

## Round Table

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# Injury to Pacific people in New Zealand: Pre-injury characteristics and early health outcomes – results from a cohort study

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### Abstract

#### Introduction

In this paper, selected pre-injury characteristics of Pacific participants in the Prospective Outcomes of Injury Study (POIS) are described, and associations with general health outcomes are identified.

#### Methods

Univariable and multivariable analyses examine relationships between pre-injury characteristics (selected by mapping to a Pacific health model) and health outcomes three months after injury.

#### Results

Of 2856 POIS participants, n=239 (8%) identified as Pacific. After adjusting for relevant variables, participants had significantly increased odds of poor/fair health, rather than good/very good/excellent, if they were: dissatisfied with pre-injury social relationships compared to not dissatisfied (OR=4.24; 95% CI=1.20, 15.00); or female compared to male (OR=2.05; 95% CI=1.04, 4.05). Participants aged 25-44 years compared to 18-24 years were also at increased odds of poor/fair health but this was not significant (OR=2.26; 95% CI=0.96, 5.35).

#### Discussion

People dissatisfied with social relationships may have fewer supports following injury. Women possibly receive poorer care than men. Other factors, not directly associated with the Pacific health model, may also have important effects on outcomes. Analysis of longer-term outcomes, and other outcomes such as disability, is planned for the Pacific subgroup.

#### Introduction

Migration of Pacific people to New Zealand has been happening since the days of early settlement by non-indigenous New Zealanders<sup>1</sup>, with notable increases from the 1950s to the 1970s<sup>2</sup>. New Zealand's indigenous population, collectively referred to as Māori, had previously settled New Zealand from East Polynesia prior to the thirteenth century<sup>3</sup>. Migration of Pacific people was, at least partly, in response to New Zealand's need to have more workers in labouring and manufacturing industries, industries which still employ a high proportion of Pacific people<sup>4</sup>. Pacific people in New Zealand comprise 7% of the total population, with the six largest Pacific ethnicities being Samoan, Cook Islands Maori, Tongan, Niuean, Fijian and Tokelauan<sup>5</sup>.

Injury-related mortality and morbidity are not distributed evenly across ethnic groups. In New Zealand for example, Pacific peoples experience higher rates of hospitalisation for injury than non-Pacific people<sup>6</sup> and injury contributes to disparities in mortality between Pacific people and New Zealanders of European or Other ethnic origins<sup>7</sup>. However, little research has been undertaken to examine outcomes for Pacific people experiencing injury in New Zealand. Knowledge of such outcomes may assist communities, policy-makers and health/social service professionals to identify areas on which to focus their attention.

In New Zealand a longitudinal cohort study, the Prospective Outcomes of Injury study (POIS), is underway with the aim of identifying predictors of disability and health outcomes following injury<sup>8</sup>. POIS provides an opportunity to consider general health outcomes post-injury, and uniquely, for Pacific peoples. The aim of this paper is to: 1) describe pre-injury characteristics of the POIS participants of Pacific ethnicity in relation to a model of health and well-being for Pacific people<sup>9</sup>, and 2) describe associations between these pre-injury characteristics and general health outcomes for the Pacific subgroup three months after injury.

#### Methods

##### Participants

POIS methods and descriptions of the entire cohort (N=2856) have been described previously<sup>8,10</sup>. To summarise, POIS recruited participants from five regions of New Zealand, including Auckland and Manukau – two regions with high proportions of Pacific residents<sup>10</sup>. Ethical approval of the study was granted by the New Zealand Health and Disability Multi-Region Ethics Committee. Injured participants were recruited by the research team via the Accident Compensation Corporation's (ACC's) entitlement claims register. This register includes people whose injuries are expected to require more than a single treatment episode. People on this register are likely to have more than one week off work because of their injury (if in paid employment at the time of injury). They may receive up to 80% of their pre-injury income if needing time away from paid employment, and also receive health, rehabilitation and social support services. People who agreed to participate in POIS were interviewed, usually by telephone, by one of a team of interviewers; a small proportion elected to complete written questionnaires. This paper

reports data from the first in a series of interviews, undertaken three months after injury. At this interview participants reported pre-injury characteristics and early post-injury outcomes.

