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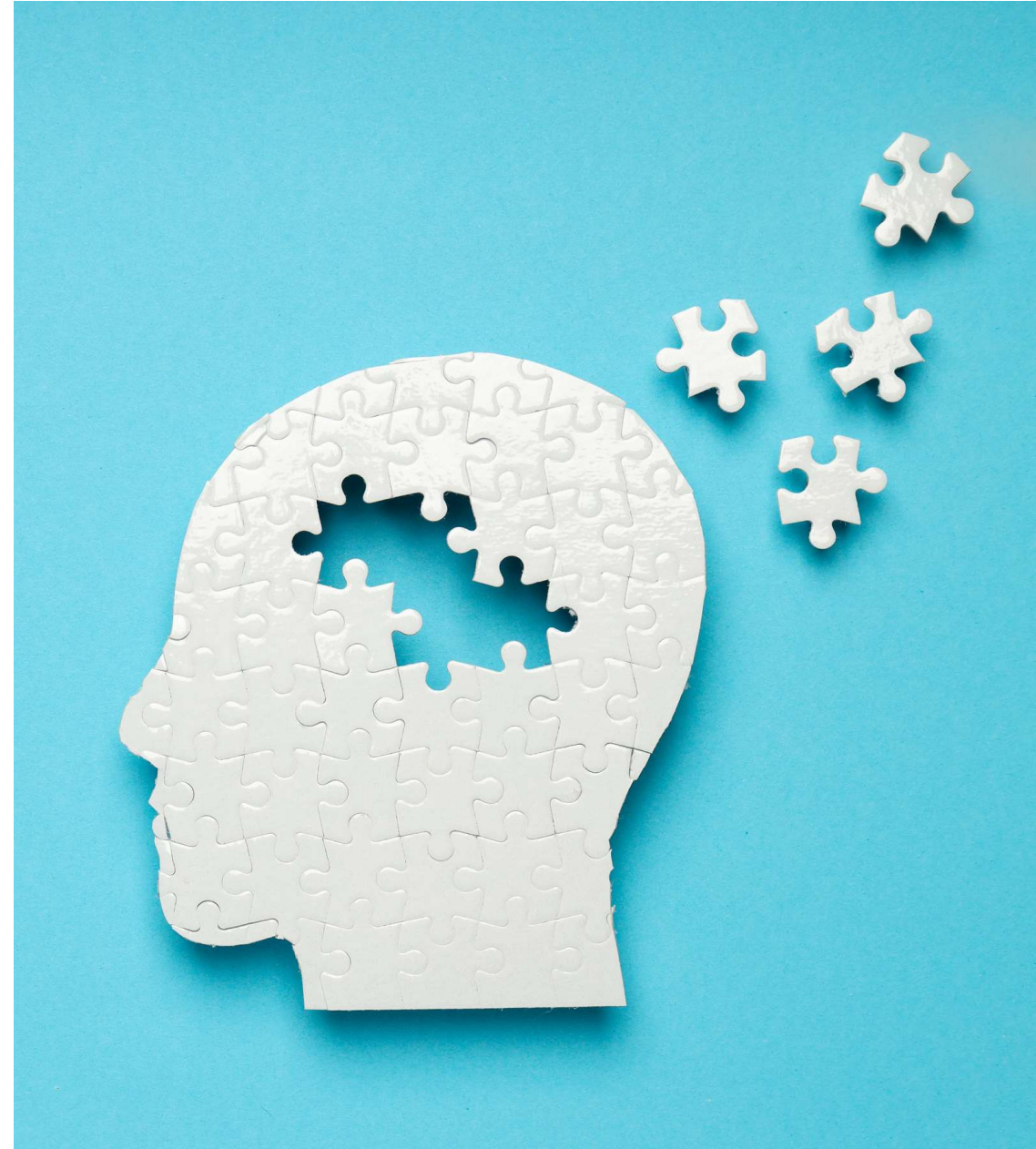


The effect of a minor health shock on labour market outcomes: the case of concussions

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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.

Research Questions

What effect does suffering a concussion have on future employment and earnings in the short and longer term?

Do the effects of concussions differ by age, gender, occupational skill level, whether treated by primary health provider or in hospital, multiple injuries or just TBI?

