

# Children and Families Research Fund

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## Application Form

Closing date 31 August 2018

Example



**MINISTRY OF SOCIAL  
DEVELOPMENT**  
TE MANATŪ WHAKAHIATO ORA

Email the completed application form to [researchfund@msd.govt.nz](mailto:researchfund@msd.govt.nz)

**Applications close on 31 August 2018**

Note – GUiNZ data sets will be accessed through the University of Auckland Remote Access Data Platform and approved research teams will be required to also apply through the (GUiNZ) Data Access Committee application process. Funding is conditional on a successful application to the (GUiNZ) Data Access Committee.

For questions about applying for funding and completing this application form please email [researchfund@msd.govt.nz](mailto:researchfund@msd.govt.nz).

Example



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### Co-researchers and collaborators

Name:	Position:
Organisation:	
E-mail:	Phone:
<b>Role in research:</b>	
<b>Bio:</b>	

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Role in research:	
<b>Bio:</b>	

Avinesh Pillai

## Research topic

Proposed topic/working title:

Identifying predictors of child injury in the preschool years

Provide a brief overview of the research project summarising the research objectives and methodology (up to 250 words).

The aim of this research is to understand how proximal and distal risk factors in combination, and events over time, affect a preschool-aged child's risk of experiencing unintentional injury. Our specific research objectives are:

1. To investigate how combinations of situations and multiple events act across the life-course to either protect a child or, alternatively place them at risk of isolated/repeated injuries requiring medical attention.
2. To determine how these life-course determinants of childhood injury vary between population subgroups in particular for Māori children.

To achieve our aim and objectives we will employ the following methodology. An analysis of *GUINZ* parental-reported data of preschool injuries (injuries from 0 to 54 months resulting in medical attention being sought) and exposure data, including:

- child and parental physical and mental health
- the relationship between the parents and observed interactions between the child and caregiver/s
- child psychosocial and cognitive development
- child's behaviour and temperament
- home safety characteristics.

Multilevel modelling will be used to identify the life-course determinants of preschool child injury. The findings will be used to aid in the development of policy initiatives to reduce the incidence of preschool injury in NZ. We will align with Safekids, Māori health providers, and key staff within the Ministry of Health to assist in the development of these policies.

## Use of GUiNZ data

The Fund is dedicated to research using GUiNZ data, specifically GUiNZ 'external' datasets. These datasets contain anonymised data and are governed by the [Data Access Protocol](#) and the [Data Access Committee](#), both of which are managed by The University of Auckland. It is expected that all researchers using the GUiNZ data will familiarize themselves with the Data Access Protocol. We strongly recommend attending a Data Access Workshop if possible.

Applications must make significant use of GUiNZ data and demonstrate researchers' familiarity with GUiNZ data through either:

- attendance at a GUiNZ Data Access [Workshop](#) (recommended)
- familiarisation with the [materials](#) covered in a workshop

Does the proposed research primarily use GUiNZ data?	<b>Yes</b>
Do any members of the research team have previous experience of using GUiNZ data?	<b>Yes</b>
Has the Principal Researcher and/or co-researcher(s) attended a GUiNZ Data Access Workshop?	<b>Yes</b>
<b>OR</b>	
Has the Principal Researcher and/or co-researcher(s) familiarised themselves with the workshop materials?	<b>Yes</b>

## Data access

GUiNZ data sets will be accessed through the University of Auckland Remote Access Data Platform and approved research teams will be required to complete the GUiNZ Data Access Committee application process. Funding is conditional on a successful application to the GUiNZ Data Access Committee.

Applicants will be required to state in their DAC application form that they have applied to the Fund. Applicants will be required to use the existing DAC application forms to maintain consistency with GUiNZ data access requirements.

## Data from other sources

The Fund covers research that makes significant use of GUiNZ data. For wider studies that include additional data sources, the GUiNZ component of the study should be foremost. In these cases, the wider study should be described in your application to demonstrate how information from the use of GUiNZ data can be compared or supplemented with information from other data sources and implications thereof for the GUiNZ Data Access Protocol and principles. This procedure has also been adopted to prevent funding overlaps, especially where government funds are involved.

## Support for Fund objectives

This section asks you to explain how the proposed research supports key objectives of the Fund. Note that research proposals are not required to support all (or any) of the objectives. However, greater support is likely to increase the chances of your application being successful because criteria for the assessment and selection of applications are based on the Fund objectives.

1. Demonstrate the **quality** of the proposed research with:

- a clear statement outlining the research questions, aims and objectives
- an outline of the research methodology, proposed analyses and peer review arrangements
- information about the researchers' expertise in relation to the proposed research (if not already addressed in earlier bios). Where the proposed research relates to Māori evidence needs and/or whānau wellbeing, include explanation of the researchers' capability for research in this area.

### Aims and objectives

The aim of this research is to understand how proximal and distal risk factors in combination, and events over time, affect a preschool-aged child's risk of experiencing unintentional injury.

Our specific research objectives are:

1. To investigate how combinations of situations and multiple events act across the life-course to either protect a child or, alternatively place them at risk of isolated/repeated injuries requiring medical attention.
2. To determine how these life-course determinants of childhood injury vary between population subgroups in particular for Māori and Pacific children.