Pacific ethnicity was determined by asking participants to self-report their ethnicity according to a question from the New Zealand Census 2006; participants could report multiple ethnicities<sup>11</sup>. Participants who reported at least one Pacific ethnicity were included in this analysis (Table 1). When participants reported a single Pacific ethnicity these are listed; ethnicities with very small numbers were classified as 'Other (Single) Pacific ethnicity'. When participants reported more than one Pacific ethnicity, they were classified as 'Multiple Pacific ethnicities'. Participants not reporting a Pacific ethnicity were excluded from the analyses.

### **Pacific framework of health and well-being**

The conceptual framework used in this paper was the Fonofale model of Pacific peoples' health and well-being<sup>9</sup>. This model was developed by Puluotu-Endemann after consultation with various Pacific communities. The model represents health and well-being using the image of a fale (house). The fale rests on a foundation of 'family and support networks'; has 'culture and beliefs' as the roof, and four supporting posts comprised of 'physical', 'spiritual', 'mental' and 'other' (e.g. gender, age, socioeconomic status) characteristics.

Previously, a review of the POIS interview questionnaire identified questions, or sets of questions, which best-mapped to components within the Fonofale model of Pacific peoples' health and well-being<sup>12</sup>. Pre-injury explanatory variables were selected from the POIS questionnaire to ensure each structural component of the Fonofale model was included. The purpose of this was not to test the Fonofale model, but to ensure that aspects of importance to the health and well-being of Pacific people were considered.

### **Explanatory pre-injury variables used for Fonofale model**

To enable us to consider the pre-injury 'foundation' of the fale, we used two questionnaire items from POIS. The first of these was about overall satisfaction with social relationships in the pre-injury period, including contact with relatives and friends, quality of relationships with partner and/or family, and frequency of social contact. Responses were categorised as Dissatisfied (Mostly dissatisfied/Completely dissatisfied), or Not Dissatisfied (Completely satisfied/Mostly satisfied/Neither satisfied nor dissatisfied). Secondly, participants were asked about the part their family played in their life before injury. Responses were categorized as Large ('Very large/Large') or Not Large ('Small/Very small/No part in their life')<sup>13</sup>.

Three items from POIS were used to represent the pre-injury 'physical post' of the fale. First, participants were asked about pre-injury physical activity. Those reporting that they did either 30 minutes of moderate activity (including brisk walking) or 15 minutes of vigorous activity that made them breathe a lot harder than usual on five or more days a week were classified as 'Yes' for being more physically active; otherwise participants were classified as 'No'<sup>14</sup>. The second and third items were taken from the EQ-5D, a five question measure of general health status about difficulty with five dimensions of general health<sup>15</sup>. The two EQ-5D questions relating to the physical post were used – a question

about pre-injury problems with Mobility (such as walking about) and a question about pre-injury problems with Self-Care (such as washing or dressing). For both questions, participants were grouped as having problems if they reported 'Some problems' or 'Extreme problems', and not if they reported 'No problems'.

Two items were used to represent the 'mental post'. The first of these was based on participants' responses to another EQ-5D question about pre-injury problems with 'Anxiety or Depression'<sup>15</sup>; participants who reported 'Moderate' or 'Extreme' anxiety or depression were categorised as depressed/anxious, and those reporting no or mild symptoms were categorized as 'Not anxious or depressed'. The second was based on a question from the Life Orientation Scale where participants were asked whether they expect 'more good things to happen to them than bad'<sup>16</sup>. Participants who 'strongly agreed' or 'agreed' with the statement were grouped as 'Optimism – Yes'; all other responses were grouped as 'Optimism – No'.

The 'spiritual post' was represented by asking a single question from the FACIT-Sp scale (permission to use was granted by <http://www.facit.org>), where participants rated the level of comfort they had from their faith or spiritual beliefs (responses: Not at all/A little bit/Somewhat vs Quite a bit, Very much)<sup>17</sup>.

