post-injury.⁷



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To cite: Derrett S, Owen HE, Barson D, et al. *Inj Prev* 2024;**30**:251–255.

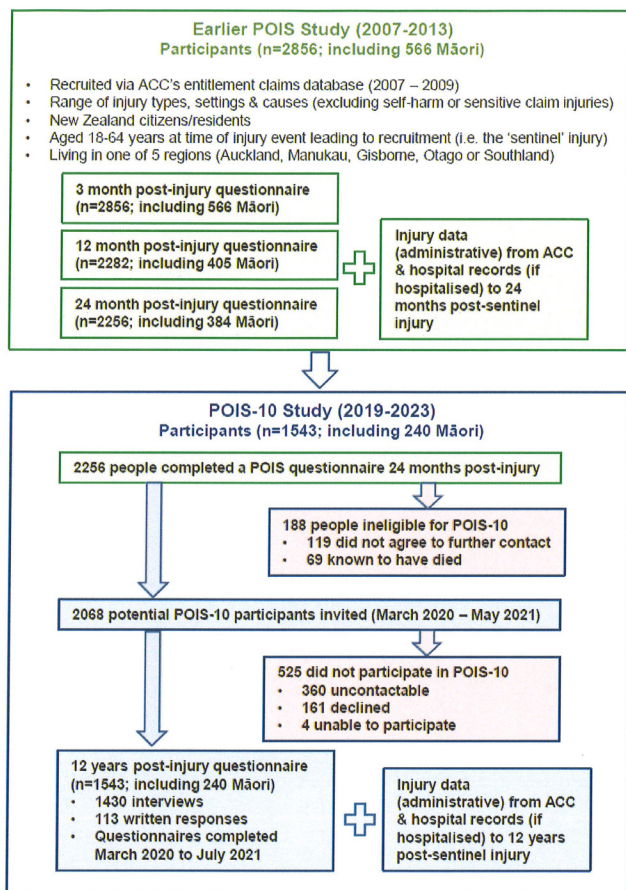


Figure 1 Overview of POIS and POIS-10 recruitment and data collection. ACC, Accident Compensation Corporation; POIS, Prospective Outcomes of Injury Study; POIS-10, Prospective Outcomes of Injury Study–10 years on.

People were eligible for POIS-10 if they had completed a POIS 24-month interview and had agreed to being recontacted by the research team.⁶ POIS-10 interviewers made up to eight contact attempts (telephone and/or email) to reach potential participants, and if unsuccessful, up to five attempts to reach participants' previously nominated alternative contacts. ACC also posted study information letters to participants who remained uncontactable and provided researchers with any updated contact details. Electoral rolls were also reviewed to identify updated contact details for eligible past POIS participants.

POIS-10 data were collected between March 2020 and July 2021. Data were primarily collected via structured questionnaires (figure 1) administered via computer-administered telephone interviews by 15 trained interviewers, including te reo Māori (Māori language)-speaking interviewers. Interviews, undertaken 12 years following the sentinel injury, were typically 1 hour in duration.

POIS-10 interview questions asked about sociodemographic characteristics (eg, ethnicity, education, adequacy of household income),^{9,10} disability,¹¹ health^{12,13} and well-being 12 years post-injury (table 1).¹⁴⁻¹⁶ The WHO Disability Assessment Schedule II (WHODAS II) measured level of difficulty on 12 items using a 5-point scale (ie, none, mild, moderate, severe, extreme), categorised as 'no' or 'any difficulty' for analyses.¹¹ Health-related quality of life (HRQoL) outcome was assessed using the EQ-5D-5L, with five dimensions: Mobility (MO), Self-Care (SC), Usual Activities (UA), Pain/Discomfort (PD) and Anxiety/

Depression (AD); responses on a 5-point scale (eg, no, slight, moderate, severe or extreme problems) were categorised as 'no problems' or 'any problems'.¹³ Injury recovery was operationalised by a yes/no question personalised to the individual: 'Do you have any ongoing problems from the injury you had in (year) when you (describe sentinel injury event)?' The first POIS interview (3 months post-injury) also recalled certain pre-injury sociodemographic, disability, health and well-being characteristics.

