



An evaluation of a government-led financial incentive program addressing the cost barrier to structured physical activity participation for children and adolescents

A thesis submitted to fulfil requirements for the degree of Doctor of Philosophy.

Bridget Clare Foley

Sydney School of Public Health
Faculty of Medicine and Health
The University of Sydney

2023

STATEMENT OF ORIGINALITY

This is to certify that to the best of my knowledge, the content of this thesis is my own work. I did not use Artificial Intelligence programs to support the production of this thesis. This thesis has not been submitted for any degree or other purposes.

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Signature:

Date: 17/11/2022

Ms Bridget Clare Foley

As supervisors for the candidature upon which this thesis is based, we can confirm that Bridget Clare Foley's thesis is sufficiently well presented to be examined, and the authorship attribution statements included in Appendix 1 are correct.

Signature:

Date: 17/11/2022

Dr Lindsey J. Reece

Signature:

Date: 17/11/2022

Emeritus Professor Adrian E. Bauman

Contents

Statement of originality	II
Acknowledgements	VI
Abstract	VIII
Thesis structure	IX
Acronyms	XI
1 Introduction	1
1.1 Chapter outline	1
1.2 Introduction	1
1.3 Benefits of physical activity participation among school-aged children	3
1.4 Definition of physical activity and physical activity guidelines	3
1.5 The global prevalence of physical activity among school-aged children	4
1.6 Domains of physical activity	5
1.7 Recreational physical activity domain	6
1.8 Opportunities for governments to increase structured physical activity participation	7
1.9 Aim of this thesis	8
1.10 References	9
2 Two-part scoping review of financial incentives to increase children's physical activity	13
2.1 Chapter outline	13
2.2 Part A: Introduction	14
2.3 Part A: Methods	17
2.4 Part A: Results	21
2.5 Part A: Discussion	43
2.6 Part A: Conclusions	47
Part B: Australian financial incentive programs	48
2.8 Part B: Introduction	48
2.9 Part B: Methods	49
2.10 Part B: Results	51
2.11 Part B: Discussion	73
2.12 Chapter conclusions	76
2.13 References	79
3 Methods	87
3.1 Chapter outline	87
3.2 Active Kids program overview	88
3.3 Methods for the evaluation of the Active Kids program	91
3.4 Data collection tools	99

3.5	Summary of the evaluation methods -----	107
3.6	Discussion-----	111
3.7	Conclusions-----	112
3.8	References-----	114
4	Population reach of the Active Kids program-----	119
4.1	Chapter outline-----	119
4.2	Chapter conclusions-----	132
5	Effects of the Active Kids program -----	133
5.1	Chapter outline-----	133
5.2	Chapter conclusions-----	150
6	Adoption of the Active Kids voucher by registered children -----	151
6.1	Chapter outline-----	151
6.2	Introduction -----	151
6.3	Methods-----	152
6.4	Results -----	156
6.5	Discussion-----	162
6.6	Conclusions-----	165
	References-----	166
7	Implementation of the Active Kids program-----	169
7.1	Chapter outline-----	169
7.2	Introduction -----	170
7.3	Materials and Methods -----	172
7.4	Results -----	176
7.5	Discussion-----	183
7.6	Conclusions and implications-----	186
7.7	Chapter conclusions-----	186
7.8	References-----	187
8	Maintenance of physical activity over time -----	188
8.1	Chapter outline-----	188
8.2	Introduction -----	189
8.3	Methods-----	190
8.3.3	Participant recruitment-----	190
8.4	Results -----	194
8.5	Discussion-----	207
8.6	Conclusions-----	210
8.7	References-----	211
9	Discussion-----	214

9.1	Chapter outline-----	214
9.2	Summary of key findings-----	214
9.3	Reflection on studies of financial incentives that address the cost barrier to participation-----	215
9.4	Lessons from evaluating a universal financial incentive program -----	221
9.5	Reflection on the application of the RE-AIM framework-----	226
9.6	Strengths and limitations of the thesis-----	230
9.7	Conclusions-----	232
9.8	References-----	234
Appendix 1: Authorship attribution statements-----		240
	Author contributions to Chapter 4-----	240
	Author contributions to Chapter 5-----	240
	Author contributions to Chapter 7-----	241
Appendix 2 Academic contributions-----		211
	Publications during candidature-----	211
	Peer-reviewed publications included within thesis -----	211
	Peer-reviewed publications related to the thesis -----	211
	Additional peer-reviewed publications during candidature-----	212
	Commissioned research report publications-----	213
	Awards -----	214
	Thesis studies in the media -----	214
	Professional societies-----	215
Supplementary material 1. Active Kids evaluation survey question items-----		216
Supplementary material 2. Semi-structured interview topic guide-----		222
Supplementary material 3. Sub-group analysis output for research sub-study participants physical activity -----		223

ACKNOWLEDGEMENTS

I am delighted to have reached the submission stage of my candidature. I would like to acknowledge the many people who inspired and enabled me to succeed in this journey.

First to my loving and supportive family. Mum and Dad, you have provided me with the most magnificent foundation of love throughout my life, always made me feel valued, and gave me the space to pursue my goals. This thesis has increased my appreciation of your efforts to enable me to play sport as a kid and the many opportunities you have provided me throughout life. I know you are both proud of me, and I can't praise you both highly enough. To my brother for making me competitive and inquisitive. To my sister for fostering my creativity, kindness, and always being up for a chat. To my siblings-in-law, Steph, and Mike for being great additions to the family and the board games table, and to Lillian and Matthew for being super cute. Our family makes my light shine.

To my loyal partner Azi, for being my strong base and helping me soar. Thank you for making me happy, keeping me alive, and never really complaining about how intrusive this thesis has been on our lives. I look forward to the next chapter of our adventures together.

To my supervisors - thanks for agreeing to let me take on this 'juicy' PhD project. It has been an honour and a privilege to have two global leaders in sport and physical activity research guiding me through this journey.

Lindsey, you are an exceptional leader, mentor, and friend. Thank you for taking me under your wing and showing me how to navigate the policy environment. You have provided me countless opportunities throughout my candidature, including presentations, workshop facilitation, research projects, introductions to the big-wigs, and even my first TV appearance. Thanks for investing so much time and energy in me and helping me grow.

Adrian, I am grateful for the opportunity to work with you before you REALLY retired. Thank you for finding me my first job in research over a decade ago and connecting me with many interesting physical activity research projects over the years. You were always available to respond to my questions, no matter where in the world you were, which helped me explore ideas and discover the beauty within the chaos of this PhD. Thank you for your genuine support, mentorship, and a few bike rides along the way.

To the rest of the awesome team involved in the evaluation of the Active Kids program. Kat, I couldn't have done this without you by my side. Thank you for being patient, kind, and encouraging over the years and for being an absolute statistical boss. And to the Bilby, the Godfather of SPRINTER (SPort & Recreation INTervention & Epidemiology Research) – no one makes an acronym like you do. I am grateful for your unwavering support and visionary leadership. The evaluation of the Active Kids program is much bigger than just the content of this thesis, and it has been excellent working with you all.

To every single parent, caregiver, and child who took the time to participate in the Active Kids evaluation — the information you shared has been invaluable. To my colleagues in the NSW Government Office of Sport who worked to establish the evaluation, and everyone who contributed along the way. Thank you for your collaboration, it has been a pleasure.

To my colleagues at the Prevention Research Collaboration and broader network of supporters — Lisa, PH, Smita, Cat, James, Lucy, Daniel, Susan, Neta, Manos, Melody, Louise B, Margaret, Bronwyn, Seema, Lou H, Steph P, Amy, Emma, and the PRC EMCR group. Whether big or small, your interactions with me at key times in the candidature have kept me

motivated and inspired. And to Julie Starkey for encouraging me to focus my energy on chronic disease prevention and setting me on this trajectory in high school.

To my friends for giving me space to do this PhD, for dancing with me, playing games, crafting, having coffees, and lifting my spirits when I came up for air - Gem, Neil, Tess, Fran, Dave, Gee, Lani, Cam, Bridget, Andrew, Nicole, Ze'ev, Squish, and the Inner west gang. You are all treasures.

When I signed up for this PhD, I thought I would have completed a few more courses, travelled internationally for conferences, maybe visited a university overseas, and engaged more directly with kids to address barriers to physical activity and sport participation. Balancing full-time work and a full-time PhD, all in the middle of a global pandemic, meant that things looked a little different, but I feel I made the best of my time.

I am proud to have followed my research interests during this candidature. The perfect project for me would have focused on physical activity promotion, involved children and adolescents, and influenced large populations to improve public health. The Active Kids program evaluation described in this thesis ticks all those boxes.

My research interests stem from three key experiences in my life. 1) I have always been a very active person with a love of sport and physical activity participation. I am a runner, dancer, footballer, bike rider and swimmer. I noticed at a young age that many people stop playing and miss out on the benefits of being physically active. 2) Prevention is always better than a cure. Promotion of physical activity during childhood and adolescence is a critical time to establish healthy behaviours. I love how this age group respond to interventions and can make long-lasting improvements to their health behaviours. 3) I was diagnosed with Type 1 diabetes when I was 16 years old. Type 1 diabetes occurs when the immune system destroys the cells in the body that break down sugars and remove them from your bloodstream; it has no known cause and cannot be prevented. Type 2 diabetes is the most common type of diabetes, and it can be delayed and even prevented through regular physical activity, healthy food choices, and healthy weight. I understand how terrible living with diabetes is and hope to prevent others from having this disease through my work. I have now been living with Type 1 diabetes for more than half my life. The studies within this thesis contribute to increasing physical activity participation in the population, towards prevention of Type 2 diabetes among other non-communicable diseases. I will continue to pursue these interests and look forward to future projects – after a holiday, of course.

Again, thank you to everyone who contributed to the research presented in this thesis, and my personal growth during my candidature.

ABSTRACT

This thesis presents the rigorous and pragmatic evaluation of the New South Wales Government's Active Kids program, a financial incentive program that allocated all school-aged children (4.5–18 years old) 5 vouchers valued at \$100AUD each, available during 2018-2020. The vouchers could be used to support the cost of registration in structured physical activity programs. The evaluation was guided by the RE-AIM framework and used a natural experiment approach to understand the extent to which the program influenced children's physical activity levels. Data were collected through the online administration platform, online surveys completed by parents/caregivers, and qualitative interviews with stakeholders involved in implementation.

The Active Kids program reached 671375 school-enrolled children (53% of the eligible population) in the first year of implementation and annually increased reach. Most children (80%) registered for a voucher used it to register in a program however, many of these children were already regularly participating in structured physical activity. Children who used an Active Kids voucher reported increasing their days achieving physical activity guidelines from 4.0 days per week (95%CI 3.8, 4.2) at registration to 4.9 days per week (95%CI 4.7, 5.1) after 6 months and maintained these increases over more than 2 years. Population-level physical activity has not yet shifted.

Policy-relevant evidence has been generated through integrating evaluation within a government-led program to inform future interventions addressing the cost barrier to participation for children and adolescents. Targeted investments to enable disadvantaged and inactive children to participate in structured programs and be physically active should be combined with financial incentives to strengthen population effects.

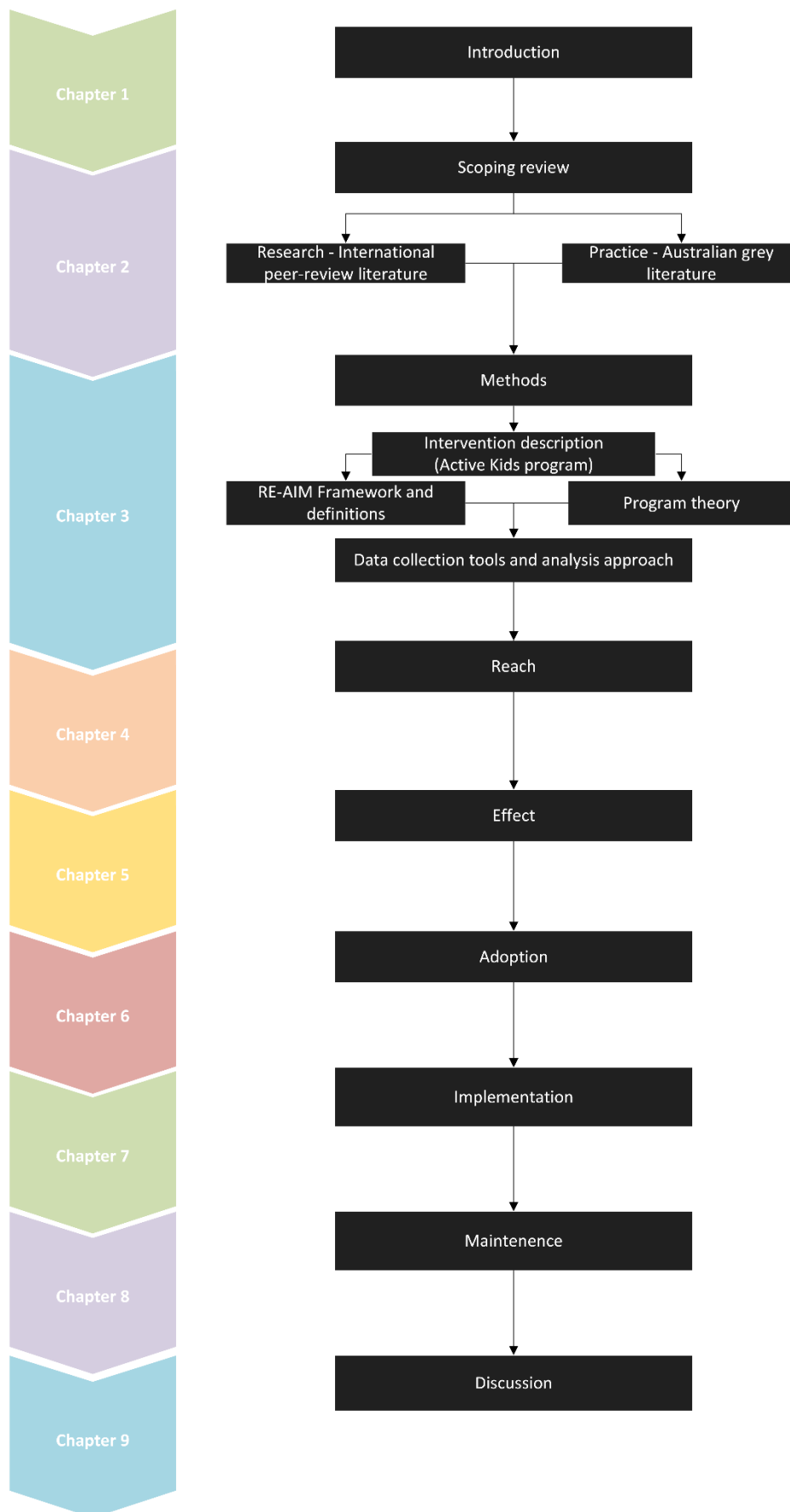
THESIS STRUCTURE

This thesis has been prepared by Bridget Clare Foley (the candidate). It presents an evaluation of a government-led financial incentive (voucher) program in New South Wales, Australia, known as the Active Kids program. The thesis includes nine chapters, three which have been published in peer-reviewed journals. The thesis structure and flow are described in the points below and have been visualised in Figure 1.