The 'Other post' was represented by pre-injury responses to three questions derived from the 2006 Census about gender, age, educational qualification (grouped according to 'No qualifications' or 'School or post-school qualifications'). A fourth question about the adequacy of participants' pre-injury household income to meet needs such as accommodation, food, clothing and other daily necessities was also included<sup>18</sup>, responses categorised as: 'Just enough/Enough/More than enough' and 'Not enough'. Questions in POIS relevant to the cultural 'roof' of the house were limited<sup>12</sup>, but a question from the 2006 Census about whether participants were born in New Zealand (Yes or No) was included in the analysis<sup>11</sup>.

### **General health outcome**

The outcome measure was overall health. Participants rated their 'overall health in general' three months after injury<sup>19</sup>. Responses were categorized as Excellent/Very good/Good; and 'Fair/Poor'.

### **Statistical analysis**

Univariable logistic regression analyses were used to evaluate relationships between pre-injury explanatory variables and outcome (general health three months after injury). All variables in the univariable analyses were then included in backwards step-wise multivariable modeling: explanatory variables, except age, were then removed from the model one by one if their particular p-value was  $\geq 0.1$ ; the model was then re-estimated using the remaining variables. Variables with the highest p-values were removed first. Variables continued to be removed until all remaining explanatory variables had a p-value of  $\leq 0.05$  in the final model. Pre-injury general health, time between the injury event and the interview (as this varied among participants) and perceived threat of severe longer-term disability (as participants had experienced a range of types of injury) were adjusted for in the multivariable analyses. Age was also retained in all multivariable models. Analysis was undertaken using STATA 11.1 (StataCorp LP, College Station, TX).

## Results

Eight percent (n=239) of the POIS cohort of participants (N=2856) identified with one or more Pacific ethnicities. Samoan ethnicity (38%) was the most frequently reported single Pacific ethnicity, followed by Cook Islands Maori (16%), Tongan (17%) and Fijian (17%); smaller proportions were from Niue, Other (Single) Pacific ethnicities, or reported Multiple Pacific ethnicities (rather than a single Pacific ethnicity). The majority of participants resided in Auckland and Manukau City. Interviews were completed a median of 3.3 months (interquartile range 2.6 to 4.5 months) after injury. Five percent of Pacific respondents reported that their health in general prior to injury was either 'poor' or 'fair' (Table 1); three months after injury 27% reported poor/fair health.

**Table 1. Pacific participants' ethnicity, region of residence and pre-injury general health status (n=239)**

Pre-injury characteristics	n	(%) <sup>a</sup>
<b>Pacific ethnicity</b>		
Samoan	92	(38)
Cook Islands Maori	39	(16)
Tongan	41	(17)
Fijian	41	(17)
Niuean	11	(5)
Multiple Pacific ethnicities	11	(5)
Other (Single) Pacific ethnicities	4	(2)
<b>Region of residence in New Zealand</b>		
Auckland	97	(41)
Manukau	121	(51)
Gisborne	7	(3)
Otago	9	(4)
Southland	5	(2)
<b>General health before injury</b>		
Excellent	84	(35)
Very Good	84	(35)
Good	58	(24)
Fair	7	(3)
Poor	4	(2)
Missing	2	(1)

<sup>a</sup> Percentages do not always equal 100 due to rounding.

Table 2 presents univariable relationships between pre-injury explanatory variables and overall health three months after injury (n=236). Larger proportions of Pacific participants dissatisfied with their pre-injury social relationships and those whose family played a smaller part in their lives pre-injury reported poor/fair health after injury, compared to participants who were not dissatisfied with their pre-injury social relationship and whose families played a very large or large part in their lives (fale foundation). There were trends for participants with pre-injury EQ-5D anxiety or depression compared to those with no problems (mental post of the fale), females compared to males, and those reporting not enough pre-injury household income compared to the rest ('Other' post of the fale), to be more likely to experience poor/fair general health after injury.