To what extent does the accident compensation scheme offset earning losses?



Background

Traumatic brain injuries (TBI) are one of the most common causes of disability and death in adults, and leading cause of disability in children and young people, worldwide.

- 36,000 TBIs a year in NZ, 95% are mild (ACC, 2022; Feigin, 2013)
- Mainly caused by falls during everyday activities (ACC, 2022)



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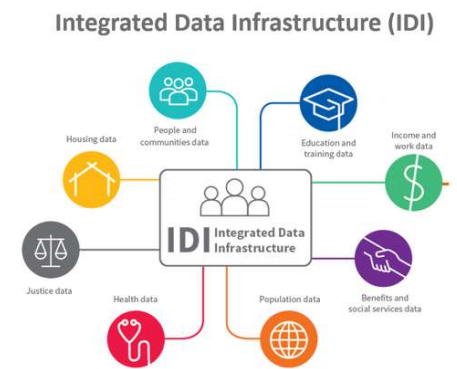
- 36,000 TBIs a year in NZ, 95% are mild (ACC, 2022; Feigin, 2013)
- Mainly caused by falls during everyday activities (ACC, 2022)

Minor health issues generally do not have long-term effects on labour market outcomes (Pelkowski & Berger, 2004)

But...

- Clinically, mTBIs have persistent symptoms despite being apparently minor (Dean & Sterr, 2013)
- Detrimental and persistent effects on educational outcomes (Wehman et al, 2017), criminal behaviour (Theadom et al., 2023), labour market outcomes (Fallesen & Campos, 2020)

Data



Stats NZ's Integrated Data Infrastructure (IDI)

Accident Compensation Corporation (ACC) data



- Compulsory and universal compensation system covering all accidents that occur in NZ
- Treatment claims lodged by medical providers
- Covers medical costs and income compensation

Population of Interest



- Those with mTBIs from January 2012 to June 2022 (ACC data)
- Aged 25-65 years old
- Exclusions: those with prior TBI; died or lived overseas during study period

Characteristics



- Inland Revenue for monthly wages and salary data
- Personal records for characteristics: age, gender, ethnicity, region etc

Identification Strategy

ISSUE 1

Comparison with those who have not suffered a mTBI => Effects cannot be attributed to the mTBI

>> Unobserved characteristics correlated with both mTBI and labour market outcomes (e.g. risk-taking behaviour)

SOLUTION

Quasi-experimental design: individuals who experience the same shock in the future as counterfactuals (Fadlon & Nielsen, 2019)