Administrative injury-related data were obtained, with participants' consent, from ACC, and for those who were hospitalised for their injury, from the National Minimum Data Set of hospital discharges. These data provided descriptions of the sentinel injury type and cause; allowed derivation of injury severity scores (New Injury Severity Score)¹⁷; hospitalisation status and the occurrence of subsequent injury events since recruitment to POIS.

RESULTS

Of the 2856 POIS participants, 2256 (79%) completed a POIS questionnaire approximately 24 months post-injury. Of the 2256, 2068 people (92%) had agreed to future follow-up or were not known to have died (figure 1). Of the 2068 potential POIS-10 interviewees, 1543 (75%) people participated; 1430 (93%) completed a telephone interview and 113 (7%) a paper questionnaire. The main reasons for non-participation were the research team's inability to trace potential participants (n=360; 17%) or people declining to take part (n=161; 8%). POIS-10 questionnaires were completed 12.2 years (median) after participants' sentinel injury. Participant characteristics at 12 years post-injury are presented in table 2. The mean age at POIS-10 follow-up was 55 years (range=29–78 years). Most people (72%) were in paid employment, and 74% reported that they had enough, or more than enough, household income to meet their everyday needs. At least one comorbidity was reported by 1207 (78%) participants. There were few missing responses (<1%) for sociodemographic characteristics.

Half the POIS-10 cohort (n=767; 50%) reported experiencing ongoing problems associated with the sentinel injury at 12 years. Many participants (n=651; 42%) also reported being affected by a different (non-sentinel) injury at this time. Proportions reporting disability problems ranged between 9% reporting difficulties maintaining a friendship and 39% reporting difficulties due to being emotionally affected by their health condition/s (table 3). Over one-third of POIS-10 participants (n=569; 37%) reported 'no difficulties' with any of the 12 WHODAS II items.¹¹ The majority (57%) of POIS-10 participants reported excellent or very good health overall.¹² However, considerable proportions reported experiencing 'any problems' with the five EQ-5D-5L dimensions,¹³ from 13% reporting 'any problems' with SC to 54% reporting 'any problems' with PD. Just over one-third (n=546; 35%) of POIS-10 participants reported 'no problems' with any of the five EQ-5D-5L dimensions. A high proportion of participants (88%) reported overall life satisfaction (mostly or completely satisfied) at long-term follow-up.^{13,15}

Missing responses for key POIS-10 outcomes were low; 0.5% (n=8) were missing responses to all 12 WHODAS II items; 0.5% (n=7) were missing a response to overall health status; 0.3% (n=4) were missing responses to all five EQ-5D-5L dimensions and 0.4% (n=6) were missing a response to the life satisfaction question.

Table 1 Overview of key predictors and outcomes collected in POIS and POIS-10 questionnaires

Variables*	POIS & POIS-10 time points following the sentinel injury				
	POIS 3 months		POIS 12 months	POIS 24 months	POIS-10 12 years
	Pre-injury	3 months			
Sociodemographic					
Age, sex, ethnicity, education ⁹		✓			
Adequacy of household income ¹⁰	✓	✓	✓	✓	✓
Living arrangements/relationship status	✓	✓	✓	✓	✓
Injury-related characteristics					
Intentional injury (assault)		✓			
Perceived threat of disability/threat to life		✓			
Trouble accessing health services		✓			✓
Injury recovery		✓	✓	✓	✓
Disability					
WHODAS II 12 items ¹¹	✓	✓	✓	✓	✓
Paid employment participation/demands/capacity	✓	✓	✓	✓	✓
Participation in unpaid activities	✓	✓	✓	✓	✓
Health					
Health in general ¹²	✓	✓	✓	✓	✓
EQ-5D-3L/EQ-5D-5L ¹³	✓	✓	✓	✓	✓
Comorbid health conditions	✓		✓	✓	✓
Exercise/BMI/sleep	✓	✓	✓	✓	✓
Alcohol/drug use/cigarette smoking	✓	✓	✓	✓	✓
Well-being					
Life satisfaction ^{13 15}	✓	✓	✓	✓	✓
Happiness	✓	✓	✓	✓	
Satisfaction with social relationships	✓	✓	✓	✓	✓
Comfort in faith/spiritual beliefs		✓	✓	✓	✓
Major life events				✓	✓
Racism		✓	✓		✓
Flourishing ¹⁶					✓
Psychological distress	✓	✓	✓	✓	✓

*POIS and POIS-10 questionnaires contained many questions and measures; references are provided for key measures only.