- Chapter 1 sets the scene for the thesis by introducing school-aged children (4.5-18 years old) as the population of interest and the importance of enabling this population to be physically active. The need to address the barriers that prevent children from being physically active and attaining their best level of health and wellbeing is described, highlighting the role of governments.
- Chapter 2 presents a two-part scoping review of financial incentive interventions that aim to reduce the cost barrier to physical activity participation for school-aged children. Emerging evidence from peer-reviewed and grey literature is appraised with Part A looking internationally, and Part B focusing in on Australian evidence. The scoping review identifies gaps between research and what has been delivered in practice.
- Chapter 3 describes the government-led intervention and the evaluation methodology. An in-depth description of the evaluation design, theoretical approach, evaluation framework, data collection tools and analysis approach employed for the five remaining studies are presented.
- Chapters 4–8 describe the evaluation of the Active Kids voucher program across five individual studies. Each chapter addresses a dimension of the RE-AIM framework, describing the program's Reach, Effect, Adoption, Implementation, and Maintenance throughout 2018–2020. In addition, further published studies from this evaluation are presented in Appendix 2, to which the candidate made major contributions.
- Chapter 9 discusses the main findings of this PhD thesis, the contribution of these studies to the evidence-base. It provides recommendations for large-scale evaluations and future government interventions aiming to address children and adolescent's physical inactivity levels.

Overall, this thesis presents an independent evaluation of a large-scale government intervention, the Active Kids program. The candidate collaborated with policymakers, academics, and stakeholders in the sport and recreation sector to design and conduct this high-quality evaluation. The findings presented in this thesis make a substantial contribution to understanding children and adolescent's physical activity behaviours and the role governments can play to enable them to be more active. Longitudinal assessment of children and adolescent's participation in structured physical activity (sport and recreation) programs, total physical activity, and other outcomes, has generated strong evidence on the effect of the Active Kids program relevant to public health. Working at the intersection where research meets policy, and practice, the candidate generated evidence which can be translated to enhance future research and government actions aiming to increase population levels of physical activity.

Figure 1 Flow chart of thesis chapters



ACRONYMS

ACT	Australian Capital Territory
ACTIVE program	Active Children Through Incentive Vouchers Evaluation program
ARIA+	Accessibility and Remoteness Index of Australia
ASC	Australian Sports Commission
BMI-z	Body Mass Index z-score
CFTC	Canadian Fitness Tax Credit
CI	Confidence Interval
COVID-19	Coronavirus disease
GLMMs	Generalised Linear Mixed Models
IOTF	International Obesity Task Force
MVPA	Moderate-to-vigorous physical activity
NSO	National Sports Organisation
NSW	New South Wales
NT	Northern Territory
PA	Physical Activity
QLD	Queensland
RCT	Randomised Control Trial
RE-AIM	Reach, Effect - Adoption, Implementation, Maintenance
SA	South Australia
SDG	Sustainable Development Goals
SEIFA	Socio-Economic Indexes for Areas
SPRINTER group	SPort & Recreation INTervention & Epidemiology Research group
SSO	State Sports Organisation
TAS	Tasmania
VIC	Victoria
WA	Western Australia
WHO	World Health Organization

1 INTRODUCTION

1.1 CHAPTER OUTLINE

This chapter defines school-aged children (4.5–18 years old) as the population of interest and multiple influences on their health behaviours. Physical activity is the key health behaviour studied in this thesis. The need to increase physical activity participation in school-aged children is justified by robust evidence of the benefits. The chapter starts with an overview of this evidence showing the importance of physical activity as a public health problem, then describes the current physical activity recommendations for school-aged children and the prevalence of physical activity among school-aged children. Despite the well-established evidence on the importance of physical activity for school-aged children and the low prevalence of children achieving recommended levels of physical activity, trends remain stable. Knowledge of effective interventions which address key barriers to physical activity participation among school-aged children is lacking, particularly beyond school settings. This chapter highlights the need to generate evidence of population-level interventions that could address barriers to participation, particularly the cost of structured physical activity programs, including sport and active recreation, and concludes with the aims of this thesis.

1.2 INTRODUCTION

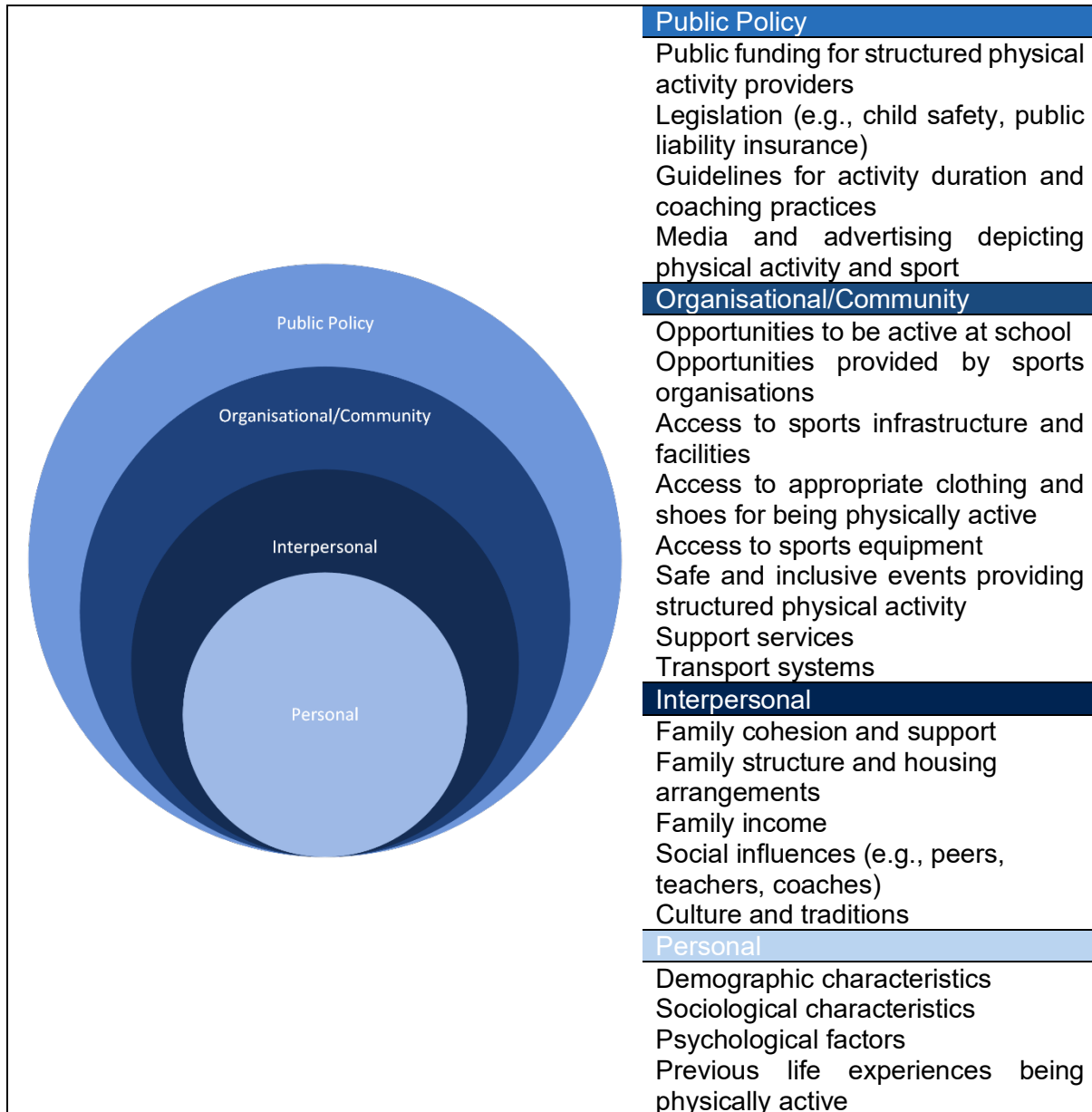
Children and adolescents constitute more than a quarter of the global population(1). Children are defined as people under the age of 18(1). The definition of children includes most adolescents, defined by the World Health Organization (WHO) as people between 10–19 years of age(2). The population of interest in this thesis are school-aged children (4.5–18 years old). In Australia, children and adolescents undertake 13 years of compulsory education, including Primary school (Prep/Kindergarten/Pre-primary/Foundation to Grade 6; children aged 4.5–11 years) and Secondary school (Grades 7–12; children aged 12–18 years)(3). School-aged have specific health and developmental needs and rights, which necessitate diverse approaches to foster positive health behaviours in this life stage(2, 4, 5). The circumstances and environments in which school-aged children live, grow, learn, and play influence their behaviours and ability to attain the best levels of health and wellbeing. Fostering positive health behaviours continuously during school years has long-term implications for public health(5, 6). Patton et al. highlight that investing in the health and wellbeing of school-aged children yields a triple dividend — improving behaviours during this life stage, into adulthood, and as they become parents of the next generation(4). Although behaviour change interventions could improve school-aged children’s health and wellbeing, there remain few examples of effective large-scale interventions for governments to invest in and implement(7).

1.2.1 Influences on school-aged children’s behaviours

Bronfenbrenner’s socio-ecological model considers that many factors and systems influence school-aged children’s behaviours across personal, interpersonal, organisational/community and public policy levels(8, 9). Figure 2 summarises these broad influences within each level of the socio-ecological model, which may influence whether school-aged children play sports. For instance, family income level (interpersonal level), and access to affordable programs with sports organisations (community level), as well as guidelines (public policy level) and previous life experiences (personal level) may predict how a child participated in sport (Figure 2). Vella, Cliff and Okley described the complex interplay between socio-ecological factors and Australian children’s sport participation in 2014 and recommended that interventions are underpinned by the socioecological model(10). The socio-ecological model can be used to

understand challenges and identify opportunities to enhance school-aged children’s behaviours. Yet, many interventions that aim to influence school-aged children’s behaviours do not address all levels of Bronfenbrenner’s model and subsequently fail to influence behaviour change(5, 8).

Figure 2 Socio-ecological influences on school-aged children’s behaviours, adapted from Bronfenbrenner(9, 11)



Most interventions aiming to improve school-aged children’s behaviours are implemented within primary schools and lack targeted components to address inequities(4, 7, 8). As children transition to secondary school, interventions are rarely maintained or adapted to sustain the gains in health behaviours achieved during primary school(4). For instance, interventions for primary school children may engage parents/caregivers to influence behaviours but as children get older the influence of parents/caregivers reduces, and interventions should be adapted to utilise interpersonal relationships with peers(4, 12, 13). Interventions which aim to enhance school-aged children’s behaviours need to act across all levels of the socio-ecological model and adapt to the rapid developmental changes during this formative life stage(5, 8).

1.3 BENEFITS OF PHYSICAL ACTIVITY PARTICIPATION AMONG SCHOOL-AGED CHILDREN

Increasing physical activity participation among school-aged children is a global public health priority(14). Several systematic reviews have reported the benefits of physical activity for the health and development of school-aged children(6, 15-18). The benefits include improved cardiovascular and muscular fitness, enhanced bone health, reduced symptoms of anxiety and depression, improved immune responses, reduced adiposity, improved quality of life, improved cognition and academic performance, and protection against the later development of non-communicable diseases(15-19). Participation in physical activity with other school-aged children, such as sports participation, has been shown to provide multiplicative health, social, and psychological benefits; including further reducing symptoms of depression, less internalising of problems, improved self-esteem and confidence, improved self-discipline and time management skills, enhanced teamwork and leadership skills(16, 20, 21). Furthermore, children who participate in greater amounts, different types, and higher intensities of physical activity, accumulate additional benefits(15).

There is evidence that the benefits of physical activity are transferable to other aspects of life and can enable and empower children throughout life(16, 21). Children who are physically active are more likely to sustain physical activity behaviours in adulthood(22). Physically active adults can foster physical activity participation in their children when they become parents, reinforcing the many co-benefits of physical activity in the next generation(4, 7). Systematic and scoping reviews have demonstrated increasing physical activity participation will contribute to achieving many of the United Nations Sustainable Development Goals (SDG); including SDG3 (health and wellbeing), SDG 9 (Industry, innovation and infrastructure), SDG 11 (Sustainable cities and communities), SDG 13 (Climate action), and SDG 16 (Peace, justice and strong institutions)(23, 24). The benefits of physical activity are well established, but physical activity remains underutilised to progress global public health and sustainable development agendas(14, 25).