### Methodology

The study will use a life-course approach and analyse *GUINZ* parental-reported data of preschool injuries (injuries from 0 to 54 months resulting in medical attention being sought) and exposures of interest including child and parental physical and mental health, the relationship between the parents and observed interactions between the child and caregiver/s, child psychosocial and cognitive development, child behaviour and temperament, and home safety characteristics.

Study setting and participants: The *GUINZ* cohort data to the 54 month data collection wave.

Case definition: We will use the World Health Organization's (WHO) unintentional injury definition. This means we include children who sustain an injury which 'accidentally' occurred such as poisoning, burns and scalds, drowning, incision, falls, and transport-related injuries. Treatment injuries will be excluded, and interpersonal violence or self-harm injuries as these are classified as 'intentional' injuries, and therefore will be excluded.<sup>1</sup>

Ethnicity: The burden of fatal and non-fatal unintentional injury is disproportionately carried by Māori children compared to their non-Maori counterparts.<sup>2</sup> Therefore the prevention of injury among Māori children is critical to improving their health and wellbeing. *GUINZ* was explicitly designed to provide relevant evidence to improve the health and social circumstance of Māori, Pacific and Asian children as well as the population as

a whole.<sup>3</sup> The use of *GUINZ* data means we have significant potential to provide meaningful information specific to the prevention of injuries in preschool Māori children.

Data variables of interest: the outcome of interest is parental reports of injury events where medical treatment was sought. The exposures of interest include the child's general health; parental demographics, physical and mental health; the relationship between the parents and observed interactions between the child and caregiver/s; child psychosocial and cognitive development; and behaviour and temperament (Table 1). Changes over time in caregiver relationships, household membership, deprivation and rurality will be examined as will aspects of the neighbourhood (including integration and access to services), and parental support and stress. Specific questions on health (e.g. injuries requiring medical attention – type and mechanism) and safety practices in the home include: safe storage of medicines, poisons, matches and cigarette lighters; presence of working smoke alarms and locked doors/secure gates on stairways; household hot water temperature settings; use of electric outlet protectors, and car seats; knowledge about toxic/poisonous substances ingestion management; fencing of play areas/driveways; and sources of safety knowledge.

<b>Child characteristics</b>	<b>Distal social environments</b>
<ul style="list-style-type: none"> <li>• Early life injuries</li> <li>• Size at birth &amp; perinatal health</li> <li>• Child anthropometry</li> <li>• Psychosocial and cognitive development</li> <li>• Behaviour and temperament</li> </ul>	<ul style="list-style-type: none"> <li>• Neighbourhood (physical location, integration, access to services, informal support available)</li> <li>• Transport &amp; access to local services</li> <li>• Early childhood Education</li> <li>• Well Child checks</li> <li>• Interaction with social services</li> </ul>
<b>Proximal social environments</b>	<b>Macro environmental factors</b>
<ul style="list-style-type: none"> <li>• Family structure, including parents, siblings and extended family</li> <li>• Child's home physical &amp; social environment</li> <li>• Parental physical and mental health</li> <li>• Household deprivation</li> <li>• Parental stress and support</li> <li>• Parent-child interaction</li> <li>• Ethnic identity</li> <li>• Safety practices in the home</li> </ul>	<ul style="list-style-type: none"> <li>• Continuity of access to primary health care services</li> <li>• Healthcare costs</li> <li>• Parental labour force status</li> <li>• Early childhood education</li> <li>• Family support measures including any family taxation relief or benefits</li> <li>• Housing tenure</li> <li>• Residential mobility</li> </ul>

**Table 1: Summary of potential proximal and distal risk factors for preschool injury confounding in the *GUINZ* dataset**

Statistical analyses: Both dichotomous (injury/no injury, health care visit/no health care visit) and interval level measures (number of injury events, number of health care visits) will be used to measure each cohort child's unintentional injuries. Appropriate life-course statistical methodology will be applied to respect the temporal nature of the data and the highly correlated repeated exposure measures. Similar analytical approaches used previously by the research team,<sup>4 5</sup> will be applied to identify clusters of overlapping injury risk factors.

After examining the distributions of exposure and outcome data using descriptive statistics, we will develop a life-course model (through the use of multilevel modelling) to examine relationships between neighbourhood, child and family characteristics and injury from birth to <5 years of age. The neighbourhood, child and family characteristic variables of interest are displayed in Table 1. The models will be built by adding variables (fixed effects) with a p-value of < 0.1 in the univariate analysis into the model, in order of their significance on univariate analysis and based on theoretical knowledge to minimize residual confounding. Where possible statistically independent variables will be entered into the model rather than proximal variables taking precedence because of measurement processes.<sup>6 7</sup> They will be retained in the model if they are significant at the 5% level. At the end of the modelling, excluded variables will be reassessed for inclusion. Two-way interactions between covariates which seem theoretically plausible

will be examined. Correlations between coefficient estimates of explanatory variables will be assessed using the covariate correlation matrix. Models will be checked by examining plots of residual values, leverage and influence. Independent associations of factors with injury events, doctor visits or hospital admissions will be described using adjusted ORs and 95% CIs. Measuring cumulative exposure is required because clusters of risk factors do not always involve the same identified characteristics.<sup>4</sup>

This project creates new knowledge about the life-course determinants that lead to injury among NZ preschoolers. The identification of factors or clusters of factors will inform the development of a prioritised range of evidence-based policy initiatives. The longitudinal perspective offers novel and critically needed contemporary population and context relevant evidence to determine timely points for the delivery of effective interventions. In addition, by deepening our understating of why inequities in injury outcomes by ethnicity and socioeconomic status exist in NZ children, we can inform new policies and interventions to reduce the frequency and impact of injury in these vulnerable populations.

