Long Term Social Impacts of Mild Traumatic Brain Injury

AUT
TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

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 and LBD 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 Revenues core operational requirements.

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Traumatic Brain Injury: TBI

Mild TBI : loss of consciousness less than 30 minutes, amnesia less than 24 hours – includes **concussion**

e.g **car accident, assault, sports injury, falls**

Background

- Estimated 36,000 traumatic brain injuries (TBI) per year in NZ
- 95% considered mild TBI
- TBI Cost $83.5 million in 2015 financial year
- Māori 23% greater risk of mild TBI than NZ European (Feigin et al., 2013)
- Evidence of longer term health impacts e.g. cognition, fatigue, headaches
- Lack of longitudinal evidence about the wider possible impacts of mild TBI

Potential link between mild brain injury and social outcomes

- A large proportion of incarcerated people have suffered a TBI (Mitchell et al, 2017).
- International studies show initial evidence for link between TBI and potential increased risk of engaging in antisocial behaviour (Williams et al, 2018)
- Initial evidence that mild injuries affect work performance and ability to maintain employment (Theadom et al, 2017)

Research Question:

Are there **longer term social impacts** as a result of **mild TBI**?

Outcomes: **Criminal Behaviour** and **Labour Market** over **10 years**

Initial Results: Some **significant** differences between Treatment and Control groups

Research Design

This is a case controlled study using **observational data**

Treatment Group (mild TBI)

Control Group (lower limb fracture)

Propensity score matching

We looked at their social outcomes up to 10 years on:

Criminal Behaviour and Labour Market Outcomes

Using linked administrative data from the **Statistics NZ Integrated Data Infrastructure**

Data: linked administrative data from Stats NZ IDI

- Spine data: ACC 2003
- Stats NZ personal details
- Ministry of Justice Court Charges
- IRD income, wages and salary and total income
- Address notifications data: Deprivation Index
- Overseas Spells: Resident in NZ

Population of Interest

- **N = 24,342**
- **Treatment group(mild tbi) n=7,572**
- **Control group(lower limb) n=17,076**

Restrictions:

- NZ resident
- 16 years and older
- 92 years and younger
- TBI after the injury in 2003
- Died before 2014
- NZ DPI missing

Methodology

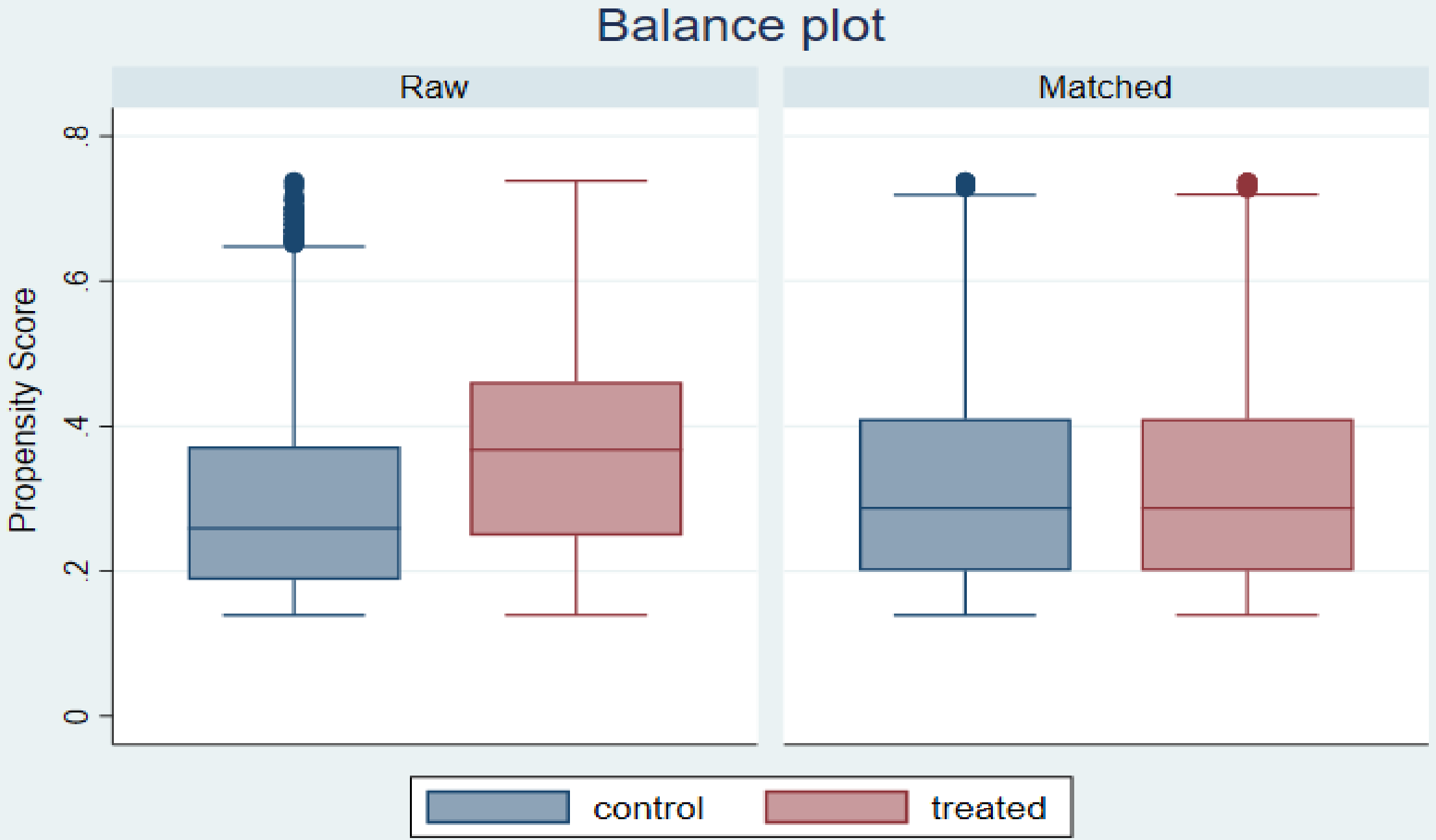
- **Propensity Score Matching**
- **Covariates that affect treatment and/or outcome**
- ATET = E[Y(1)/T = 1] − E[Y(0)/T = 1]