1.4 DEFINITION OF PHYSICAL ACTIVITY AND PHYSICAL ACTIVITY GUIDELINES

Before outlining the prevalence of physical activity participation among school-aged children, it is important to define physical activity and the guidelines for school-aged children.

Physical activity was defined by Caspersen, Powell, and Christenson in 1985 as:

“Any form of bodily movement performed by skeletal muscles that result in an increase in energy expenditure”(26).

This definition is widely accepted and has been adopted by the WHO with the addition that “All forms of physical activity can provide health benefits if undertaken regularly and of sufficient duration and intensity.”(14). School-aged children of all abilities should have the opportunity to be physically active and achieve their highest attainable standard of health(5, 14). The WHO provides evidence-based recommendations for children, adolescents, and people of all ages to obtain substantial health benefit(27, 28). In 2020, the WHO updated the evidence-based global guidelines on Physical Activity and Sedentary Behaviour(27); the Australian guidelines were last updated in 2019(28). The WHO and Australian physical activity guidelines include recommendations for aerobic activities, muscle and bone-strengthening activities, and recommendations for limits on sedentary behaviour (Table 1). These guidelines are the same for children and adolescents with and without a disability(27, 28). The Australian guidelines also include recommendations for light physical activity to encourage movement throughout the day (Table 1)(28).

The evidence-based recommendations for physical activity can inform intervention design, provide a clear indicator that an intervention is contributing to health improvements, and can allow comparisons to population surveillance measures which report the proportion of the population meeting physical activity guidelines. Individuals that do not accumulate their recommended physical activity levels are considered 'Physically inactive' or 'insufficiently active'(27, 28). The aerobic component of the physical activity guidelines is commonly used to indicate if individuals are or are not meeting guidelines i.e., do children accumulate at least 60 minutes of moderate-to-vigorous physical activity each day. By focusing on only the aerobic component, studies may overestimate the true prevalence of children achieving all aspects of the physical activity guidelines. Participation in structured physical activity and sport can involve aerobic moderate-to-vigorous activity and vigorous activities that incorporate muscle and bone strengthening activities however measurement of muscle and bone strengthening activities is not commonly conducted due to measurement difficulties(29). There are no specific WHO or Australian guidelines for structured physical activity or sport participation for school-aged children(27, 28). More research is required to understand how structured physical activity and sport may contribute to reducing population levels of physical inactivity.

Table 1 Global and Australian Guidelines on physical activity for school-aged children

World Health Organization Guidelines on physical activity and sedentary behaviours for children and adolescents aged 5–17 years. Updated 2020(27)	Australian 24-Hour Movement Guidelines for Children and Young People aged 5–17 years. Updated 2019(28)
Do at least an average of 60 minutes per day of moderate to vigorous intensity, mostly aerobic, physical activity across the week.	Do at least one hour of moderate to vigorous activity involving mainly aerobic activities per day.
Incorporate vigorous intensity aerobic activities and those that strengthen muscle and bone at least three days a week.	Incorporate vigorous activities, including muscle and bone strengthening activities at least three days per week.
Limit the amount of time spent being sedentary, particularly the amount of recreational screen time.	Minimise and break up long periods of sitting and limit recreational screen time to less than two hours per day.
	Do several hours of light activities per day.

1.5 THE GLOBAL PREVALENCE OF PHYSICAL ACTIVITY AMONG SCHOOL-AGED CHILDREN

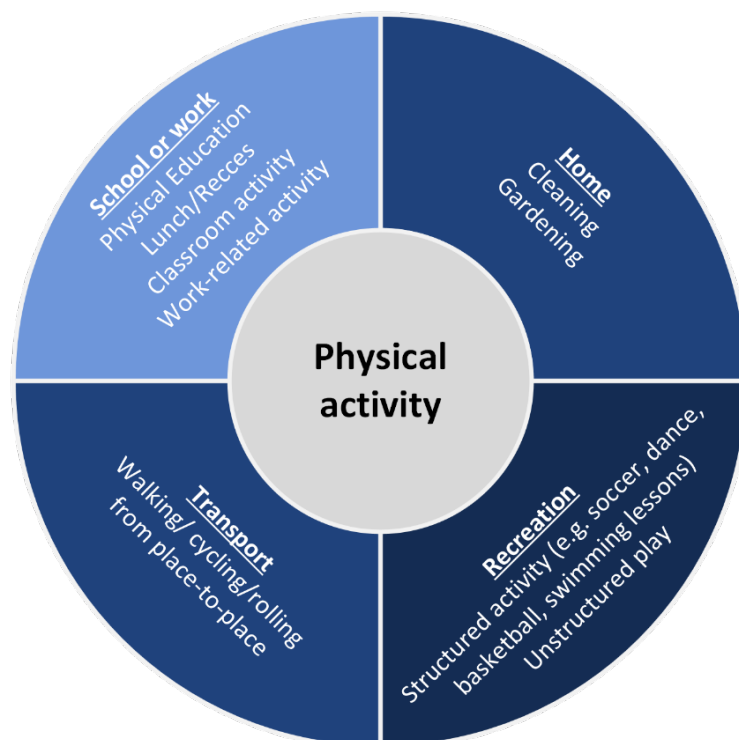
In 2012, the first Lancet series on physical inactivity drew the world's attention to the prevalence of physical inactivity by describing it as a pandemic and calling for increased action to address what was then considered the fourth leading cause of death worldwide(30). Over the past two decades, there have been no substantive reductions in levels of physical inactivity(31). Despite evidence-based global guidelines, only 20% or 1 in 4 adolescents achieve the recommended physical activity levels. This estimate is based on data from 298 population-based surveys across 149 countries with 1.6 million participants (11–17 years old)(22). Australian children and adolescents are among the least active in the world; one in ten (10.3%) 15–17-year-olds engage in the recommended levels of physical activity daily(22, 32). More recent surveillance of physical activity in children aged 5–15 years living in New South Wales (NSW), Australia, reports that 18% of children (20% of boys and 16% of girls) achieve recommended levels of physical activity(33). Understanding the prevalence rates of physical activity among school-aged children is challenging due to inconsistencies in physical activity measurement.

There is no globally accepted instrument to measure school-aged children’s physical activity(34). Aubert et al. recently demonstrated standardised measurement of the moderate-to-vigorous physical activity component of the WHO physical activity guidelines is lacking in intercontinental studies, limiting the reliability and validity of physical activity levels within, and between, nations(34). Within Australia, National surveillance of children’s physical activity is only conducted among adolescents through a self-report survey(22, 32). Each sub-national jurisdiction takes a unique approach to physical activity surveillance of school-aged children using various survey tools and/or device-based measurement. The inconsistencies in measurement and limited data availability for all age-groups (4.5–18 years) make comparisons within Australia challenging. Irrespective of the measurement tool used, most school-aged children are not achieving the current Australian physical activity guidelines. Standardised measurement of school-aged children’s physical activity should be adopted to understand intervention effects. The National and NSW measurement tools are standardised and were adopted throughout this thesis to allow comparisons to population surveillance of school-aged children’s physical activity within Australia.

1.6 DOMAINS OF PHYSICAL ACTIVITY

School-aged children may accumulate physical activity in different areas of life, often referred to as physical activity domains, including activity at school/work, home, transport, and recreation(35) (Figure 3).

Figure 3 Four domains of physical activity



Socio-ecological influences on behaviour in each physical activity domain are part of a dynamic and interrelated system affecting whether children and adolescents achieve the recommended levels of physical activity(8-10, 35). Understanding the prevalence of children and adolescents' physical activity in particular domains of their lives is even more challenging than understanding total prevalence rates due to inconsistent or absence of measurement(29).

1.7 RECREATIONAL PHYSICAL ACTIVITY DOMAIN

The WHO Global Action Plan for Physical Activity defines recreational physical activity as:

"Physical activity performed by an individual that is not required as an essential activity of daily living and is performed at the discretion of the individual. Such activities include sports participation, exercise conditioning or training, such as going for a walk, dancing, and swimming." (14).

Physical activity in the recreational domain can be undertaken in a variety of community settings such as public spaces, sports clubs, parks, and leisure centres, but does not include activity at school, work, home, or activity for transport (Figure 3).

Recreational physical activity can be broadly categorised into two types of activity; **structured** and **unstructured** physical activity(35). Structured physical activities are activities delivered through an organisation that involves physical exertion, skill and/or hand-eye coordination as the primary focus of the activity; elements of competition are not essential(35). These may be undertaken as a team or individual pursuits such as sports participation (e.g., football, swimming, athletics, tennis) and/or active recreation (e.g., dance, martial arts, bush survival skills, etc.). Participation in structured physical activity (youth sports) is positively associated with higher physical activity levels during childhood and adulthood(6). Unstructured physical activity includes recreational physical activity and play, where the focus is on relaxation or socialisation, and the activity does not require a delivery organisation(35, 36).

The types of recreational physical activities school-aged children participate in varies significantly across different regions of the globe(37). Hulteen et al. conducted a systematic review and meta-analysis examining the most common types of recreational physical activities globally, finding that school-aged children in the America's participated in more team sports such as soccer, basketball and volleyball, whilst in the Western Pacific region (including Australia) activities such as running, swimming, walking and cycling more frequently reported(37). It is unclear from Hulteen's global review whether activities such as running, swimming, and cycling were undertaken as structured or unstructured activities. Understanding what types of recreational physical activities children and adolescents prefer is important to motivate and prolong participation in structured physical activity.

1.7.1 Structured physical activity participation trends

Monitoring trends in structured physical activity participation can provide a new understanding of how this type of activity contributes to addressing physical inactivity and identify population sub-groups with low participation rates. Through understanding the trends, evidence can inform strategic decisions on how to increase school-aged children's participation in structured physical activity and sport. The global prevalence of structured physical activity participation is unclear due to a lack of valid and reliable measurement tools(29, 34). International organisations and academics advocate for improved measurement of structured and unstructured physical activity, yet consensus on a standardised measure has not been established(14, 15, 29, 38). Whilst global prevalence estimates are not available, longitudinal studies have identified trends in school-aged children's structured physical activity participation(39-42). Socio-demographic characteristics such as gender, age, and socioeconomic status demonstrate a strong correlation with physical activity participation trends(19, 43). Trends from longitudinal research suggest many children start participating in structured physical activity programs outside of school time during early school years(5-9 years old), then participation in structured physical activity peaks during early adolescence (10-14 years old) and follows a few different subsequent trajectories(39-42). The most favourable trajectory from a public health perspective is continued participation throughout

adolescence. Boys and children from high socioeconomic status families are most likely to follow this trajectory(39-42). The second and most common trajectory is a steep decline or drop-out of participation during adolescence; Girls and children with low socioeconomic status backgrounds demonstrate the steepest declines(39-42). Data from the Health Behaviour in School-aged Children study, a WHO cross-national survey, has demonstrated that children are beginning to drop out of structured physical activities earlier in life, which will have consequences on their lifelong physical activity levels(44). The third and least common trajectory is children who do not participate in structured physical activity during childhood and start during adolescence(39-42). In addition to these three trajectories (continued, drop-out, and late joiners), some children do not participate in structured physical activity during school years(39-42). Participation in structured physical activity programs during childhood is associated with greater physical activity participation and improved physical and mental health in adulthood(6). Longitudinal studies have identified these trends yet interventions that address inequities and increase school-aged children's participation in structured physical activity are required.

In Australia, the National government agency for sport and recreation is the Australian Sports Commission (ASC). The ASC conducts a population-based survey (the serial AusPlay Surveys) survey which monitors structured and unstructured physical activity participation in a sample of the population. The measurement tools have not been tested for validity or reliability, however, have been monitoring participation trends since 2015. The ASC report that structured physical activities are one of the most popular forms of physical activity during childhood(45). Most children aged 0–14 years old participate in structured physical activity sessions outside of school at least once a year (76% boys, 75% girls) and at least once per week (57% boys, 57% girls)(45). Children's most popular types of structured physical activities outside of school include swimming, soccer, Australian football, dancing, gymnastics, basketball, netball, tennis, Athletics (Track and field), and cricket(45). The AusPlay surveys also show that Australian children follow the drop-out participation trajectory with participation peaking around age 11–12 and declining with age(46). AusPlay data can be utilised to inform and guide the design, implementation, and evaluation of government interventions which prevent drop out and enable long-term participation in structured physical activity. The data collected through AusPlay has limitations including the serial methodology, therefore complementary longitudinal studies may provide more rigorous trend estimates.

1.8 OPPORTUNITIES FOR GOVERNMENTS TO INCREASE STRUCTURED PHYSICAL ACTIVITY PARTICIPATION

The socioecological model presented at the beginning of this chapter (Figure 2) highlighted that multiple factors across different levels of the model influence school-aged children's behaviours(9). There is no simple solution – interventions that aim to increase school-aged children's physical activity levels should act across all levels of the socio-ecological model to influence behaviour change and maintain physical activity participation throughout children's development(5, 8). A recent review of reviews on physical activity promotion among children and adolescents found that most interventions did not include public policy-level components; only interventions delivered in school settings involved intervention components at each level of the socio-ecological model(7). Interventions delivered outside-of-schools focused primarily on interpersonal and intrapersonal factors using educational programs or health professional support(7). Critically, there are few examples of government-led interventions which take a coordinated approach to promoting school-aged children's participation in structured physical activity outside-of-school. In NSW, the health and education agencies implement most interventions, and these may not be aligned with actions taken by other government agencies

to increase physical activity participation. Local context of initiatives implemented by the NSW Government is described in section 3.2.1. There are multiple opportunities for governments to collectively address barriers to physical activity and increase children's physical activity outside-of-school. A systematic review by Sommerset and Hoare collated evidence from qualitative and quantitative studies to identify barriers to voluntary participation in structured physical activities, specifically sports, for school-aged children(43). Cost, time, and location were identified as key modifiable barriers to participation in structured physical activity which should be addressed at the public policy level(8, 9, 43). Government interventions should be underpinned by the socio-ecological model and involve multiple government agencies to address these key barriers to participation(7).