### **Alignment with Children and Families Research Fund objectives**

This proposal aligns with the objectives of the fund in the following ways:

#### Increases the number of high-quality, high-impact, policy-relevant research projects using *GUINZ* data

Findings will be submitted for publication in NZ and international scientific peer reviewed journals. Opportunities to present results will be sought at a range of national and international health research venues, including those with a focus on injury prevention and life-course research. The research builds on a previous publication which used the *GUINZ* data to determine whether specific demographic characteristics are associated with the presence or absence of household safety strategies.<sup>8</sup>

The project will provide a platform for collaborative, evidence-based change by providing data which will help to identify opportunities to reduce inequities in child health outcomes through the use of epidemiological and statistical modelling methods. Predictive models are useful because they can consider both proximal and more distal determinants of injury. The existing *GUINZ* Policy Forum and the project specific Study Reference Group (SRG) will provide a knowledge transfer pathway to ensure the findings are made available to key agencies involved in the delivery or funding of injury prevention activities.

#### Facilitates partnerships between government and researchers and foster evidence-informed policy and decision-making

The project will strengthen existing domestic relationships between the Centre for Longitudinal Research based at the University of Auckland, the NZ Child & Youth Mortality Review Committee, the NZ Trauma Committee of the Royal Australasian College of Surgeons, ACC, the Australian Injury Prevention Network, Safekids Aotearoa, Massey University, and Te Whare Wānanga o Awanuiārangi. These strong relationships support the development of capacity to analyse injury-related information that can be used to inform injury prevention and to enhance the programme of research in this field. We will also draw on members of the research team's international networks to facilitate the dissemination of findings beyond NZ including the WHO Expert Advisory Group on Violence and Injury Prevention, and the Road Traffic Injury Research Network Board.

#### Builds sector capacity for research with longitudinal data, including with non-academic and early career researchers

Given the disproportionate number of Māori children who experience unintentional injuries, we have been particularly careful to ensure that Māori researchers and academics have been involved in the design of the study. Moreover, that Māori have had the opportunity to consider how the research might be applied to improve Māori health outcomes. It is therefore our intention to recruit a Māori Research Fellow so that

we can develop Māori research capacity in advanced analytical skills including life-course epidemiology, and child injury prevention. Funding has been allocated in the budget for the Research Fellow to participate in statistical training courses as required. This will provide an important opportunity for them to experience working within a team of experts in injury prevention, child health, and advanced epidemiological statistical methods. Professor Te Kani Kingi has agreed to help support the Māori Research Fellow and to also connect them with the study's wider Kaitiaki Group. The Research Fellow will meet with the Kaitiaki Group over the course of the study to discuss the study's progress, outcomes and potential application of findings. The Group will support the Research Fellow to explore their development needs and opportunities. Statistical support for the Research Fellow will be offered by the Senior Epidemiologists and Statistician on the team. We will utilise our networks with Te Kupenga Hauora Māori (University of Auckland) to assist us to locate a suitable candidate. The candidate will ideally have a background in public health and an interest in child health. They will assist with all aspects of the study including drafting ethics and institutional research approvals, data linkage, cleaning of data, analysis and write up, and the translation of findings for informing policy and practice.

Supports use of *GUINZ* data to meet the evidence needs of Māori and Pacific peoples, and to understand, promote and further whānau wellbeing

Injuries are a major cause of mortality and morbidity among Māori children.<sup>9</sup> Māori children have an unintentional injury mortality rate 3.5 times that of non-Māori children.<sup>10</sup> We acknowledge the important contemporary work being completed in Australia on differences in injuries between indigenous and non-indigenous populations,<sup>11 12</sup> and we value the opportunity to compare NZ to Australia and other developed countries in order to better understand potential drivers for known inequities in child injury rates between indigenous and non-indigenous groups. Māori participation has been embedded at every level of *GUINZ*. The research is guided by a Kaitiaki group, chaired by Professor Te Kani Kingi (a NI on this project). Kaumātua and Kuia from Ngāti Whātua and Tainui have also guided the research since its establishment. The research team will continue to utilise Māori input at all stages of the research and use consultative and participatory processes to ensure the research design, implementation, analysis, report writing and dissemination of this project is appropriate for Māori. We will work with Māori health providers, the Minister for Whanāu Ora and Māori Development, and with key Māori staff within the Ministry of Health who are well placed to use our research to develop policies that recognise Māori rights to good health and self-determination. This engagement will be a key component in the development of recommendations arising from the findings of this research that can assist the Ministries of Health, Business Innovation and Employment, Social Development, the Children Young People and Families Service, Land Transport, Police, ACC and other agencies involved with the care and safety of Māori children to be responsive to the needs of the tangata whenua with regard to injury prevention.