Identification Strategy

ISSUE 2

Individuals in the sample are not treated at the same time

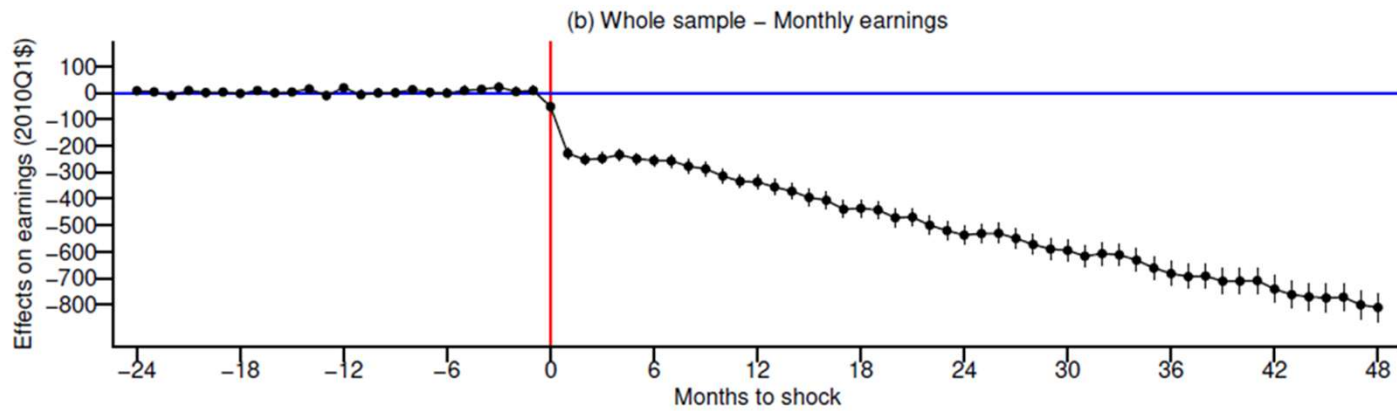
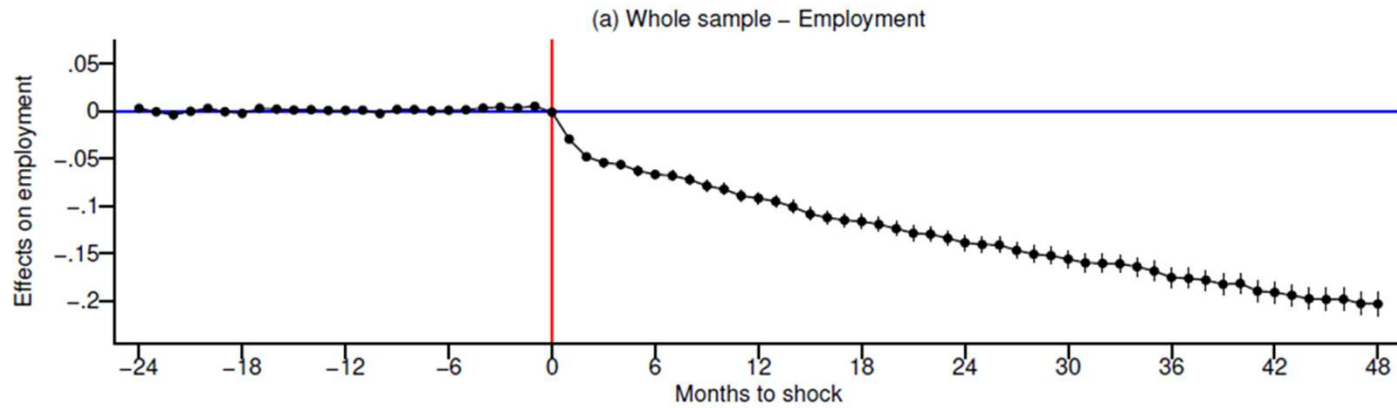
>> Two-way fixed effects regressions may be biased (de Chaisemartin & D'Haultfoeuille, 2020; Callaway & Sant'Anna, 2021; Sun & Abraham, 2021)

SOLUTION

Doubly-robust staggered difference-in-differences estimator (Callaway & Sant'Anna, 2021)