**Table 2. Pre-injury characteristics in relation to general health three months after injury (n=236) grouped according to the Fonofale model of health and well-being**

Pre-injury characteristics	General Health After Injury		
	Excellent/ Very good/ Good n (%)	Poor/ Fair n (%)	p-value
<b>Foundation of the fale (house)</b>			
Satisfaction with social relationships			
Not Dissatisfied	165 (74)	57 (26)	
Dissatisfied	5 (42)	7 (58)	p=0.01
Family involvement			
Very large/Large	157 (75)	51 (25)	
Small/Very small/ No part in life	14 (52)	13 (48)	p=0.01
<b>Physical post of the fale</b>			
Physical activity			
Yes	83 (73)	31 (27)	
No	80 (73)	29 (27)	p=0.92
EQ-5D Mobility			
No problems	163 (74)	59 (27)	
Problems	9 (64)	5 (36)	p=0.46
EQ-5D Self-Care			
No problems	169 (73)	62 (27)	
Problems	3 (60)	2 (40)	p=0.51
<b>Mental post of the fale</b>			
EQ-5D Anxiety or Depression			
No problems	156 (75)	53 (25)	
Problems	16 (59)	11 (41)	p=0.09
Optimism			
Yes	144 (72)	55 (28)	
No	22 (71)	9 (29)	p=0.87
<b>Spiritual post of the fale</b>			
Comfort in faith or spiritual beliefs			
Very much/Quite a bit	151 (74)	52 (26)	
Somewhat/Little/None	19 (70)	8 (30)	p=0.66
<b>'Other' post of the fale</b>			
Gender			
Male	133 (76)	42 (24)	
Female	39 (64)	22 (36)	p=0.07
Age (years)			
18-24	46 (82)	10 (18)	
25-44	91 (69)	41 (31)	
45-64	35 (73)	13 (27)	p=0.18
Educational qualification			
School or post-school qualifications	132 (75)	44 (25)	
No qualifications	33 (67)	16 (33)	p=0.28
Household income			
Enough/More than enough/ Just enough	145 (76)	45 (24)	
Not enough	26 (62)	16 (38)	p=0.06
<b>Roof of the fale</b>			
Born in New Zealand			
Yes	89 (73)	33 (27)	
No	83 (73)	31 (27)	p=0.98

Pre-injury variables in the final multivariable model are presented in Table 3. Participants reporting dissatisfaction with their pre-injury social relationships had over four times the odds of having poor/fair health outcomes compared to those reporting satisfaction, although the 95% confidence interval was wide. Females had twice the odds of poor/fair health after injury compared to males. There was weak evidence for participants aged 25-44 years having increased odds of poor/fair health after injury compared to the youngest age, however this was not significant.

**Table 3. Multivariable analysis of pre-injury factors associated with fair or poor general health three months after injury (n=227)**

Pre-injury characteristics	Fair/Poor General Health	
	OR <sup>a</sup>	95% CI
<b>Satisfaction with social relationships</b>		
Not Dissatisfied	1.00	Ref
Dissatisfied	4.24	(1.20, 15.00)
<b>Gender</b>		
Male	1.00	Ref
Female	2.05	(1.04, 4.05)
<b>Age (years)</b>		
18-24	1.00	Ref
25-44	2.26	(0.96, 5.35)
45-64	1.39	(0.48, 3.98)

<sup>a</sup> Adjusted for pre-injury general health, time between injury and interview and perceived threat of severe long-term disability at the time of injury event.

## Discussion

This study describes a range of pre-injury characteristics of Pacific participants in a longitudinal cohort study of outcomes following injury. When considering univariable relationships between pre-injury variables (selected for their reflection of components of the Fonofale model of general health and well-being), dissatisfaction with pre-injury social relationships and low levels of reported family involvement pre-injury were associated with poorer health outcomes following injury; weak associations were also found with having pre-injury problems with EQ-5D-defined anxiety or depression, being female and not having enough household income. However, when all pre-injury variables (as presented in Table 2) were considered in multivariable modeling, only being dissatisfied with pre-injury social relationships and being female were significantly associated with increased odds of poor/fair health. Being aged 25-44 years also increased odds of poor/fair health after injury compared to those aged 18-24 years, although this association was not significant.