At age four, 25% (1522 children) of the *GUINZ* cohort were Māori ensuring adequate explanatory power for Māori in the proposed analyses. Regression modelling will be used to investigate how life-course determinants of injury among preschool children vary between ethnic and socio-economic population subgroups. The findings could help address ethnic disparities in child injury rates by providing Māori specific data to inform the development and prioritisation of relevant injury prevention activities. A recent systematic review of interventions to reduce childhood injuries among indigenous populations, acknowledged the need for more evaluation of interventions to assess their appropriateness for Tamariki Māori.<sup>13</sup>

Twenty percent of the cohort identify as Pacific, and with a retention rate of 90% at 54 months, this project has adequate explanatory power to identify risk and protective factors for injury among Pacific children. The research will provide unique individual,

family and neighbourhood information to assist with understanding why inequities in injury outcomes by ethnicity and socioeconomic status continue to persist.

Increases the impact of funded research through effective research dissemination and application.

It is anticipated that the project will result in at least two publications for submission to peer reviewed scientific journals. Drawing on the study findings, we will work with the SRG and key stakeholders to develop a prioritised range of new policy initiatives to reduce the incidence of preschool injury. We will align with Māori health providers, and key staff within the Ministry of Health to assist in the development of policies that recognise Māori rights to good health and self-determination.

### **The team**

The proposal brings together a strong team with international expertise in child injury epidemiological research, public and child health, life course epidemiological methodology and analyses, and translation of research evidence to inform policy. Each team member has a specific role in the study's oversight, design and analysis and all will contribute to the interpretation and dissemination of findings, including preparation of publications. The investigators have extensive linkages with child health and injury research networks in NZ and internationally. These include: Injury Prevention Aotearoa, the NZ Interagency Injury Information Working Group, the Australasian Epidemiological Association, the Australian Injury Prevention Network, the Society for Advancement of Violence and Injury Research (US based), the Paediatric Society of NZ, the Road Traffic Injury Research Network Board, ACC, Safekids Aotearoa, the WHO Expert Advisory Group on Violence and Injury Prevention, the NZ Child & Youth Mortality Review Committee, the NZ Trauma Committee of the Royal Australasian College of Surgeons, and the Road Traffic Injury Research Network Board.

All members of the research team will contribute to the generation of high quality outputs relevant to local and international audiences, and the translation of study findings. The study will build on existing networks and the collaborative relationships that will be established with the proposed SRG. The SRG will include representatives from ACC, Safekids Aotearoa, Plunket, and a Pacific injury prevention group.

2. Demonstrate the likely **impact** of the proposed research using the following questions:

- What actions or decisions could result from this research for the end-user? If the proposed research relates to whānau wellbeing, how will the findings be used to positively impact whānau wellbeing?
- What are the cross-sector implications of this research and to whom?
- How will the results of this research be communicated to the decision maker or end user? What type of information will help them action the findings?
- What are the planned dissemination methods and audiences? (Note that dissemination includes the standard deliverables required of all successful proposals, i.e. an interim progress report, final technical report, policy brief, and seminar, and the planned peer review processes associated with these.) How will these outputs be used to maximise the impact of the research?

### **The actions or decisions benefiting the end-user**

It is hoped that the findings of this research will create new knowledge about the life-course determinants that lead to injury among NZ preschoolers. We anticipate being able to identify factors or clusters of factors that will inform the development of a prioritised range of policy initiatives (including socio-political factors), based on existing evidence-based practice. The longitudinal perspective will offer novel and critically needed population relevant evidence to determine timely points for the delivery of effective interventions that are contextually relevant to NZ children and their current families and environments.

We described how our proposed research will be used to positively impact whānau wellbeing in Section 1, where we linked our research to the fund objective – ‘Supports use of *GUINZ* data to meet the evidence needs of Māori and Pacific peoples, and to understand, promote and further whānau wellbeing’.

In addition, the PI has previously been an adviser for the ‘injury prevention’ section of the Well Child Tamariki Ora book. The findings from this research will provide an evidence base for future updates of the Well Child book.

### **Cross sector implications**

The project will provide a platform for collaborative, evidence-based change by providing data which will help to identify opportunities to reduce inequities in child health outcomes through the use of epidemiological and statistical modelling methods. Traditional conceptual approaches to understanding and preventing child injury in NZ have focused on short-term and proximal influences, such as playground surfacing,<sup>14</sup> behavioural characteristics, parental discipline,<sup>15</sup> and child characteristics.<sup>16</sup> While these factors are individually important predictors of injury, significant population level improvements are difficult with approaches that remedy single risk factors. The aim of this research is to explore predictors of preschool unintentional injury, looking at both proximal and distal factors. The inclusion of household and neighbourhood factors mean that the findings are likely to require cross-sector solutions. The multi-dimensional nature of the SRG will help to provide a pathway for knowledge transfer to inform key stakeholders of the recommendations for policy and practice to highlight opportunities for child injury prevention.