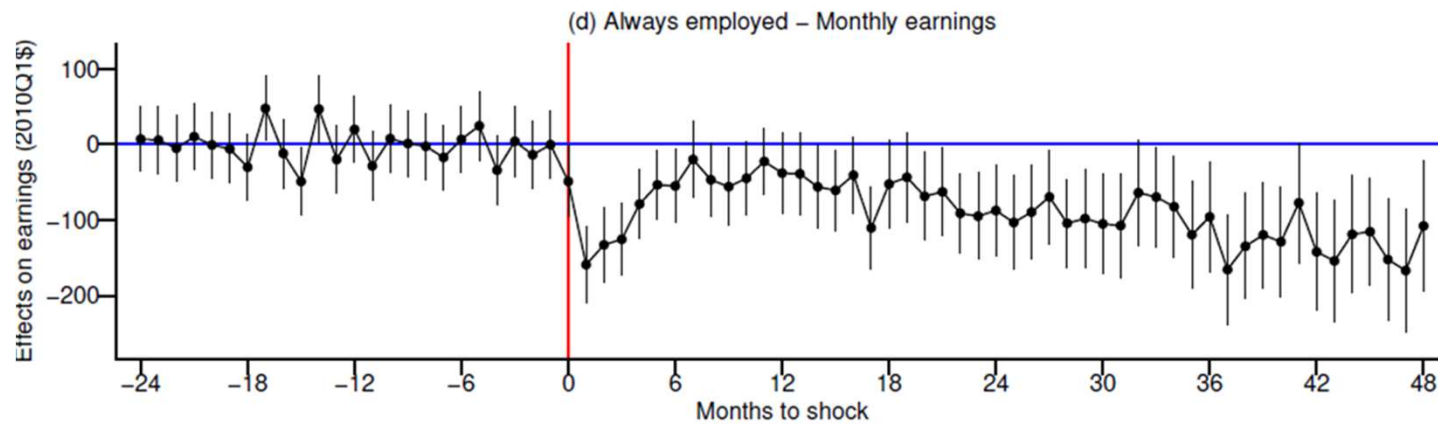
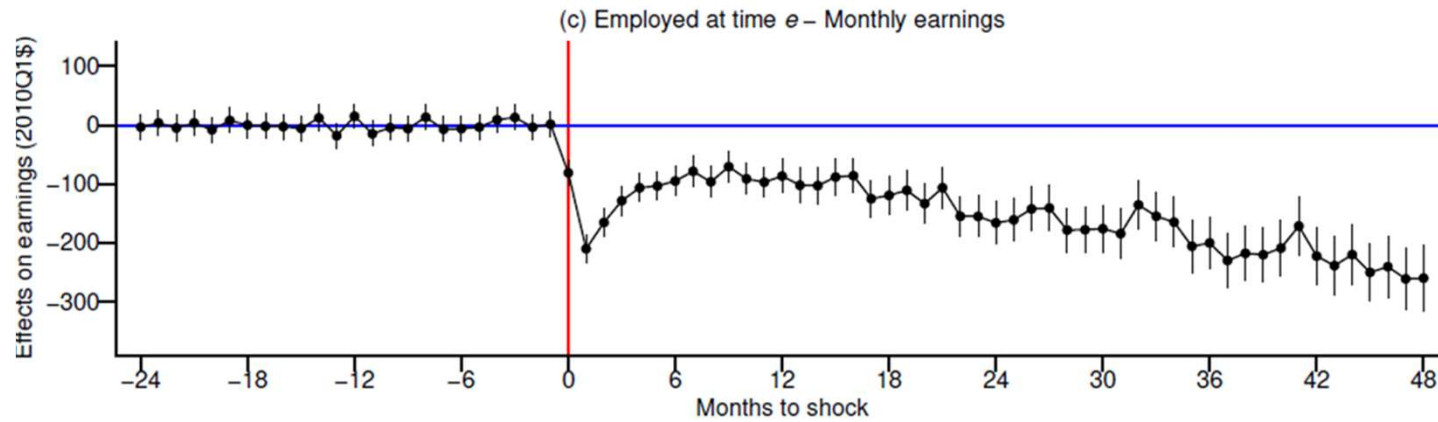
Results

Monthly treatment effects



Results

Monthly treatment effects



Heterogeneity analysis: Skill level

	1. Low-to-mid skilled (n=23,505 individuals)		2. High skilled (n=11,796 individuals)	
ATT	(a) Monthly earnings	(b) Employment	(a) Monthly earnings	(b) Employment
12 months	-218***	-0.06***	-329***	-0.07***
24 months	-274***	-0.08***	-487***	-0.11***
36 months	-326***	-0.10***	-626***	-0.14***
48 months	-381***	-0.11***	-748***	-0.16***

Conclusion

Mild traumatic brain injuries have more than a minor, temporary effect

Strong adverse effects on employment and earnings

- Mostly an employment (extensive margin) effect
- But also an earnings (intensive margin) effect

Long-term effects: earnings drop after the mTBI, then recover somewhat, then drop again

- In line with medical literature and clinical observation

Heterogeneous effects across groups

- TBI-only vs. TBI+Other injuries strengthens the findings that other injuries are recovered from but TBI effects linger
- Those in high-skilled jobs have greater negative effects



Thank you

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Model

Staggered Difference-in-Differences

$$Y^{g,t} = \alpha_1^{g,t} + \alpha_2^{g,t} \cdot G_g + \alpha_3^{g,t} \cdot 1\{T = t\} + \beta^{g,t} \cdot (G_g \times 1\{T = t\}) + \gamma \cdot X + \epsilon^{g,t}$$

Five assumptions (Callaway & Sant'Anna, 2021):

- Irreversibility of treatment
- Limited anticipation
- Random sampling
- Parallel trends (should hold conditional on covariates)
- Overlap (timing of treatment uncorrelated with the probability of treatment)