1.8.1 Cost as a barrier to structured physical activity participation

Many costs are associated with structured physical activity outside of school for school-aged children and their families/caregivers. On average, Australian families spend \$649 p.a (Girls = \$770 p.a, Boys = \$538 p.a) for a child to participate in structured physical activity outside of school(47). These may be direct or indirect costs. Direct costs include membership and registration fees, event entry fees, travel costs, coaching fees, insurance, uniforms, costumes, shoes, personal protective equipment (gloves, shin pads, mouth guards, harnesses) and medical costs if injuries occur. Indirect costs associated with the time required for participation in structured physical activities include family members taking time off work to supervise/volunteer/cheer or attending group-bonding activities. Cost is known to present a greater barrier for groups with lower levels of participation, such as girls and children from low-income families, that have much to gain from increased structured physical activity participation(14, 43). Although participation in structured physical activity is considered a fundamental human right, and the cost barrier is well understood, there is limited evidence of effective interventions that have reduced the cost barrier to make participation in structured physical activities more affordable for school-aged children(29, 48). Chapter 2 further outlines this research gap and presents two-part scoping review on financial incentives that address the cost barrier to participation in structured physical activity programs for school-aged children.

1.9 AIM OF THIS THESIS

There is a clear need to identify and implement practical solutions which increase population-level participation in structured physical activity among school-aged children(5, 14, 25). This thesis presents a comprehensive and pragmatic evaluation of a government-led financial incentive program that aims to address the cost barrier to participation in structured physical activity programs for school-aged children. This program was implemented in NSW, Australia. The aims of this PhD thesis are to:

- I. Review and critique the current evidence base for financial incentive interventions that address the cost barrier to participation in structured physical activity programs for school-aged children.
- II. Design and implement a rigorous evaluation of the Active Kids program using an evaluation framework.
- III. Enhance the quality of evidence available to inform government decisions for interventions that can increase children's physical activity levels in Australia and internationally.
- IV. Demonstrate the value of embedding independent, pragmatic evaluation within a large-scale government intervention to advance the science of physical activity.

1.10 REFERENCES

1. United Nations. Convention on the Rights of the Child 1989 [Available from: <https://www.ohchr.org/Documents/ProfessionalInterest/crc.pdf>].
2. World Health Assembly. Youth and health risks: report by the Secretariat. Geneva: World Health Organization; 2011.
3. Services Australia. School years: Australian Government; 2022 [17 June 2022]; Available from: <https://www.servicesaustralia.gov.au/school-years?context=60007#:~:text=Primary%20and%20secondary%20school%20are,to%20year%206%20or%207>.
4. Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. *Lancet*. 2016;387(10036):2423-78.
5. World Health Organization and the United Nations Children's Fund (UNICEF). Investing in our future: a comprehensive agenda for the health and well-being of children and adolescents. Geneva; 2021.
6. Lee JE, Pope Z, Gao Z. The Role of Youth Sports in Promoting Children's Physical Activity and Preventing Pediatric Obesity: A Systematic Review. *Behav Med*. 2018;44(1):62-76.
7. Messing S, Rütten A, Abu-Omar K, Ungerer-Röhrich U, Goodwin L, Burlacu I, et al. How Can Physical Activity Be Promoted Among Children and Adolescents? A Systematic Review of Reviews Across Settings. *Frontiers in Public Health*. 2019;7.
8. Cushing CC, Brannon EE, Suorsa KI, Wilson DK. Systematic Review and Meta-Analysis of Health Promotion Interventions for Children and Adolescents Using an Ecological Framework. *Journal of Pediatric Psychology*. 2014;39(8):949-62.
9. Bronfenbrenner U. Toward an experimental ecology of human development. *American Psychologist*. 1977;32(7):513-31.
10. Vella SA, Cliff DP, Okely AD. Socio-ecological predictors of participation and dropout in organised sports during childhood. *The international journal of behavioral nutrition and physical activity*. 2014;11:62.
11. Bronfenbrenner U. *The Ecology of Human Development*: Harvard University Press; 1979.
12. Rhodes RE, Guerrero MD, Vanderloo LM, Barbeau K, Birken CS, Chaput JP, et al. Development of a consensus statement on the role of the family in the physical activity, sedentary, and sleep behaviours of children and youth. *Int J Behav Nutr Phys Act*. 2020;17(1):74.
13. Basterfield L, Gardner L, Reilly JK, Pearce MS, Parkinson KN, Adamson AJ, et al. Can't play, won't play: longitudinal changes in perceived barriers to participation in sports clubs across the child-adolescent transition. *BMJ Open Sport & Exercise Medicine*. 2016;2(1):e000079.
14. World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018.
15. Chaput J-P, Willumsen J, Bull F, Chou R, Ekelund U, Firth J, et al. 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–

17 years: summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):141.

16. Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *The international journal of behavioral nutrition and physical activity*. 2013;10:98.

17. Warburton DE, Bredin SS. Health benefits of physical activity: a systematic review of current systematic reviews. *Current opinion in cardiology*. 2017;32(5):541-56.

18. Barbosa A, Whiting S, Simmonds P, Scotini Moreno R, Mendes R, Breda J. Physical Activity and Academic Achievement: An Umbrella Review. *International Journal of Environmental Research and Public Health*. 2020;17(16):5972.

19. Biddle SJH, Atkin AJ, Cavill N, Foster C. Correlates of physical activity in youth: a review of quantitative systematic reviews. *International Review of Sport and Exercise Psychology*. 2011;4(1):25-49.

20. Moeijes J, van Busschbach JT, Bosscher RJ, Twisk JWR. Sports participation and psychosocial health: a longitudinal observational study in children. *BMC public health*. 2018;18(1):702.

21. Bruner MW, McLaren CD, Sutcliffe JT, Gardner LA, Lubans DR, Smith JJ, et al. The effect of sport-based interventions on positive youth development: a systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*. 2021:1-28.

22. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc Health*. 2020;4(1):23-35.

23. Salvo D, Garcia L, Reis RS, Stankov I, Goel R, Schipperijn J, et al. Physical Activity Promotion and the United Nations Sustainable Development Goals: Building Synergies to Maximize Impact. *Journal of Physical Activity and Health*. 2021;18(10):1163-80.

24. van Sluijs EMF, Ekelund U, Crochemore-Silva I, Guthold R, Ha A, Lubans D, et al. Physical activity behaviours in adolescence: current evidence and opportunities for intervention. *The Lancet*. 2021;398(10298):429-42.

25. World Health Organization. Fair Play: Building a strong physical activity system for more active people. In: team PA, editor. 2021.

26. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep*. 1985;100(2):126-31.

27. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*. 2020;54(24):1451.

28. Australian Government Department of Health. Australian 24-Hour Movement Guidelines for Children and Young People (5 to 17 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep. Australian Government; 2019.

29. Howie EK, Guagliano JM, Milton K, Vella SA, Gomersall SR, Kolbe-Alexander TL, et al. Ten Research Priorities Related to Youth Sport, Physical Activity, and Health. 2020;17(9):920.
30. Kohl HW, 3rd, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, et al. The pandemic of physical inactivity: global action for public health. *The Lancet*. 2012;380(9838):294-305.
31. The L. A sporting chance: physical activity as part of everyday life. *The Lancet*. 2021;398(10298):365.
32. Australian Bureau of Statistics. National Health Survey: First Results, 2017-18. 2018.
33. HealthStats NSW. Physical activity in children by activity level NSW Population Health Survey (SAPHaRI). Centre for Epidemiology and Evidence, NSW Ministry of Health.: NSW Government; 2021 [Available from: <https://www.healthstats.nsw.gov.au/#!/indicator?name=-beh-phys-cat-kid-phs&location=NSW&view=Trend&measure=prevalence&groups=Activity%20level&compare=Activity%20level&filter=Activity%20level,Sedentary%20behaviours,Adequate%20physical%20activity>].
34. Aubert S, Brazo-Sayavera J, González SA, Janssen I, Manyanga T, Oyeyemi AL, et al. Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: a narrative review. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):81.
35. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJF, Martin BW. Correlates of physical activity: why are some people physically active and others not? *The Lancet*. 2012;380(9838):258-71.
36. Kemp BJ, Cliff DP, Chong KH, Parrish A-M. Longitudinal changes in domains of physical activity during childhood and adolescence: A systematic review. *Journal of Science and Medicine in Sport*. 2019;22(6):695-701.
37. Hulteen RM, Smith JJ, Morgan PJ, Barnett LM, Hallal PC, Colyvas K, et al. Global participation in sport and leisure-time physical activities: A systematic review and meta-analysis. *Preventive medicine*. 2016;95:14-25.
38. UNESCO. Report of the Sixth international conference of ministers and senior officials responsible for physical education and sport (MINEPS VI) Annex 1. Kazan Action Plan. Paris; 2017; adopted on 14–15 July 2017.
39. Howie EK, McVeigh JA, Smith AJ, Straker LM. Organized Sport Trajectories from Childhood to Adolescence and Health Associations. *Med Sci Sports Exerc*. 2016;48(7):1331-9.
40. Farooq A, Basterfield L, Adamson AJ, Pearce MS, Hughes AR, Janssen X, et al. Failure to Launch: Predictors of Unfavourable Physical Activity and Sedentary Behaviour Trajectories from Childhood to Adolescence: The Gateshead Millennium Study. *International Journal of Environmental Research & Public Health* [Electronic Resource]. 2021;18(24):16.
41. Kwon S, Janz KF, Letuchy EM, Burns TL, Levy SM. Developmental Trajectories of Physical Activity, Sports, and Television Viewing During Childhood to Young Adulthood: Iowa Bone Development Study. *JAMA Pediatr*. 2015;169(7):666-72.

42. Mikalsen HK, Bentzen M, Säfvenbom R, Lagestad PA. Trajectories of Physical Activity Among Adolescents in the Transition From Primary to Secondary School. *Frontiers in Sports and Active Living*. 2020;2.
43. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
44. Mathisen FKS, Kokko S, Tynjälä J, Torsheim T, Wold B. Leisure-time physical activity and participation in organized sports: Changes from 1985 to 2014 in Finland and Norway. *Scandinavian Journal of Medicine & Science in Sports*. 2019;29(8):1232-42.
45. Sport Australia. *Children's Organised Out-of-school Participation*. 2018.
46. Eime R.M. HJT. *Sport Participation Across the Lifespan: Australian Trends and Policy Implications*. Palgrave Macmillan, London. 2018.
47. Sport Australia. *AusPlay Results: Clearinghouse for Sport; 2020* [Available from: <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/results>].
48. United Nations Educational Scientific and Cultural Organization. *International Charter of Physical Education, Physical Activity and Sport*. UNESCO's General Conference 1978.

2 TWO-PART SCOPING REVIEW OF FINANCIAL INCENTIVES TO INCREASE CHILDREN'S PHYSICAL ACTIVITY

2.1 CHAPTER OUTLINE

The global priority of enabling more school-aged children (4.5–18 years) to be physically active more often is well recognised, however, interventions that overcome barriers to participation have received insufficient investment⁽¹⁾. Chapter 1 presented the socio-ecological model and described the many barriers which can influence school-aged children's participation in physical activity, particularly structured physical activity¹ outside-of-school^(2, 3). Costs were identified as a key modifiable barrier that government intervention could address⁽⁴⁾. This Chapter describes the costs and other financial influences across all levels of the socio-ecological model on school-aged children's participation in structured physical activities. The need for practical solutions that reduce or remove the cost barrier and could be combined with other intervention components to enable children to be more active is presented.

Financial incentives are one tool which can address the cost barrier to participation, and their use in research and practice has increased in recent years⁽⁵⁻¹¹⁾. Financial incentives that aim to increase physical activity levels have been primarily studied in adults, and there is a lack of evidence regarding populations less than 18 years old⁽⁵⁻⁹⁾. Interventions using financial incentives to motivate school-aged children to participate in physical activity outside-of-school hours are examined in this Chapter. There have been no previous literature reviews investigating the effectiveness of financial incentives on increasing physical activity participation for school-aged children.

A scoping review was undertaken to describe the emerging evidence of financial incentives that address the cost barrier for children and adolescents' physical activity. The scoping review method was adopted to include all research designs and to fill the gap in knowledge using a structured approach; the quality of the studies is not formally assessed as would be done in a systematic review. The scoping review was initially undertaken at the start of the candidate's doctoral studies and was updated in the year of submission to include all studies in this emerging field up to February 2022. The scoping review is divided into two parts.

Part A of the scoping review involved conducting scientific database searches to identify peer-reviewed studies of financial incentives aiming to increase school-aged children's physical activity levels published since 2002. A critique of identified financial incentive programs design, implementation, evaluation, and scale-up is presented. In light of the significant investment from Australian States and Territories in financial incentive programs, Part B provides a snapshot of the Government-led financial incentive programs that have been implemented in Australia since 2002. The structured scoping review method used in Part A was modified in Part B to explore the available evidence (from Government reports and the grey literature) of locally relevant interventions. Collectively, Part A and Part B of this scoping review synthesise evidence from research and practice to strengthen the current understanding of the role financial incentives play in reducing or removing the cost barrier to participation for children and adolescents outside of school hours.

¹ Structured physical activities are activities delivered through an organisation that involve physical exertion, skill and/or hand-eye coordination as the primary focus of the activity; elements of competition are not essential. This includes sport and active recreation and may be undertaken as an individual or in a team.