### **Communication Plan**

The existing *GUINZ* Policy Forum and the project specific SRG will provide a knowledge transfer pathway to ensure the findings are made available to key agencies involved in the delivery or funding of childhood injury prevention activities. Findings will be submitted for publication in NZ and international scientific peer reviewed journals. Opportunities to present results will be sought at a range of national and international health research venues, including those with a focus on injury prevention and life-course research. As an integral component of the project, investigators will work with the multi-sector SRG to draw on the study findings, related national and international evidence, and stakeholder perspectives to develop a prioritised range of new policy initiatives (including ones that address socio-political factors). The development of new policy initiatives will be based on existing evidence-based practice identified from systematic reviews of the published literature. We will consider relevant consensus building approaches in discussion with the SRG identifying, where relevant, novel approaches that can overcome existing barriers to child injury prevention in the NZ context.

3. Demonstrate the **policy relevance** of the proposed research using the following questions:

- What is the emergent or enduring policy problem, issue or opportunity that the proposed research addresses?

- How will the proposed research assist in developing solutions, supporting existing activities or prompting new activities or interventions?
- How does the research address current research and policy knowledge gaps?
- What information does the user or decision maker need to know to answer the policy question? What level of precision do they need for findings to be useful? How are the strengths and limitations of chosen methods balanced with the information needed for decision-makers to act on the findings?

### The Issue

The proposed research addresses three key issues or opportunities, these are:

1. The burden of unintentional childhood injuries in the preschool age group in New Zealand

Unintentional injuries are a leading cause of child hospitalisation and death in NZ.<sup>17-19</sup> On average, 2,600 children under the age of 5 years are admitted to hospital with an injury annually, and close to 50 die. In addition, injury among young children exacts a substantial cost on society. ACC accepts around 19,000 new claims annually for unintentional injury among this age group, with falls the leading mechanism of injury accounting for approximately 50% of claims.<sup>20</sup> The annual ACC claim expenditure for child injuries is around \$175M, and the total economic and social cost per child injury fatality \$8.05M (2008 data - most recent available).<sup>21</sup>

The distribution of child injury varies by socio-economic status<sup>22</sup> and ethnicity,<sup>9</sup> with children living in areas of greater social disadvantage over-represented in injury-related admissions to hospital.<sup>2 23</sup> Māori children experience higher rates of hospitalisations for pedestrian and vehicle occupant injuries than non-Māori non-Pacific children.<sup>23</sup> Both fatal and non-fatal unintentional injury rates in NZ have the highest prevalence among preschool-aged children.<sup>24</sup> In this younger age group patterns of injury differ from those seen in older children and more frequently include burns,<sup>25</sup> poisonings,<sup>26</sup> and ingestions.<sup>27 28</sup>

2. The need for a broader perspective on child injury prevention and a child specific approach

As mentioned in the previous section, traditional conceptual approaches to understanding child injury in NZ have focused on short-term and proximal influences. Single risk factor approaches (while important) can curtail opportunities for more substantial gains at a population level.<sup>17</sup> In contrast, studies in other countries have explored a range of proximal and distal child injury related factors. This proposal builds on research on unintentional injuries in childhood during the 1970s as explored in the Dunedin,<sup>29-32</sup> and Christchurch cohorts,<sup>33-36</sup> other relevant NZ analytical studies,<sup>37 38</sup> and international cohort studies that have explored a range of factors and injuries to young children including: neighbourhood influences,<sup>39 40</sup> family and individual characteristics,<sup>39-42</sup> and safety practices.<sup>40 41</sup>

*GUINZ* considers the breadth of influences impacting upon children. In section one of this application, Table 1 summarises the potential proximal and distal risk factors for preschool injury contained in the *GUINZ* dataset that we will explore in this study. In addition, similar safety feature information to that explored by Kendrick et al.<sup>41</sup> have also been collected from the *GUINZ* cohort. An analysis of the relationship between their absence or presence in the *GUINZ* cohort and preschool injury will enable comparisons with the UK data from Kendrick et al's study which found children from households lacking certain safety behaviours (e.g. storing sharp objects safely, fitted stair gates, working smoke alarms etc.) were at increased risk of injury. Data from Safekids NZ, indicates that over 60% of injuries in preschool children happen in the home,<sup>2</sup> consistent with the 69% found in the *GUINZ* cohort.<sup>22</sup> Suggesting that the identification of factors

which place children at increased risk of injury in these settings has the potential to reduce a substantial burden of childhood injury.

### 3. The advantages of a life course approach to injury prevention

A life-course epidemiological approach can be applied to build a more comprehensive picture of the multiple factors that surround preschool injury, permitting analysis of the proximal and distal causes of pre-schooler injury and the interaction effects between these. This approach has the potential to identify multiple potential interventions and determine their optimal timing and relative potential.<sup>43</sup> For example, a programme of prenatal and infancy home visitation in the US to improve prenatal health related behaviours, reduced the rates child abuse and neglect, maternal welfare dependence, and a subsequent reduction in the child's criminal and antisocial behaviour.<sup>44</sup>

We hypothesise that situations in combination and the cumulative effect of separate events acting over time determine a child's risk of being injured during the preschool years.