The Fonofale model, developed through consultation with many different Pacific communities, positions family relationships and networks as the bedrock for Pacific peoples' health and well-being<sup>9</sup>. To our knowledge, the Fonofale model has not previously been used to inform the selection of explanatory variables in studies of general health outcomes. However, our results suggest that for Pacific participants who have been injured, pre-injury satisfaction with social relationships, including family, is associated with their early post-injury outcomes. It is possible that people

dissatisfied with their pre-injury social relationships have fewer social supports to help with the process of rehabilitation and recovery on the pathway to good health in general after injury. The size of the effect was considerable and, if this relationship is supported by results from other studies, suggests that identifying people dissatisfied with pre-injury social relationships (who were a minority), and intervening to provide them with additional supports following an injury, may have the potential to improve general health outcomes after injury.

Pacific women had twice the odds of poor health outcomes three months after injury compared to men, even when adjusting for satisfaction with social relationships, age, pre-injury health and perceived threat of severe longer-term disability. Pacific women more frequently work in manual occupations and less frequently work in administrative, managerial or legislative occupations in New Zealand<sup>20</sup>. It is possible that work in manual occupations has a negative effect on Pacific women's general health after injury. However, in the larger POIS cohort, women of all ethnicities were also at increased risk of poor functional and disability outcomes<sup>21,22</sup>. Other studies have also found women to be at increased likelihood of poor outcome compared to men<sup>23,24</sup>, perhaps because women receive poorer care than men<sup>25</sup>. Further research needs to be undertaken to understand why women, in general, are at increased odds of poor outcomes following injury, including why Pacific women are at risk of poor health after injury. Although not statistically significant, being aged 25-44 years also placed participants at increased odds of poor/fair health three months after injury. Again, further research is required to understand why this group should be at increased odds of poor outcome compared to the youngest group. Perhaps it occurs as a consequence of the multiple tasks and responsibilities often undertaken by this age group (for example, supporting children materially and also in their activities) interfering with opportunities for optimal rehabilitation.

Some variables which were hypothesised to be associated with poor health outcomes following injury were not sustained in the model. For example, it was possible that Pacific people born outside of New Zealand (roof of the fale) may have had poorer health outcomes. This was not supported by our analyses. However, a limitation of our study was that recruitment was via ACC, precluding consideration of people who were injured but did not come to ACC's attention as entitlement claimants.

Although this is first paper to our knowledge where relationships between pre-injury characteristics and outcomes following injury for Pacific people are considered, the analyses we present are opportunistic, arising because POIS contained a reasonable proportion of Pacific participants. Therefore, as with opportunistic studies, our study has a number of limitations. The small sample size means that the analyses may have been underpowered to identify relationships where these, in fact, exist. Because of the sample size, the number of explanatory variables that could be considered in the model was also limited. We were also restricted to the questions asked within the POIS questionnaire and, since it was not designed with the Fonofale model in mind, some areas such as Pacific culture were not comprehensively addressed<sup>12</sup>. Also, other factors, not directly

associated with the Fonofale model of health, may have an important effect on outcomes following injury for Pacific people. Since this study relies on self-reported survey data with pre-injury data collected retrospectively at the time of first interview recall bias might have occurred. As participants were specifically directed to consider their status pre-injury, and few of the pre-injury variables examined here are likely to be influenced by their status at the time of interview, the impact of recall bias, if any, should be minimal.

## Conclusions

Being dissatisfied with pre-injury social relationships and being female were significantly associated with increased odds of poor/fair health for Pacific participants in a larger cohort study. People dissatisfied with social relationships may have fewer supports following injury. Women possibly receive poorer care than men. Other factors, not directly associated with the Pacific health model, may also have important effects on outcomes. This is the first paper in which specific analyses of data provided by Pacific participants in the larger cohort study are presented. Future analyses are planned to investigate other variables such as those related to access to health and social services and the type and severity of injury experienced by Pacific people. Analyses are also planned to consider other outcomes for this Pacific subgroup such as disability and socioeconomic outcomes; and longer-term outcomes at 12 and 24-months.

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