Propensity score matching combines information on covariates into one continuous **probability of treatment** or **propensity score**

AGE GENDER ETHNICITY Previous TBI:MILD,SEVERE
Previous COURT CHARGES DPI

Methodology: before matching

Variable	Treatment(mean)	Control(mean)
AGE (years)	34	42
ETHNICITY (%)	16 (māori), 71(european), 5(Pasifika)	10 (māori), 78(european), 4(Pasifika)
GENDER (%)	60 male	47 male
Mild TBI (previous) %	6	2
More severe TBI (previous) %	2	1
COURT CHARGES (number)	1.5	1.3
DPI (Deprivation Index)	5.6	5.3


Balance plot
Raw
Matched
Propensity Score
0
.2
.4
.6
.8
control
treated

Outcomes: Criminal Behaviour

$9.1 billion 2003/2004

VARIABLE	COEFFICIENT
Court charges , 0,1 (any court charge)	0.02***
Convictions, 0,1 (any conviction)	0.013**
Violent Convictions 0,1	0.0002
Charges (number)	0.14
Convictions (number)	0.08
Violent Charges (number)	0.05**

Outcome Variables : Labour Market

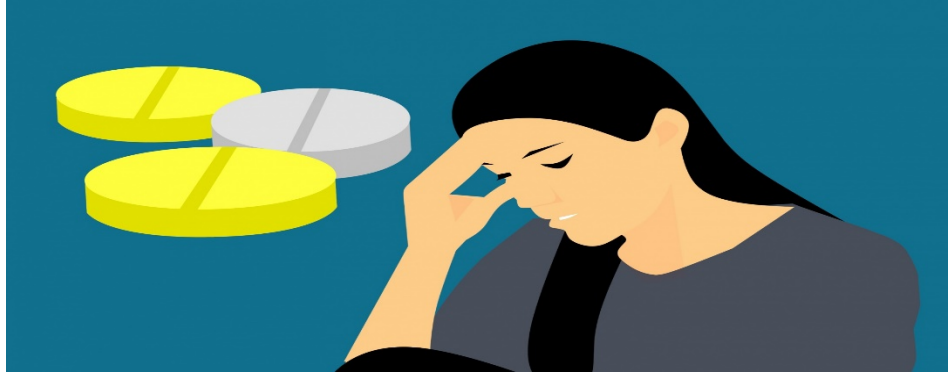
- **Employment** : number of years out of 10 employed
- **Total Wages and Salary** : over 10 years including 2003
- Wages and Salary **one year** from the month of injury
- Wages and Salary for one year from **five years** from month of injury
- Wages and Salary **10 years** on, for the year 10 years following the injury

VARIABLE	COEFFICIENT
Employment (out of 10 years)	-0.2***
Total Wages and Salary $ (10 years)	-13313***
Wages and Salary $ (year 1)	200
Wages and Salary $ (year 5)	-1096**
Wages and Salary $ (year 10)	-1631***
Significance *0.1	**0.05 ***0.01

Limitations:

- **Potential Confounders** – variables not included that may affect treatment or outcome (e.g. mental health, substance use)
- **Classification of mild TBI** – reliant on medical professionals to record TBI correctly and ACC to enter details
- **Under reporting**, some injuries may have been missed

Conclusions:



Significant initial results indicating wider longer term impacts of mild TBI

Area of concern for policy makers due to the proportion of the population affected

Highlights importance of recognition and early intervention to prevent longer-term impacts

Further research imperative to control for confounders due to potential social and economic costs