#### **How we will address the issues**

This project creates new knowledge about the life-course determinants that lead to injury among NZ preschoolers. We anticipate being able to identify factors or clusters of factors that will inform the development of a prioritised range of policy initiatives (including socio-political factors), based on existing evidence-based practice. The longitudinal perspective will offer novel and critically needed population relevant evidence to determine timely points for the delivery of effective interventions that are contextually relevant to NZ children and their current families and environments. In particular:

- Preventing injury: Injury is the leading cause of mortality and morbidity for young NZ children. Identifying proximal as well as distal life course determinants of preschool child injury in NZ will identify new multi-sectoral and, multi-level opportunities to optimise injury prevention and control efforts and provide evidence of modifiable risk factors which can be used to inform policies and interventions to reduce the impact of injuries.
- Reducing inequalities in risk factors and determinants for disease and injury: Children living in areas of high social disadvantage, and of Pacific or Māori ethnicity are over-represented in injury-related hospital admissions. With 24% of the child cohort identified as Māori, 20% as Pacific, and a retention rate of 90% at 54 months, this project has adequate explanatory power to identify risk and protective factors for injury among Māori and Pacific children. The research will provide unique individual, family and neighbourhood information to assist with understanding why inequities in injury outcomes by ethnicity and socioeconomic status continue to persist. Moreover, to provide the evidence needed to inform the design and application of culturally responsive and effective policies and interventions to reduce the prevalence and impact of injury in these vulnerable populations.
- Economic benefits for NZ: In addition to achieving a primary outcome of health benefit: This research will identify opportunities to reduce preschool child injury morbidity and mortality in NZ, and thereby the associated direct and indirect costs of those injuries. A review of child and adolescent safety measures in NZ estimated that if our child injury mortality rate was reduced to that of The Netherlands (one of Europe's safest countries), then approximately 130 lives per year could be saved (60% of all child & adolescent injury deaths).<sup>17</sup> This research has the potential to identify opportunities to reduce the frequency of preschooler injuries and thereby the associated direct and indirect costs.

The awareness of existing strategies, barriers to implementation, and relevant cost and resourcing implications will strengthen the collective role of the stakeholder group to act as knowledge brokers informing specific evidence-based child prevention strategies in

NZ. Where evidence is lacking we anticipate we will identify novel injury prevention approaches for evaluation in subsequent intervention studies.

The *GUINZ* Policy Forum, the SRG and the research team named in this proposal represent a nationwide group of experts with extensive networks that include key Government Ministries relevant to the child health and injury area in NZ. On completion of the study, this stakeholder group will participate in a hui where they will draw on the study findings, related national and international evidence, and stakeholder perspectives to develop a prioritised range of new policy initiatives (including ones that address socio-political factors), based on existing evidence-based practice identified from systematic reviews of the published literature. A policy brief aimed at Government agencies will be developed to summarise the evidence and provide guidance on priority areas for action. These policy initiatives will be relevant to Government agencies involved in the provision or funding of healthcare for injured children and those involved in child injury prevention MoH, DHBs, ACC, Safekids, Plunket, Land transport, and Housing NZ.

4. Demonstrate how the research will be achieved through **partnerships** with policy professionals, using the following questions:

- Describe engagement to date between policy professionals and researchers on the proposed research.
- Do you have a policy collaborator?
- Who are your key stakeholders?
- How has this research been co-designed?
- How does this research encourage linkages between Government policy and researchers across New Zealand?

#### **Partnerships and policy collaborators**

This research plan has been evolving over a number of years and has been a partnership between researchers at the School of Population Health, research advisors, and agencies involved in child wellbeing including injury prevention. These discussions have helped to inform the current design of the project. In addition, more recently discussions have been held with Melissa Wilson, the recently appointed Director of Safekids Aotearoa, who is very supportive of the project.

The senior investigators (Kool, Morton, Grant, Kingi, and Ameratunga) have all had 17 years or more experience in undertaking/leading health-related research. Kool, Morton, Grant, and Ameratunga have published extensively on child health issues including injury. Two of the investigators are Paediatricians (Grant and Ameratunga), and two are Public Health Medicine Specialists (Ameratunga and Morton) both of these specialities require an in depth knowledge of the determinants of health and a sound understanding of primary prevention and the policies that are required to address them. The PI has spent the majority of her 17 years of research experience focusing on injury epidemiology, and this combined with her more than 20 years of paediatric nursing experience mean she is well positioned to lead this research.

All of the senior investigators on this project are actively engaged with key agencies involved in improving health outcomes for New Zealanders. These include: the Accident Compensation Corporation of NZ (ACC), NZ Interagency Injury Information Working Group, the Major Trauma National Clinical Network, the Ministry of Health, Australasian Epidemiological Association, the Australian Injury Prevention Network, the Paediatric Society of NZ, the Road Traffic Injury Research Network Board, ACC, Safekids Aotearoa, the WHO Expert Advisory Group on Violence and Injury Prevention, the NZ Child & Youth

Mortality Review Committee, the NZ Trauma Committee of the Royal Australasian College of Surgeons; and the Road Traffic Injury Research Network Board. Members of the research team will draw on these networks to engage with the development and dissemination of child-injury relevant policy. They will draw on these networks to develop partnerships to explore how the findings of this research reaches the policy advisors who can influence change to reduce the burden associated with injuries among preschoolers in NZ to ensure the .