BMI, body mass index; POIS, Prospective Outcomes of Injury Study; POIS-10, Prospective Outcomes of Injury Study–10 years on; WHODAS II, WHO Disability Assessment Schedule II.

DISCUSSION

This paper describes characteristics of the POIS-10 cohort, including their health, disability and well-being outcomes 12 years after a sentinel injury. Describing the cohort is the first step towards understanding long-term outcomes after injury and identifying opportunities for intervention to improve the health of injured New Zealanders.

Of concern, over two-thirds of the cohort experienced difficulties with disability 12 years post-injury. While over half of POIS participants reported being emotionally affected by their health problems and having difficulty standing for long periods 3 months post-injury,⁷ over one-third of the cohort reported difficulties on these WHODAS items 12 years on. Also, the majority (78%) of participants reported at least one comorbidity 12 years post-injury. Earlier POIS analyses found pre-injury multimorbidity was associated with an increased risk of disability 24 months post-injury^{18 19}; longitudinal analyses are now underway to explore changes in disability overtime in the cohort and predictors of longer-term disability outcomes.

Regarding HRQoL, the prevalence of ‘any problems’ with UA was slightly lower 12 years after injury for POIS-10 participants (EQ-5D-5L UA=27%) compared with the prevalence reported by participants 12 months post-injury (EQ-5D-3L ‘any problems’

UA=30%), but was higher, or slightly higher, 12 years post-injury for the remaining four EQ-5D dimensions (EQ-5D-5L ‘any problems’: MO=29%, SC=13%, PD=54% and AD=23%) compared with 12 months post-injury (EQ-5D-3L ‘any problems’: MO=24%, SC=7%, PD=52% and AD=20%).²⁰ Importantly, in no EQ-5D dimension did the prevalence of problems approach reported pre-injury levels (EQ-5D-3L ‘any problems’: MO=6%, SC=2%, UA=6%, PD=6% and AD=6%).²⁰

Some of the disability and HRQoL problems experienced 12 years post-injury will be related to ageing and comorbid conditions (78% reported at least one comorbid condition at 12 years, compared with 46% pre-injury); nevertheless, such a high proportion reporting ongoing problems associated with their sentinel injury is important in terms of timely interventions to improve outcomes. Despite the prevalence of disability and HRQoL problems, a high proportion of participants (88%) reporting overall life satisfaction 12 years after injury is encouraging. The exclusion of injuries resulting from self-harm or sensitive claims (eg, sexual assault) means the prevalence of life satisfaction may be overestimated, while anxiety/depression may be underestimated in POIS-10 compared with the ‘all injury’ population in NZ. A further limitation of this study is that our

Table 2 Key characteristics of POIS-10 participants (n=1543) 12 years after sentinel injury

Characteristics	n	%*	Characteristics continued	n	%*
Sex			Chronic conditions†		
Male	864	56	Neck/back disorder	465	30
Female	679	44	High blood pressure	450	29
Age in years			Arthritis	415	27
25–34	119	8	Asthma	214	14
35–44	240	16	Depression	185	12
45–54	351	23	Heart disease	173	11
55–64	425	28	Anxiety	170	11
65–74	363	24	Migraine	158	10
75+	45	3	Diabetes	138	9
Ethnicity			Sleep disorder	127	8
Māori	240	16	Irritable bowel	122	8
Pacific (non-Māori)	44	3	Cancer	103	7
Non-Māori and non-Pacific	1259	82	Osteoporosis	85	6
Paid employment			Liver condition	48	3
Yes	1107	72	Stroke	33	2
No	433	28	Chronic bronchitis or emphysema	32	2
Missing	3	0	Chronic obstructive pulmonary disease	32	2
Adequacy of household income			Stomach ulcers	26	2
Not enough	107	7	Epilepsy	25	2
Just enough	284	18	ME (chronic fatigue syndrome)	22	1
Enough	583	38	Bipolar disorder	14	1
More than enough	559	36	Multiple sclerosis	5	0
Missing	10	1	Motor neuron (disease)	3	0
			Schizophrenia	3	0
			No diagnosed comorbidities	336	22

*Percentages do not always equal 100 due to rounding; cells with numbers ≤3 are reported as 3 for anonymity.
†Participants were able to respond to more than one category.
ME, myalgic encephalomyelitis; POIS-10, Prospective Outcomes of Injury Study–10 years on.

findings are likely to have been biased by participants lost to follow-up. To assess this, we ran a sensitivity analysis under the extreme case scenario assuming that all potential participants lost to follow-up had no post-injury difficulties. Under this hypothetical scenario, the prevalence of estimated difficulties would reduce by 25%.