2.2 PART A: INTRODUCTION

2.2.1 Costs associated with structured physical activity participation

Children and adolescents' participation in structured physical activities and the associated financial costs of participation vary greatly between countries(12-14). In Australia, 63% of children under the age of 15 years participate in structured physical activity outside of school once per week. The most frequently reported activities include swimming, soccer (football), Australian football, dancing, and gymnastics(15). Each year, Australian families spend more than \$2.1 billion dollars on memberships and registration fees to enable school-aged children to participate in structured physical activity programs(15). Children and adolescents that regularly participate in structured physical activities are typically of higher socio-economic status(16). Australian children and adolescents of low socio-economic status spend less money on structured physical activities and participate less than children of high socio-economic status(10). Research has consistently demonstrated that cost is a barrier to participation in structured physical activities, particularly for children and adolescents of low socio-economic status(3, 4). Sex is also highly correlated with structured physical activity participation and associated costs; for instance, girls' preferred activities may be more expensive than boys, resulting in higher annual expenditure for participation in the same number of sessions(10). Actions to create more affordable and equitable opportunities for all children and adolescents to participate in structured physical activity are required at scale.

2.2.2 Financial influences on school-aged children's participation behaviours

There is limited understanding of effective interventions that address costs associated with structured physical activity participation among school-aged children(4, 17). Bronfenbrenner's Socio-Ecological Model, first presented in Chapter 1, is a helpful theoretical framework for understanding the complexity of school-aged children's physical activity behaviour patterns(2, 3, 18). Financial influences at each level of the socio-ecological model can profoundly affect structured physical activity costs and whether families invest in children's participation. Personal factors (sex, age, socio-economic status, preferred activities) are interrelated with interpersonal factors (family income, social support), organisational factors (registration costs, location, equipment, uniform requirements), community factors (transport availability, facility hire/maintenance costs, stereotypes) and public policy (economic policies, laws, guidelines) level factors of the socio-ecological model. The socio-ecological model can help to identify opportunities at each level of the model to reduce the costs associated with structured physical activity participation(2, 4). Most physical activity interventions focus on personal and interpersonal level factors, and have demonstrated modest success. There is a need to identify and test which organisational, community, and public policy level interventions can address barriers to physical activity and increase participation at the population-level.

2.2.3 Financial incentives to change behaviour

One type of intervention that may address costs associated with children and adolescents' participation in structured physical activity programs is financial incentives. The use of financial incentives to influence health behaviour, including physical activity participation, has become increasingly popular in the past two decades, yet evidence about the effectiveness of financial incentives in changing health behaviour is mixed(5, 10, 11, 19). Financial incentives are defined as an economic tool that is offered to motivate a behaviour that may not otherwise occur(11). Financial incentives may promote or enable a desirable behaviour or discourage undesirable behaviour(11). Financial incentives can take many forms (variable cash rewards, lump-sum cash rewards, lottery draws, price controls, subsidies, and taxes) and be provided to individuals or organisations(11, 19). We focus here on financial incentives provided to individuals.

2.2.4 Theories of change in financial incentive design

Interventions which are guided by theories of behaviour change are more effective at increasing physical activity participation than interventions that are not underpinned by theories of behaviour change(20). There are many widely accepted theories of behaviour change which can be used to predict how and why an intervention such as a financial incentive could influence children to be more active. The nuanced design and implementation features of financial incentives can substantially influence their success(21). Research recommends that stakeholders use behavioural economics principles to inform the design of financial incentive interventions to influence positive behaviour change(11, 21, 22). Behavioural economics is a field that merges economic theories, psychological concepts, and theories of behaviour change to understand and predict behaviour patterns, acknowledging socio-ecological influences on behaviours. The addition of economic theories to the more typical behaviour change theories used in public health interventions (E.g. COM-B, Theory of planned behaviour, Stages of change) improves the accuracy of the prediction for fiscal interventions(23). The behavioural economics principles that may underpin financial incentives for behaviour change include, but are not limited to, loss aversion, increasing pay-offs, 'present bias', herd behaviour, and reference points(5, 11). Although these principles are well established in behavioural economics, McGill et al. found that they are not widely embraced in public health, particularly in financial incentives targeting physical activity behaviours(23). Application and evaluation of different behaviour change theories and behavioural economics principles would help understand the mechanisms of change in financial incentive interventions and will be explored in this scoping review.

2.2.4.1 Behavioural economics principles

Multiple systematic reviews and meta-analyses investigating the impact of financial incentives on physical activity behaviours of adults aged at least 18 years old have been conducted(5-9). Each review highlights the importance of behavioural economics principles in intervention design and implementation; the application of these principles is more influential than the magnitude of the financial incentive(5-9). Some examples of how behavioural economics principles could inform the design of financial incentives are described below.

'Present bias' (also referred to as hyperbolic discounting or temporal discounting) is the most used behavioural economics principle in studies of financial incentives encouraging adults to be active(5). Present bias refers to people's preferences for here-and-now over the future, and how the appeal of a reward decreases the more distant the outcome is. For exercise programs, the effort (e.g., perspiration, exhaustion) and expense (e.g., time and money) required to participate is usually experienced in the present, and the rewards are delayed (such as prevention of cardiovascular disease), which deters physical activity behaviours. There is evidence that financial incentives that overcome present bias and provide incentives in less than seven days are most effective at increasing physical activity levels in adults compared to those with delayed credit(5).

The principle of loss aversion is also commonly used. Loss aversion describes a process whereby humans react more to losses than gains of the same magnitude. Therefore, loss framing of financial incentives could strongly impact getting people to be more active(11, 24). A study by Chokshi et al. 2018 explored this by allocating patients to a financial incentive for being active (\$14) but detracted \$2 from the incentive value each day the patients didn't meet their personal step goal. This financial incentive, combined with personal goal setting, resulted in significant increases in steps per day(25). Patel et al. has shown that interventions that leverage loss aversion out-perform gain-framed rewards for being active, including prizes, subsidies or lottery draws(26).

Another less studied principle of behavioural economics in financial incentive interventions is the theory of herd behaviour, in which individuals follow the behaviour of others rather than making their own decisions(5). This is similar to social norm influences from other theories and may affect the adoption of financial incentive programs among particular population sub-groups. Interventions could promote how many people have received the incentive to encourage others to adopt the same behaviour.

2.2.5 Key findings from reviews of financial incentives to promote adult's participation in structured physical activity

Barte and Wendel-Vos examined the difference between gain-framed financial incentives that lower the costs of participation, incentive rewards for attendance and rewards for being physically active(7). Their systematic review identified 12 studies and found interventions which reduced the cost of registration or equipment were not effective at promoting physical activity(7). Rewards for physical activity were more promising than lowering the costs, especially if the reward was tied to physical activity participation rather than simply attendance(7). Increasing payoffs which progressively increase the reward/gain, have been shown to motivate behaviours compared to constant or decreasing payoffs.

Mitchell et al. collated evidence on the effect of financial incentives on adults' physical activity, updating their 2013 review reporting that financial incentives increased exercise session attendance in the short term(5, 27). Analysis of 23 studies that used modest incentives (USD\$1.40 median value per day) demonstrated positive effects of financial incentives on physical activity in the short-term (<6 months), long-term (≥6 months) and post-intervention (after incentive removal)(5). Evidence that the increases in physical activity behaviours of adults are maintained after financial incentives are removed may have implications for policy and practice.

A recent review examined the role of financial incentives in increased recreational physical activity, specifically gym attendance and walking behaviour, across 51 studies(9). The types of incentives used to motivate recreational physical activity included cash, donations, reimbursements, vouchers, or goods/services. Luong et al. found financial incentives may be effective at increasing recreational physical activity however, there was insufficient evidence to determine if financial incentives increased adults' total physical activity time or the proportion of adults meeting physical activity guidelines. Luong et al. report that most financial incentives are implemented at the interpersonal level of the socio-ecological model; they did not identify any public policy-level financial incentives for adults' physical activity(9).

The evidence for intervention design used in financial incentives studies has grown substantially in recent years through rigorous experimental trials, although research has primarily focused on adult populations (>18 years old). Further research is needed to understand the effect of these interventions when translated into practice in real-world settings and whether financial incentives can effectively establish positive health behaviours in children and adolescents.

2.2.6 Financial incentives to promote school-aged children's physical activity participation

No previous review has identified, collated, and synthesised the evidence of financial incentives that aim to increase school-aged children's physical activity levels. Corepal et al., conducted a systematic review and meta-analysis on behavioural incentives for a broad range of different health behaviours (physical activity, healthier eating, alcohol, and smoking) in children(28). They identified eight physical activity interventions delivered in school settings using non-financial incentives (e.g., TV access, academic points, and non-cash prizes).

Corepal et al. found a small, non-significant positive intervention effect for behavioural incentives (non-financial) on changing children's physical activity behaviours in schools, but did not identify any financial incentives for physical activity outside-of-school setting. Kenyon et al. conducted a narrative review of design features and the use of theory in financial incentive interventions promoting healthy childhood behaviours(29). They did include any studies investigating the effects of financial incentives on children's physical activity levels(29). There remains little understanding of the implementation and effect of financial incentives on children and adolescents' physical activity behaviours. Furthermore, studies examining optimal design principles for financial incentive programs that influence children and adolescents' physical activity behaviours are required.

2.2.7 Purpose of the review

This scoping review aims to identify and critique the evidence base regarding the implementation of financial incentive interventions to increase physical activity levels of school-aged children.

The scoping review has been conducted in two parts. Part A of this scoping review includes peer-reviewed studies of financial incentives aiming to increase school-aged children's physical activity levels published since 2002. Part B looks specifically at government-led financial incentive programs that have been implemented in Australia.

2.3 PART A: METHODS

A scoping review was conducted to summarise the peer-reviewed literature describing financial incentives that reduce or remove the cost barrier to structured physical activity participation for school-aged children.

2.3.1 Scoping review approach

A scoping review is a structured approach to creating a snapshot of the current evidence base, identifying existing knowledge, and research gaps(30). Scoping reviews differ from systematic reviews as the quality of studies is not formally assessed, nor is an extensive data synthesis undertaken(31). Scoping reviews can generate clarity for future research on complex or emerging topics with a lack of evidence by incorporating a range of research designs and the grey literature. To strengthen the research rigour of the scoping review method Arksey and O'Malley and, more recently Levac et al. established a framework with which to conduct a scoping review(30, 31).

The five stages for conducting scoping reviews were used in this study:

1. Identifying the research question

The research questions were broad in scope, defined as:

- I. To what extent do financial incentives promote physical activity participation outside of school hours among school-aged children?
- II. Are financial incentives effective in promoting physical activity participation for school-aged children?

In Australia, children undertake 13 years of compulsory education, including Primary school (Prep/Kindergarten/Pre-primary/Foundation to Grade 6; children aged 4.5–11 years) and Secondary school (Grades 7–12; Children aged 12–18 years)(32). Therefore, school-aged children in this study are defined as 4.5–18 years old.

2. Identifying relevant studies

The search strategy was developed by the candidate combining terms for the population of interest (children or adolescents or youth or child or teenager or kids or students), the intervention/concept (incentive or voucher or rebate or subsid* or tax or reimbur* or

economic or financ* or lottery) and the outcome of interest (physical activity or exercise or fitness or physical exercise or sport or recreation). Literature searches were conducted in scientific databases (Medline, SPORTDiscus, Embase, Cochrane). Citation searches were conducted in Google. A Google Scholar alert was set up after the initial searches were conducted in 2018 to identify any new records after the searches were conducted.

Titles and abstracts were screened using the inclusion criteria below:

- School-aged children (4.5–18 years old) in non-clinical settings, based in any country internationally.
- Provision of financial incentives i.e., vouchers, tax incentives, financial reimbursements or subsidies, cash rewards, deposit contracts, lottery with financial prize, or discounts – that aim to minimise the cost of total physical activity participation on children/families. Include travel subsidies or social prescription of physical activity to children free from chronic conditions.
- Physical activity or sport participation (device-based or self-report measurement), fitness levels, fundamental movement skills, physical literacy, or sedentary behaviour/screen time.
- Must written be in English.
- Published in peer-review journals between January 1, 2002, and February 5, 2022. A twenty-year limit was chosen to ensure relevance to the present time.

Studies were excluded if they described:

- financial incentives for schools, sports clubs or organisations which minimise the cost of delivering physical education or sports programs.
- Unconditional free provision of physical activity programs to children.
- Incentives that were not financial (e.g., heart-rate feedback, academic points).

The literature search was initially conducted in 2018, however for relevance, we repeated the search in February 2022 to ensure all relevant articles were included.

3. Study selection

After screening the titles and abstracts from peer-reviewed literature, 24 full-text articles and two reports were obtained and read in full. Relevant policy documents and websites describing the financial incentives in published literature were also examined to obtain the information required to chart the financial incentive data. Figure 5 depicts the flow of information from the literature search to inclusion for data extraction.

4. Charting the data

Identified interventions had information across multiple data sources that provided contextual and process information about the financial incentive. Data charted in this stage of the scoping review were extracted from the full-text articles and supplemented by grey-literature where information was not available in the article. Data were extracted to identify the financial incentive; describe the context and implementation process that may moderate the effectiveness of the intervention or transferability of the findings; detail the design and implementation approach; and provide evidence of the effectiveness of the financial incentives. Specifically, data were collected under the following headings:

- *Identification — Name of the financial incentive, and source of evidence used to collate details about the financial incentive.*
- *Implementation context — Details about the Region/Country of implementation, year launched, duration, the target population and setting.*
- *Intervention details — Objectives and key features of the incentive, the research/evaluation approach, theoretical underpinning, outcome/s measured, budget allocation and other details such as modifications to the program.*
- *Evaluation — Process and outcome assessment of the intervention's effectiveness.*

5. Collating, summarising, and reporting the results

Given the lack of evidence and understanding about financial incentives targeting children, when collating the evidence an evaluation framework was adopted to provide structure to the emerging evidence.

2.3.2 Evaluation framework: RE-AIM

The RE-AIM framework was adopted to collate, summarise, and report the results of this scoping review. The RE-AIM acronym is denoted by Reach, Effect, Adoption, Implementation, and Maintenance(33). The five dimensions in the RE-AIM framework provide a guide for researchers, policy makers and practitioners to improve intervention planning, generate evidence of interventions success, and understand processes that influence the success of interventions(34, 35).