### **Key stakeholders**

As mentioned earlier in this document we will bring together a SRG for this study with relevant expertise, in addition we will have access to the *GUINZ* Policy Forum. These are our key stakeholder groups who will provide direct advice and support regarding refinements to the design of the study and in the interpretation and dissemination of study findings and their implications for policy and practice. There are other stakeholders directly/indirectly involved with the prevention of childhood injuries who are also important to this project who we intend to engage with at the proposed hui (discussed in Section 3) and they include: Plunket; Watersafe NZ; NZ Transport Agency; ACC; local government; education providers; the Office of the Children's Commissioner; District Health Boards; Worksafe NZ; the Ministries of Health, Business Innovation and Employment, and Social Development; and consumer groups.

### **Research co-design**

Implementation science attempts to understand and encourage uptake of research through the development of strong partnerships between researchers and stakeholders from the outset. This co-design approach involves engaging with end-users in the design of the research to aid in promoting their understanding of the research and encouraging uptake of the findings.<sup>45</sup> It places end-user values at its very heart and seeks to establish an ongoing, collaborative approach between researchers and end users. A co-design approach has been used from the outset of the design of this project and has where possible adhered to the principles of co-design: inclusive, respectful, participative, iterative, and outcomes focused. The composition of the research team has been designed to be inclusive of a range of relevant end-user disciplines including nursing, paediatrics, public health medicine and injury prevention specialists and Maori health experts. The study proposal has been discussed and is supported in principle by the Director of Safekids NZ. Should the study be funded a SRG will be established whose membership will include key agencies involved in child injury prevention and will draw on existing networks that the co-investigator team have established over many years of working in child health and injury prevention. An initial meeting will be held with SRG members to discuss and where required refine the proposed study methods including the analysis and dissemination plan. Throughout the conduct of the study, the SRG will be kept up to date with the study progress through quarterly updates. As the study findings become available, the investigators will work with the SRG to draw on the study findings, related national and international evidence, and stakeholder perspectives to develop a prioritised range of new policy initiatives (including ones that address socio-political factors), based on existing evidence-based practice identified from systematic reviews of the published literature. This phase of the research is also designed to access and integrate stakeholder perspectives on intervention strategies that require further evaluation and indicators that require ongoing monitoring. This activity will take place during a hui with the SRG and other key stakeholders.

### **Encouraging linkages between Government policy and researchers across New Zealand**

The project aligns with a number of key national and international strategy documents and therefore the findings will be useful in engaging with government agencies to inform the development of policy that can help reduce the harm resulting from preschool child injury. These policies include the New Zealand Health Strategy,<sup>46</sup> He Korowai Oranga

(the Māori Health Strategy),<sup>47</sup> 'Ala Mo'ui: Pathways to Pacific Health and Wellbeing,<sup>48</sup> and the United Nations (UN) Convention on the Rights of the Child.<sup>49</sup>

The NZ Health Strategy recognises the importance of a life course approach to improving people's health.<sup>46</sup> The strategy acknowledges that "influences outside the health system, such as home environments and participation in work, are also vital to people's wellbeing and health" (page 4, NZ Health Strategy).

He Korowai Oranga (the Māori Health Strategy) highlights the need to support conditions that build on the "strengths and assets of whānau and encourage their health and wellbeing (as well as preventing or treating disease)", and emphasises the importance of pursuing health in the context of the environment in which whānau live.<sup>47</sup>

One of the main priorities in 'Ala Mo'ui: Pathways to Pacific Health and Wellbeing is supporting projects that strengthen Pacific child and youth protective factors.<sup>48</sup>

The UN Convention on the Rights of the Child is a human rights treaty which sets out the out the civil, political, economic, cultural, social and health rights of children.<sup>49</sup> Article 6 states that:

- Parties recognise that every child has the inherent right to life.
- Parties shall ensure to the maximum extent possible the survival and development of the child

The existing well-established networks that the investigator team have with key government and non-government agencies in addition to the proposed make-up of the SAG will help to support the ongoing maintenance of key linkages. Members of the research team collaborate closely with Otago University's Injury Prevention Research Unit, and the PI is on the executive of the Australasian Injury Prevention Network an excellent forum for creating linkages with child injury researchers in Australia and NZ.

5. Explain how the proposed research will build **sector capability for research with longitudinal data**. Consider:

- outlining the GUiNZ data to be used, the general analytic approach and how it will answer the research question.
- how the research question relies on longitudinal data.
- the role of non-academic and/or early career researchers in the proposed research.
- how the methods used in research design and analysis of longitudinal data will be disseminated.

**GUiNZ data use, the general analytic approach and how it will answer the research question**

As previously described, the study will draw on self-reported data from the GUiNZ study including: dichotomous (injury/no injury, health care visit/no health care visit) and interval level measures (number of injury events, number of health care visits), and the neighbourhood, child and family characteristic variables of interest (see Table 1).