POIS-10 is unique in its recruitment of New Zealanders with a range of injury types and follow-up to 12 years post-injury. Conducting interviews using a highly structured questionnaire resulted in the collection of a rich data set, with low proportions of missing responses. We believe the completeness of data is largely due to the skilled interviewers, and their ability to develop rapport and sustain engagement with participants throughout the hour-long interview. The skilled interviewers and rigorous contact tracing processes also enabled POIS-10 to achieve its aspirational follow-up rate (75% of those eligible).⁶

Table 3 Key descriptive disability, health and well-being outcomes 12 years after sentinel injury among POIS-10 participants (n=1543)

Disability, health and well-being outcomes	n	%*
Disability		
WHODAS II (any difficulty) ¹¹		
Standing for long periods	527	34
Household responsibilities	389	25
Learning new tasks	179	12
Community activities	249	17
Emotionally affected by health problems	595	39
Concentrating more than 10 min	281	18
Walking a long distance	477	31
Washing whole body	191	12
Getting dressed	244	16
Dealing with unknown people	160	11
Maintaining a friendship	133	9
Day-to-day work	393	27
Health		
Overall health status ¹²		
Excellent	248	16
Very good	630	41
Good	470	31
Fair	139	9
Poor	49	3
EQ-5D-5L (any problems) ¹³		
Mobility	431	28
Self-care	207	13
Usual activities	417	27
Pain or discomfort	834	54
Anxiety or depression	354	23
Well-being		
Life satisfaction ¹⁴		
Completely satisfied	308	20
Mostly satisfied	1044	68
Neither satisfied nor dissatisfied	134	9
Mostly dissatisfied	43	3
Completely dissatisfied	8	0

*Numbers do not always add to n=1543 due to small numbers of missing responses and because of multiple responses per participant; percentages do not always equal 100 due to rounding.
POIS-10, Prospective Outcomes of Injury Study–10 years on; WHODAS II, WHO Disability Assessment Schedule II.

CONCLUSIONS

Twelve years post-injury, many participants experienced ongoing problems attributed to their sentinel injury. Almost two-thirds of participants reported difficulties with disability and/or HRQoL problems. Problems with pain or discomfort were most common. By identifying long-term outcomes after injury, POIS-10 findings highlight the importance of early post-injury interventions and contribute towards understanding the health, disability and well-being needs of injured New Zealanders, especially for Māori.

Acknowledgements The authors wish to thank the POIS and POIS-10 participants for their participation over many years. They thank the skilled team of POIS-10 interviewers for the care they took in data collection. They also thank the Health Research Council of New Zealand for funding POIS-10 and the University of Otago for hosting this research.

Contributors SD and EHW are principal investigators of POIS-10 and conceived the idea for the study. AS and HH are named investigators on POIS-10. HEO is the POIS-10 operational project manager; DB the data manager, and BM is undertaking

various analyses. SD and HEO prepared the first draft of the paper. HEO, DB and BM collated the descriptive data, and all authors reviewed the initial and final drafts of the paper.

Funding This research was funded by the Health Research Council of New Zealand (2019–2022; HRC19/344).

Disclaimer The views and conclusions in the article are the authors' and may not represent those of funders.

Competing interests SD is a member of the EuroQol Group responsible for the development of the EQ-5D instruments used in this study; no funding was received from the EuroQol Group for the POIS-10 Study reported in this short report. Other authors indicate they have no competing interests to declare.

Patient and public involvement statement Consultation about the design of POIS was undertaken with people living with an injury-related disability and Māori stakeholders prior to the commencement of POIS. Patients and/or the public were not involved in the conduct, reporting or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study involves human participants and was approved by New Zealand's Southern Health and Disability Ethics Committee (MEC/07/07/093/AM07). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

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