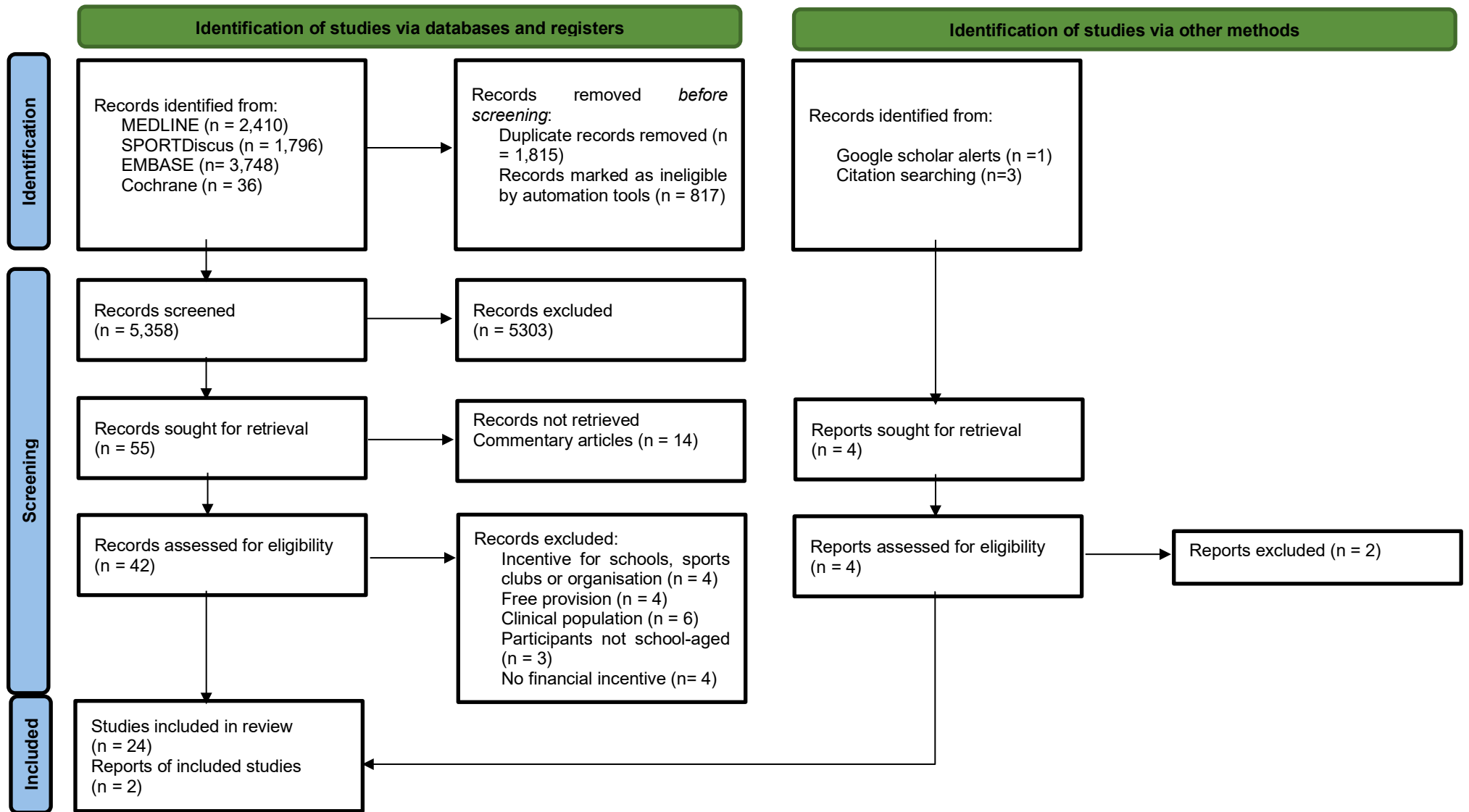
Since Glasgow first conceptualised the RE-AIM framework, it has been applied extensively in public health and behaviour change research and revised over time(34, 35). Over time, researchers have recognised that the application of all five dimensions of the RE-AIM framework is challenging in real-world conditions, particularly if only quantitative data are considered(36). Glasgow et al. strongly encourage mixed method evaluation studies to gain a deeper understanding of the interventions across each RE-AIM dimension(34). Pragmatic application of RE-AIM is also considered appropriate (i.e. not all dimensions are applied), if the reasons for not reporting a dimension are justified(34). D’Lima et al. conducted a systematic review on the pragmatic application of the RE-AIM framework in intervention studies identifying that 69% of studies using the RE-AIM framework reported all five dimensions, with “reach most frequently reported, followed by implementation, adoption, effectiveness, and maintenance”(35). Application of the RE-AIM framework (in part and full) and other evaluation frameworks in real world settings has increased in recent years, strengthening evidence generation(35, 37). Further explanation of the RE-AIM framework is presenter in Chapter 3, as this framework was used for the evaluation of the Active Kids program presented in this thesis.

The RE-AIM framework has also been used to summarise evidence in systematic reviews of various intervention studies(38-40). The RE-AIM framework provides a structure which enables similar dimensions of existing studies to be compared and considers the implementation process across the identified interventions. The RE-AIM framework was adopted in this scoping review. The definitions of each RE-AIM dimension have been interpreted differently in various studies in the past. The present study has adapted definitions for each step in the RE-AIM framework from recommendations from applied public health research(34, 41, 42):

- **Reach:** The number and proportion of the eligible population that engage in the financial incentive intervention and how representative the participants are compared to the eligible population.
- **Effect:** The effectiveness of the intervention on important outcomes, including children's physical activity levels or participation in structured physical activity programs, quality of life, economic outcomes, and adverse effects.
- **Adoption:** Use of the financial incentive and other intervention components to reduce the cost of physical activity participation.
- **Implementation (process):** The uptake of the financial incentive across the implementation setting/s by stakeholders/partners and the degree to which stakeholders/partners facilitate delivery of the intervention.
- **Maintenance:** The extent to which the intervention is sustained after the research trial period (>12 months) or becomes part of routine practice; and long-term effectiveness of the intervention on primary and secondary outcomes.

The flow diagram of the search for studies of financial incentives in school-aged children are reported in Figure 4. This Prisma flowchart shows the selection of studies and their inclusion in the final scoping review sample (24 studies and two reports) (Figure 4).

Figure 4 Prisma flowchart of studies located of incentives for physical activity among school-aged children



Prisma flowchart adapted from: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71.

2.4 PART A: RESULTS

Twenty-four peer-reviewed journal articles and two reports were screened as eligible for inclusion in the scoping review (Figure 4). These articles describe twelve financial incentive programs that aimed to increase school-aged children's physical activity levels outside of school. Identified financial incentive programs were implemented in **Singapore (n=3)**(43-45), **Germany (n=2)**(46, 47), **the United States (n=2)**(48, 49), **the United Kingdom (n=3)**(50-54), **Canada (n=1)** (55-61), and **Australia (n=1)**(62-70).

The candidate's publications and articles about the Active Kids program evaluation in Australia were identified when the literature search was updated in February 2022. Articles describing the Active Kids program have been excluded from this chapter. Chapters 4–8 describe the evaluation of the Active Kids program, focusing on each dimension of the RE-AIM framework. A critique of the interventions identified in this scoping review, compared with the nine peer-reviewed articles on the Active Kids program, will be presented in Chapter 9. Herein we report on the eleven financial incentive interventions summarised in Table 2, described across fifteen studies and two reports that were published between 2008–2021.

2.4.1 Financial incentive design

Interventions that aimed to minimise the cost of physical activity participation outside-of-school used various types of financial incentives, including subsidies (n=4)(46, 48, 50-52, 54), tax credits (n=2) (49, 55-59), cash rewards and lottery draws (n=2)(44, 45), lotteries (n=2)(47, 53), and cash rewards alone (n=1)(43). The reason each type of financial incentive was selected was not well described. The fiscal value of financial incentives ranged between \$5–\$500. Cash rewards were designed to equate to pocket-money and provided lower value incentives on a regular basis. Lotteries were valued higher than cash rewards but were not guaranteed at regular intervals. Cash rewards and lotteries did not reduce the cost of participation but instead incentivised regular participation(43-45, 47, 53). Subsidies could be used to reduce the costs of registration/membership fees; subsidies were typically valued at the average costs of the registration/membership fees they aimed to support and could be accessed between 1–4 times during the year(46, 48, 50, 51). One subsidy could also be used to support the cost of equipment or pooled with other children to bring new activities into communities or schools if there were no suitable activities nearby(52, 54). Tax credits were either fixed value or variable amounts based on expenses paid and could be claimed once per year(49, 55-59).

Few financial incentives were designed using theoretical approaches (Table 2). One intervention FIT-FAM reported underpinning the design of their cash reward incentive with the group-dynamics principle of behavioural economics; based on this principle, they included parent-child dyads to motivate each other to be active and gain the reward(43). One subsidy that offered a \$200 reimbursement reported the intervention was based on the economic theory of household production(49); however, economic theories alone don't acknowledge the socio-ecological influences on behaviour limiting the utility of this intervention in real-world conditions. In financial incentive interventions, broader influences on behaviour should be considered to achieve meaningful and sustainable behaviour change. Two other interventions used psychological concepts of peer-modelling, social support, goal setting and self-monitoring to develop additional intervention components to motivate behaviour change(44, 47). The remaining seven financial incentive interventions did not mention a theory of change or use of theoretical underpinnings to inform the design or delivery of the intervention. Although not explicitly stated, theory may have been applied in the design of one other intervention, as the program required physical activity programs to provide sessions on at least eight consecutive weeks or five consecutive days of health enhancing physical activity to be eligible for the tax credit(23, 71); no other interventions specified a minimum participation

threshold to receive the incentive. Behavioural economics theories and psychological concepts appear underutilised in the design of financial incentives and supportive intervention components.

2.4.2 Study details

Two out of eleven interventions had published evaluation protocols for the financial incentive programs(47, 51, 54). Across the 17 articles identified in the scoping review, eight used RCT designs(43-45, 47, 49-51, 53); two used mixed-methods(50, 51). In addition, five were cross-sectional studies(46, 48, 61, 71, 72), two feasibility studies(50, 53), one qualitative study(73), and three provided contextual information for the interventions(55, 59, 60). One feasibility study led to a larger-scale RCT(50, 51). No RCT's led to continued or scaled up implementation of the financial incentive intervention.

An evaluation framework was used in studies on the ACTIVE intervention, and each dimension of RE-AIM was applied to comprehensively report on the ACTIVE voucher program(50, 51). The remaining studies often reported on intervention effects and reach however, there was a lack of evidence regarding the adoption, implementation, and maintenance of financial incentive interventions. A critique of the published studies exploring financial incentive programs amongst school-aged children is presented herein, aligned to each dimension of the RE-AIM framework.

2.4.2.1 Reach

The number of school-aged children that engaged in the financial incentive intervention was reported in all interventions. The number of participants in the financial incentive interventions in a single calendar year ranged between 29 and 33,000 children (mean=3,601 children). The proportion of school-aged children reached by the intervention was usually reported as the proportion that provided consent to participate in the study. Population-level interventions (n=2) reached a higher number of participants than research studies(46, 55-60). The recruitment approach for universally available voucher programs had different effects on reach, with one intervention delivered through school reaching all children in class on the day of implementation(46); the Canadian Fitness Tax Credit which engaged participants through the tax system, reached less than 20% of the eligible population(55, 71).

Eligible children and adolescents across all interventions were aged between 2–16 years old. There were no financial incentives available for children aged 17–18, and one study didn't report the age of the secondary school students included in their study(48). Most financial incentives (n=6) were delivered for primary school-aged children(43-46, 49, 53), and one was available to children in primary and secondary school(55-60). Reach was achieved well among primary school-aged children by involving an adult (parents/teachers) to support the child's behaviours. Secondary school students were eligible for three of the eleven financial incentives(47, 48, 50, 51). Interventions that had a tight target age-group (Range 1–3 years) achieved better reach into their target population than interventions with a broad target age group (Range > three years). Targeting interventions to tight age groups may have enabled age-appropriate program design and data collection protocols.

About half of the financial incentive interventions were targeted toward socio-economically disadvantaged children (n=6), and the others were widely available to the target age group (n=5). Targeting was achieved based on school or community level socio-economic disadvantage rather than individual levels. Socio-economically disadvantaged children who were already motivated to participate in structured physical activity readily used available financial incentives; however, effective approaches to reaching new participants require additional investment and investigation(46, 51, 71). Another approach to reaching

disadvantaged children was to provide proportionate support based on the annual expenditure on structured physical activity participation — this meant that families facing the greatest cost barriers received the least support(71). Whilst studies recommended ways interventions could be adapted to achieve more equitable reach, there was limited evidence that adaptations had occurred, or promotional activities designed to complement the financial incentive and increase reach.

2.4.2.2 Effect

All interventions investigated the effect of the financial incentive on children's physical activity participation. The effects were assessed up to 12 months after the intervention (3–12 months), except one cross sectional study which was conducted 7–9 years after the intervention. A range of different outcome measures were used across the twelve studies to assess the effect of eleven financial incentives on outcomes of interest, including physical activity. Multiple measures of physical activity were collected, including accelerometers (n=5), pedometers (n=3), fitness tests (n=3), validated proxy-report surveys/diaries (n=6), self-report surveys (n=4), non-validated proxy-report survey items (n=3) and focus groups (n=3). Device based measurements of physical activity were collected in eight studies, however these were small scale RCT studies (Range 29–1,489 children). Studies with low funding and large-scale studies relied on self-report or parental proxy-report measures of effectiveness. In addition to measuring total physical activity, some studies (n=6) specifically measured structured physical activity participation using surveys and physical activity diaries. Structured physical activity was indicated by program enrolment/memberships, attendance frequency, or session duration. There was no consistent measurement tool used to specifically measure recreational or structured physical activity participation.