A life-course epidemiological approach will be used to build a comprehensive picture of the multiple factors that surround preschool injury, permitting analysis of the proximal and distal causes of preschooler injury and the interaction effects between these. After examining the distributions of exposure and outcome data using descriptive statistics, we will develop a life-course model (through the use of multilevel modelling) to examine relationships between neighbourhood, child and family characteristics and injury from birth to <5 years of age. The models will be built by adding variables (fixed effects) with

a p-value of  $< 0.1$  in the univariate analysis into the model, in order of their significance on univariate analysis and based on theoretical knowledge to minimize residual confounding. Where possible statistically independent variables will be entered into the model rather than proximal variables taking precedence because of measurement processes.<sup>6 7</sup> They will be retained in the model if they are significant at the 5% level. At the end of the modelling, excluded variables will be reassessed for inclusion. Two-way interactions between covariates which seem theoretically plausible will be examined. Correlations between coefficient estimates of explanatory variables will be assessed using the covariate correlation matrix. Models will be checked by examining plots of residual values, leverage and influence. Independent associations of factors with injury events, doctor visits or hospital admissions will be described using adjusted ORs and 95% CIs. Multiple imputation and sensitivity analyses will be used to address issues related to missing data. Measuring cumulative exposure is required because clusters of risk factors do not always involve the same identified characteristics.<sup>4</sup>

### **How the research question relies on longitudinal data**

Traditional conceptual approaches applied to understanding child injury epidemiology in NZ have focused on short-term and proximal influences, such as playground surfacing,<sup>14</sup> behavioural characteristics, parental discipline,<sup>15</sup> and child characteristics.<sup>16</sup> While these factors are individually important predictors of injury, significant population level improvements are difficult with approaches that remedy single risk factors.<sup>43</sup> In addition, these studies rarely focus specifically on young children. A life-course epidemiological approach can be applied to build a more comprehensive picture of the multiple factors that surround preschool injury, permitting analysis of the proximal and distal causes of preschooler injury and the interaction effects between these. The analysis of *GUINZ* data will enable analysis of this nature. In addition, it is our intention to recruit a Māori Research Fellow so that we can develop Māori research capacity in advanced analytical skills including life-course epidemiology, and child injury prevention.

### **The role of non-academic and/or early career researchers in the proposed research**

The proposal includes provision for a Māori Research Fellow so that we can develop Māori research capacity in advanced analytical skills including life-course epidemiology, and child injury prevention. Detail on how we will support an early career researcher was provided in Section 1, including how our proposal aligns with the objective of the fund - to build sector capability for research with longitudinal data.

### **How the methods used in research design and analysis of longitudinal data will be disseminated**

It is our intention to prepare a publication that will detail the methods used in the proposed study, this will add to the limited body of knowledge of the use of life-course epidemiological approaches to investigate childhood injury. In addition the methods will be presented at an epidemiological conference such as the Australasian Epidemiological Association Annual Scientific meeting.

## **Funding sources**

This Fund is not intended to be the exclusive source of funding for *GUINZ*-related research. Other agencies may choose to independently purchase research using the *GUINZ* data, or researchers may access funding from other sources such as the Health Research Council or the Marsden Fund under existing conditions for external data access.

Will the proposed research be funded exclusively through the Children and Families Research Fund?

**Yes**

If no, describe linkages to other work programmes and funding sources and how they complement (and not duplicate) this research.

## **Budget**

Funding is intended to cover direct research and associated research costs, including the costs of contracted researchers (eg research assistants and postgraduate students), specialist expertise and replacement teaching costs.

The grant may also cover appropriate overhead and indirect costs, however, where such costs are already covered by Government funding, we would not expect those costs to be included in your application. For government agencies applying for funding, please include an explanation of how and why this research project would not be covered by existing funding.

The description and allocation of direct and indirect costs (eg scoping, analysis, data access etc) should be clearly shown in the breakdown of costs in your application.

Provide a breakdown of the funding requested for the proposed research project:

Example

## Timeline

The maximum duration of funding is 12 months from the date data access is available.

Provide a timeline of research activities, key project milestones and project start and end dates, including a breakdown of researchers' time on the project (scoping, planning, project and risk management, analysis, writing, review):

Activity	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Data access approvals	x											
Extraction of <i>GUI</i> NZ self-report child injury data		x										
Extraction of <i>GUI</i> NZ exposure data			x									
Building & testing of life-course model					x	x						
Analysis of predictive life-course data							x	x	x			
Develop a prioritised range of new policy initiatives										x		
Preparation of publications											x	x

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Provide any additional supporting information not covered in other sections:

## Conflicts of interest

Declare any real or perceived conflicts of interest you have with agencies associated with the Fund (eg Ministry of Social Development, Growing Up in New Zealand study, Data Access Committee, members of the Fund selection panel). Include information about the parties involved, the nature of their involvement and how it relates to the proposed research, and what steps will be taken to manage the conflict of interest.

Example

## Declarations

We the undersigned confirm that to the best of our knowledge, the information provided on this form is true and accurate. We have read the final research proposal and agree with its content.

### Principal researcher


### Co-researchers and collaborators



Signature:	

Signature:	

Signature:	

### Organisational signatory (Chief Executive Officer or assigned delegate)

I confirm that  supports this research project, including accepting all liability, associated costs and FTE commitments for the research project.

Organisation: Auckland UniServices Ltd, as authorised agent for the University of Auckland

Position: Business Development Manager	Team:
Signature:	Date: 30/08/2018

Example