There is currently insufficient evidence to determine the effectiveness of financial incentive interventions on increasing school-aged children's physical activity participation. The ACTIVE study demonstrated significant improvements in adolescents' distance ran, fitness, and reduced high blood pressure in the intervention group 6 and 12 months after the intervention(51). The "läuft" intervention demonstrated positive effects, but only followed up after 3 months(47). A fee waiver program also reported positive intervention effects, based on qualitative data(48). Two RCT's conducted in Singapore demonstrated positive intervention group short-term effects on daily steps; these outcomes were maintained at 6 and 9 months(43, 44). Finkelstein et al. followed up again after 12 months finding null effects(43). Five other interventions demonstrated no significant effects of the financial incentive in the short or long term(45, 46, 49, 53, 61). Marcus et al.'s null effects study reported that "the promise of reducing parents' taxes in the future was not enough to encourage their children to exercise now"(46). A retrospective omnibus survey regarding the Canadian Fitness Tax Credit found parents who used the tax credit reported that children had increased their organised sport participation, however secondary analysis of device-based physical activity collected during the implementation of the Canadian Fitness Tax Credit found no significant effect on children's physical activity levels(61, 71). Evidence for the effectiveness of financial incentives remains mixed and inconclusive due to a low number of heterogeneous studies.

2.4.2.3 Adoption

Children's use of financial incentives after they were made available was challenging to compare across the various types of financial incentives. Interventions that provided a financial incentive as a reward for physical activity behaviour did not report whether the incentives were used by the child or their parents. Non-refundable tax credits claimed using receipts for payments provided limited understanding as the difference between reach and adoption could not be determined. Financial incentives that provided a subsidy at point of payment achieved the best rates of adoption.

The number of participants reached by population-wide interventions was high (mean=33,000) compared to other research studies (mean=334), however adoption was lower. The highest adoption rate in the identified interventions was estimated to be 30% of those reached by the “KOMM! In den Sportverein” voucher(46). This voucher was described as a ‘win’ for parents of existing sports club members, who primarily redeemed the vouchers, rather than reducing barriers for less active students(46). A similar outcome was demonstrated in multiple studies of the Canadian Fitness Tax Credit; for example, just 12.3% of those aware of the program claimed a tax credit in 2007(71). Spence reported, “Parents in the lowest income quartile were significantly less aware and less likely to claim the Canadian Fitness Tax Credit than other income groups”(71). The refundable tax rebate in Los Angeles and the ACTIVE program targeted disadvantaged populations, resulting in higher adoption rates amongst disadvantaged communities compared to population-wide interventions(48, 50, 51).

The financial incentives that provided a subsidy to support many forms of structured physical activity, including sport and active recreation, appealed to children's different activity preferences. The ACTIVE program was designed specifically for disadvantaged 13–14-year-old students, to enable to access more unstructured, informal, and social activities in their local areas, based off formative research(51, 52). Ensuring participants had agency over how the vouchers were used was also important to encourage voucher adoption among adolescents; they found allowing adolescents to select an activity of their choice increased voucher use, rather than providing a limited selection of activity options. Process information regarding the types of activities incentivised by the remaining interventions was not well-described.

2.4.2.4 Implementation

Some financial incentives (n=7) were designed to achieve a health objective such as improved cardiovascular fitness or increased physical activity. Others (n=4) focused on more economic objectives such as alleviating structured physical activity costs or increasing registrations in sport. There were noticeably more intervention components described in financial incentive interventions designed to achieve health objectives rather than economic objectives.

Financial incentives were delivered in various settings including community settings alone (n=5), school and community settings (n=4), home and community settings (n=1), or school only (n=1). The main partners in the studies were schools/teachers, structured physical activity providers and activity guides, and local council staff. Studies funded through research grants or philanthropic groups were implemented for less than 12 months. Interventions that had been implemented by governments had longer durations, lasting 3–10 years but did not include evaluation within their budget. Studies of interventions delivered over multiple years were not conducted in partnership with the governments implementing them and therefore studies lacked process information. Conducting research in community settings is known to be more complicated compared to school-based interventions; follow up periods longer than 12 months may not be feasible in community based financial incentive intervention studies.

The main implementation process discussed was the recruitment process. Two studies recruited participants using advertisements in newspapers, and one partnered with sports clubs for recruitment. Five programs engaged schools as partners during recruitment which enhanced reach for studies of various sizes. Delivering the intervention through the school setting using teachers to reach students, and making involvement the social norm, draws on the principles of herd behaviour, or social norms, to enhance reach. The “KOMM! In den Sportverein” vouchers were printed on paper slips and handed directly to Third Grade students by their teacher; reach and adoption were and not systematically recorded in this process. The refundable tax rebate in Los Angeles and the ACTIVE voucher program reached

disadvantaged children through partnering with schools in disadvantaged areas(49, 51). Face-to-face provision of the financial incentive from a trusted source (such as a teacher) shows promise to achieve high reach, however, can be resource-intensive for large-scale interventions(46, 74). The Canadian Fitness Tax Credit which was available to all Canadian children did not appear to have a recruitment strategy. Marcus et al. were the only intervention to mention a mass media campaign to raise awareness of the intervention. They also reported a “starter kit”, was distributed which included a T-shirt with the logo of the initiative as well as an information letter for the parents describing the basic idea of the initiative. These additional material components and advertising developed a strong and recognisable brand for the initiative but did not achieve equitable implementation(46).

Following recruitment, little details were available to understand the intervention delivery, adoption of financial incentives or maintenance of interventions. The ACTIVE trial reported adding peer mentors and council support workers to encourage voucher use after the feasibility study(50, 51). These additional intervention components were found to be resource intensive and unsustainable(51). Other interventions included description of goal setting, peer-modelling and rewards however did not assess the relationship between these components and the intervention outcomes(44, 47). The remaining did not describe how interventions were delivered in community settings.

Details about the budget of the intervention or cost effectiveness were challenging to identify. The majority of financial incentives were funded through research grants, yet the value of the finding was not always reported. The “KOMM! In den Sportverein” intervention had 4.5 million euros over three years allocated, however the investment in the Canadian Fitness Tax Credit was not clearly reported.

2.4.2.5 Maintenance

Financial incentives were available for children to use over a short period (8-weeks–12-months) except the Canadian Fitness Tax Credit which was available annually for a decade (2006-2016). There is no clear indication of why the Canadian Fitness Tax Credit was maintained by the government for this long-term duration(55, 60, 61, 71). All financial incentive interventions had concluded at the time of the review. The primary reasons for the conclusion of the financial incentive interventions were a lack of ongoing funding, or ineffective interventions.

Studies evaluating financial incentive interventions for children’s participation in physical activity outside-of-school followed up 3–12 months after the intervention, except one which looked at long-term effects after 7–9 years. The German study conducted 7–9 years after the intervention compared the eligible population in the state of Saxony, to comparative groups in two neighbouring states (Brandenburg and Thuringia) finding no significant effects in physical activity, health or sport club membership after receiving a voucher to enable enrolment in a sports club in Year 3(46). Studies which followed intervention effects 12 months after the interventions demonstrated mixed effects. The ACTIVE study demonstrated significant improvements in adolescents' distance ran, fitness, and reduced high blood pressure in the intervention group after 12 months(51) whilst another RCT which followed up after 12 months did not observe positive effects(43). There is a need to assess whether short-term intervention effects are maintained after the long-term implementation of effective financial incentive interventions.

Table 2 Peer-reviewed studies of financial incentive interventions

Identification <i>Name;</i> <i>Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
<p>Name: Active Children Through Incentive Vouchers — Evaluation (ACTIVE) (Feasibility)</p> <p>Evidence source: (50)</p>	<p>Region, Country: Swansea, South Wales, United Kingdom</p> <p>Year launched: 2015</p> <p>Duration: 6-month intervention, 12-month research period</p> <p>Population: Adolescents in Year 9 (13–14 years old)</p> <p>Setting: School and community settings</p>	<p>Objective: Examines whether placing decision making with young people through activity vouchers can increase empowerment and engagement to shape activity provision.</p> <p>Incentive features: Vouchers could be used to: i) enrol in existing activities, ii) fund coaches or new activities directly in communities or at their school, such as Zumba and Boxercise and, iii) purchase new sporting equipment for themselves or their school.</p> <p>Recognised providers (i.e., leisure centres, clubs, and dance providers) were recruited during development stages, and their logos were printed on the vouchers to enable easy identification of where they could be used.</p> <p>Teenagers were eligible to receive £25 of vouchers (five vouchers in increments of £5) per month for six months.</p> <p>Research design: Mixed methods feasibility study using the RE-AIM framework</p>	<p>Reach: All Year 9 pupils (n = 115; 13.3 ± 0.48 years; 51 % boys) from one secondary school in Wales participated.</p> <p>Effect: A marginal increase in moderate-to-vigorous PA (MVPA) was observed during the scheme (7.4 mins/day (95% CI -5.4, 20.3). The intervention was associated with improvements in fitness post-intervention measured by the coopers run test, significant for boys (168.2m (95%CI 44.9, 291.5).</p> <p>Adoption: At least one voucher was used by 81% (48 out of 59) of boys and 77% (43 out of 56) of girls. At least one voucher was used by 76% (37 out of 49) of deprived participants and 83% (53 out of 64) of non-deprived.</p> <p>Implementation [process]: The ACTIVE scheme was implemented as intended with pupils receiving vouchers through school teachers. Positive feedback was received from teachers, who reported the scheme was feasible to run through school and was not too intrusive on school time. Qualitative responses showed promise in changing attitudes towards PA and reducing cost barriers, allowing</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Theoretical underpinning: Not stated.</p> <p>Outcome/s measured: Acceptability of the intervention, as well as objectively measured PA (GENEActive triaxial accelerometer), self-reported PA (PA-Q) and aerobic fitness (Cooper Run test)</p> <p>Budget: Could not be identified.</p> <p>The work was funded by the British Medical Association in conjunction with support from The Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (DECIPHer), a UKCRC Public Health Research Centre of Excellence.</p>	<p>those from deprived backgrounds more opportunities to access activities.</p> <p>Of the 24 activity providers participating, 16 were utilised. Providers not used were those initiated by researchers at baseline and were predominantly structured activities including dance classes, swimming clubs, gymnastics classes, and football coaching.</p> <p>Maintenance: This feasibility study led to a large-scale mixed method RCT.</p>
<p>Name: ACTIVE Project</p> <p>Evidence source: (52, 54)</p>	<p>Region, Country: Swansea, South Wales, United Kingdom</p> <p>Year launched: 2016, Not scaled up.</p> <p>Duration: Sept 2016 – Jan 2018 (RCT period) 12 month follow up.</p>	<p>Objective: 1) Improve cardiovascular fitness 2) Evaluate the effects of the intervention on cardiovascular.</p> <p>Incentive features: Vouchers could be spent on existing PA provision (e.g., gym membership or sports clubs) or could be used to bring new activities into communities or schools. They could also purchase equipment. How the vouchers were spent was directed by the teenagers.</p>	<p>Reach: 9 eligible schools invited, 7 participated. Control=385 students (42%); Intervention=524 students (58%) – Similar characteristics between groups.</p> <p>Effect: The intervention showed a trend to improve the distance ran (primary outcome) and was significant in improving the likelihood of intervention teenagers being fit (OR=1.21, 95% CI=1.07,1.38,p=0.002). There was a reduction in teenagers classified as having high blood pressure</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
	<p>Population: Adolescents in Year 9 (13–14 years old)</p> <p>Setting: School and community settings</p>	<p>Teenagers received PA vouchers of £20 (4 vouchers in increments of £5) each month for 12 months.</p> <p>Research design: Mixed Methods RCT. Developed following the feasibility study and subsequent conversations with teenagers recommending what they felt was needed to improve PA opportunities and fitness.</p> <p>Theoretical underpinning: Not stated.</p> <p>Outcome/s measured: Aerobic Fitness (Cooper run test), accelerometry over 7 days, cardiovascular (CV) measures (blood pressure, pulse wave analysis), exercise motivation (using the Behavioural Regulation in Exercise Questionnaire [BREQ-2] and the Relative Autonomy Index) and Adolescents' views (focus groups).</p> <p>Budget: Could not be identified.</p> <p>This work was supported by the British Heart Foundation who peer reviewed the protocol at the time of grant application but had no further involvement other than providing funding (grant number: PG/16/16/32057).</p>	<p>(secondary outcome) in the intervention group (baseline, 5.3% [28/524]; 12 months, 2.7% [14/524])</p> <p>Adoption: Data on where teenagers used vouchers and evidence from focus groups showed that teenagers wanted to access more unstructured, informal, and social activities in their local areas.</p> <p>Implementation: Delivered through partnership with 7 secondary schools. Included teachers, peer mentors, as well as local council and support worker engagement to encourage voucher use.</p> <p>Maintenance: Improvement sustained at 12-month follow up in children. Project does not appear to have been scaled up after this research trial.</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		Other details: Multicomponent intervention composed of (1) a voucher scheme, (2) peer mentoring, and (3) support worker engagement.	
Name: Canadian Fitness Tax Credit (CFTC) Evidence source: (55-61)	Region, Country: Canada Year launched: 2006 Duration: 10 years, reduced for 2016, eliminated 2017. Population: Children aged 2–16 years old Setting: Community-based	Objective: The CFTC aimed to alleviate the cost of participation in organised PA by offering tax rebates to families. Incentive features: The CFTC allowed a non-refundable tax credit to register a child 16 years old or younger in an eligible PA program. To qualify, PA programs must be offered for a minimum of 8 consecutive weeks or 5 consecutive days, be supervised, and contribute to "cardio-respiratory endurance, plus one or more of: muscular strength, muscular endurance, flexibility, or balance." CFTC for children aged 16 years or younger were valued at \$500 per child (\$1,000 for 2014/15, \$500 for 2007 to 2013 taxation years). An additional tax credit for children under the age of 18 with a disability was available valued at \$500. Research design: Spence conducted cross-sectional study; data was collected through the Canadian Ipsos Reid Online Omnibus (telephone interviews).	Reach: Population reach was not reported. In studies, less than half of respondents were aware of the CFTC (42.8%), had claimed it for 2007 (12.3%), or planned to claim it for the 2008 tax year (15.5%). Low-income families were less likely to be in organised sport and less likely to have claimed their tax credit. Effect: Approximately 16% of parents who had claimed the CFTC agreed it had increased their child's participation in organised PA. This level of agreement ranged from 37.5% among low-income families to 10.4% among the highest-income families. Thus, even though children from low-income families are less likely to be enrolled in organised PA, and their parents are less likely to have claimed the CFTC, the tax credit appears to be most effective for increasing PA among such children.

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Stearns conducted secondary analysis of device measured and survey data from 3 cross-sectional studies during the CFTC implementation.</p> <p>Theoretical underpinning: Not stated</p> <p>Outcome/s measured: Program awareness, Self-report physical activity (Omnibus survey), Device measured physical activity, specifically designed surveys.</p> <p>Budget: Could not be identified.</p> <p>Other details: Prior to the Nationwide fitness tax credit program, some provinces and territories had a tax credit (Manitoba, Yukon, Nova Scotia, and Saskatchewan).</p>	<p>The Alberta sub-study used accelerometers and found the CFTC had no effect on total physical activity levels or steps counts.</p> <p>Adoption: Cannot be differentiated from reach.</p> <p>Implementation [process]: The amount of the credit is relatively modest, in most cases representing a rather small proportion ($\leq 15\%$) of the total amount of the claim (which in turn may be less than the actual cost). Furthermore, Individuals do not receive the benefit of the tax credit until after an annual tax return is filed, potentially a year or more after the expense was incurred.</p> <p>Maintenance: There is no evidence of maintained sport participation, or on other outcomes, for children who engaged with the CFTC. This program has limited evaluation but was maintained for 10 years.</p>
Name: KOMM! In den Sportverein (Come to the Sports Club)	Region, Country: Saxony, Germany Year launched: 2009 Duration: Three cohorts were treated	Objective: To encourage primary school children to join a sports club, outside of school. Incentive features: Two vouchers valued at \$33 or 30 pounds each were distributed to children to provide	Reach: Vouchers were administered among all (n=33,000) third grade students in Saxony in January 2009. A survey administered seven to nine years after the programs found that significantly more treated children in Saxony recall having received and redeemed the vouchers, relative to older cohorts

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
Evidence source: (46)	2009, 2010, and 2011. Studied in 2018. Population: Third grade pupils Setting: School and community	subsidised or free access to sports club membership for one year. Vouchers were distributed together with a “starter kit”, which included a T-shirt with the logo of the initiative as well as an information letter for the parents describing the basic idea of the initiative. Research design: Cross-sectional study with comparison group. Theoretical underpinning: Not stated. Outcome/s measured: Register-based survey on the awareness of the program, long-term effects on physical activity, sports club membership, weekly hours of sport, and BMI. Budget: 4.5 million euros over three years Other details: The initiative was restructured in 2012 and abolished in 2013. Money was reallocated to hire regional coordinators to foster physical activity among the population, especially for adolescents and older people. No evaluation was undertaken during the initiative or by the government who invested in the program.	and cohorts in neighbouring states. The vouchers were “a windfall gain” or win for parents of existing sports club members, who primarily redeemed the vouchers. Effect: Despite higher awareness and utilisation of the vouchers, no significant short or long-term effects on membership rates, physical activity, and overweightness were observed among previously inactive students. Adoption: In January 2011, the initiative announced that about 20,000 vouchers (out of a total of about 66,000 eligible third graders) had been redeemed – approx. 30% use. Effect sizes were significantly larger for children from higher socio-demographic backgrounds, who attended an academic track school and those who were already sports club members before the “KOMM! In den Sportverein” campaign – not the target group of disadvantaged children. Implementation [process]: The vouchers were handed out by primary school class teachers and had the official school stamp to hinder illegal copies being made.

Identification <i>Name;</i> <i>Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
			<p>Maintenance: There is no evidence of long-run effects on any outcome. This initiative was maintained for three years. The program still exists today however it no longer includes voucher distribution.</p>
<p>Name: Refundable Tax Credits to Increase Low-Income Children’s After-School Physical Activity Level Evidence source: (75)</p>	<p>Region, Country: Los Angeles, United States of America Year launched: 2014 Duration: <12 months Population: 6–11-year-old children (1st through 5th grade) Setting: Community based (After-school)</p>	<p>Objective: Reduce the cost barrier that currently deters some low-income parents from enrolling their children in after-school activities, and thus promote more children to engage in after-school physical activity programs.</p> <p>Incentive features: Refundable tax credit (fixed). Participants that were randomly selected to take part in the treatment group were given a letter stating that they will receive up to \$200 reimbursement following the enrolment of their elementary school-aged child in a qualified after-school physical activity program of their choice.</p> <p>Qualified programs had to encourage children to accumulate at least 30 minutes MVPA per session, be supervised by an adult, be suitable for children and last at least 8-weeks duration, with at least one session per week.</p>	<p>Reach: Participants were recruited from three elementary schools. 130 families provided consent for the study; 64 were assigned to the treatment group and 66 the control group.</p> <p>Effect: Simulated tax credits did not significantly influence low-income children's rates of enrolment in after-school physical activity programs, frequency of participation and time spent in after-school physical activity programs, or overall moderate-to-vigorous intensity physical activity at post-intervention or follow-up.</p> <p>Adoption: In the treatment group, 24 people completed the study measurements and 7 submitted the form required for the \$200 reimbursement.</p> <p>Implementation [process]: The intervention was most effective in schools that offered fee-based after school programs, compared to free or no after</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Research design: Randomised Controlled Trial</p> <p>Theoretical underpinning: The economic theory of household production</p> <p>Outcome/s measured: (1) enrolment rate in after-school physical activity programs, (2) time spent participating in after-school physical activity programs, (3) weekly participation frequency in the afterschool physical activity programs, (4) duration of enrolment (in weeks) in after-school physical activity programs, (5) MVPA, and (6) long-term enrolment patterns in after-school physical activity programs. Measures used to assess efficacy were obtained from Actigraph GT2M accelerometers, and parent completed time use diaries. Data were collected from the participants at baseline, post-intervention (four months after baseline) and follow up stage of the study (six weeks after post-intervention).</p> <p>Budget: Grant from the Robert Wood Johnson Foundation (Grant number: 68492), California State University, Northridge's Research Fellowship Program, and by NIH Research Infrastructure in Minority Institutions from the National Institute of Minority Health and Health Disparities, P20 MD003938.</p>	<p>school programs. This suggests the reimbursable activity needs to be readily available (on-site), not require additional time and transport costs.</p> <p>Maintenance: Project does not appear to have been scaled up after this research trial.</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
<p>Name: Financial Incentive Trial targeting FAMilies (FIT-FAM)</p> <p>Evidence source: (43)</p>	<p>Region, Country: Singapore</p> <p>Year launched: 2016</p> <p>Duration: January 2016 to July 2017 (12 month follow up)</p> <p>Population: Parent-child dyads. Parents aged 25–65 years) and children aged 7–11 years.</p> <p>Setting: Home and community</p>	<p>Objective: To increase parent’s physical activity levels by providing incentives child-based incentives or family-based incentives.</p> <p>Incentive features: Two parallel arms (1) activity tracker plus child-based incentive, and (2) activity tracker plus family-based incentive.</p> <p>Children in the child-based study arm were awarded SGD5 (≈USD3.60) each week that they achieved the target through logging their steps on the activity tracker according to the following schedule: ≥10,000 steps/day on ≥4, ≥5, and ≥ 6 days each week in months 1–3, 4–6, and 7–12, respectively, and their participating parent logged ≥2000 steps/day on ≥4 days in the same week.</p> <p>Family-based children were awarded SGD5 (≈USD3.60) each week that they and their participating parent achieved the same step target.</p> <p>Family-based children were also eligible to earn the monthly bonus if they and their participating parent met the goal in all weeks in the month.</p> <p>Pay-outs were disbursed as child-friendly gift vouchers (e.g., Toys”R”Us).</p>	<p>Reach: 316 dyads were recruited, of which 159 were randomly assigned to arm 1, and 157 to arm 2. Parents were on average 42 years old, and children were on average 9 years old. In both study arms, 159 dyads completed 12 month follow up.</p> <p>Effect: At month 6, relative to baseline, family-based children achieved a statistically significant increase of 464 steps/day (95% CI: 34–895), whereas children in the child-based study arm logged a decrease of 8 steps/day (95% CI: – 445–428), resulting in a statistically nonsignificant differential of 473 steps/day (95% CI: – 139– 1085) between the two arms. At month 6, there was a 613 steps/day (95% CI: 54– 1171) differential in favour of family-based parents. At month 12, our primary endpoint, the differential was reduced to 369 steps/day (95% CI: – 88–1114) and was no longer statistically significant.</p> <p>Adoption: On average, children in the child-based and family-based arm earned SGD11.51 (≈USD8.29) and SGD11.30 (≈USD8.13) per month, respectively, over the 12-month incentive period. Adoption declines over time.</p> <p>Implementation [process]: Neither gender, social support for physical activity, family dynamics, nor</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Research design: Randomised Control Trial.</p> <p>Theoretical underpinning: Behavioural economics, group dynamics</p> <p>Outcome/s measured: Objectively measured steps/day (adults and children); MVPA and MVPA bouts; sedentary duration; light, moderate, and vigorous physical activity; and total volume of physical activity</p> <p>Budget: This study was supported by a Health Services Research Competitive Research Grant (HSRG/0048/2015) from the National Medical Research Council (NMRC), Ministry of Health, Singapore. Value of funding was SGD \$540,457.</p> <p>Other details: Participants signed an informed consent form, assented to their child's participation, and paid a non-refundable enrolment fee of SGD25 (≈USD18.00). The nominal enrolment fee served as a deterrent to those who may join the study solely to receive the free activity tracker but who are not truly motivated to change their behaviour. The child's activity tracker could be upgraded to a Fitbit Flex® for an additional SGD20 (≈USD14.40). Participants also had access to all features available on the Fitbit app and website.</p>	<p>enjoyment of physical activity moderated the effectiveness of the family-based incentives on steps.</p> <p>Maintenance: At month 12, the children's and parents' steps had increased but outcomes were not statistically different across arms. Project does not appear to have been scaled up after this research trial.</p>

Identification <i>Name;</i> <i>Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
<p>Name: Family Incentive Trial (FIT) to Increase Outdoor Time and Fitness</p> <p>Evidence source: (76)</p>	<p>Region, Country: Singapore</p> <p>Year launched: 2011</p> <p>Duration: 9 months</p> <p>Population: Children 6–12 years old</p> <p>Setting: Community</p>	<p>Objective: To evaluate an incentive-based physical activity intervention to increase physical activity and fitness among children.</p> <p>Incentive features: Awarded toy store vouchers (worth ~\$19 USD) when pedometer goals were met, in addition to the chance to win other prizes with a value of ~\$74 USD (e.g., tickets to the zoo) via monthly lotteries.</p> <p>Research design: Cluster Randomised Control Trial.</p> <p>Theoretical underpinning: Not stated.</p> <p>Outcome/s measured: Objectively measured steps per day (Omron pedometers), 6-minute walk test (6MWT), Paediatric Quality of Life Inventory (PedsQL), and body mass index (BMI)</p> <p>Budget: In addition to the cost of the pedometers (roughly SGD\$95 [US\$74]), the average incentive payout across the 147 children in the intervention group was SGD\$186 (US\$145) per child over the 9-month study period, for a total of SGD\$281 (US\$220).</p> <p>Other details: Each participating family received pamphlets from the Singapore Health Promotion Board presenting information on the benefits of</p>	<p>Reach: 285 children (from 212 families), with 138 children (from 106 families) randomised to the control group and 147 children (from 106 families) to the intervention.</p> <p>Effect: At follow-up (~9 months), children in the intervention group recorded significantly more pedometer steps than controls over the entire week (8660 vs 7767; $P = .010$), on weekdays (8646 vs 7826; $P = .041$), and on weekends (8779 vs 7684; $P = .018$). There was no significant effect on health outcomes. Compared with controls, children in the intervention group logged more steps over the entire week, during weekday, and on weekends. Over the 7-day period, 24.4% of the intervention group achieved at least 8000 steps daily, compared with only 1.9% of controls. The difference was more pronounced on weekends than on weekdays.</p> <p>Adoption: Use of rewards was not reported.</p> <p>Implementation [process]: Multicomponent study involving peer modelling materials, goal-setting, pedometers, and rewards. In the first month of the study, 43% of participants attended all planned weekend outdoor activities. This decreased to 26% in the second month and then further in subsequent</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>physical activity. In addition, families assigned to the intervention group received information on structured weekend outdoor activities and pedometer step programs. The structured weekend outdoor activities included hikes at nature reserves and parks. Families were encouraged to attend sessions at least twice a month. All sessions, held on weekends and lasting 2–3 hours each, were organised in conjunction with the reserves and parks.</p>	<p>months, to a low of 7% in the final month, suggesting that this aspect of the intervention is not sustainable.</p> <p>Maintenance: Not reported. A longer follow-up period was recommended to assess impacts on health outcomes.</p>
<p>Name: Family Incentive Trial (FIT) to increase outdoor time and prevent myopia in children</p> <p>Evidence source: (45)</p>	<p>Region, Country: Singapore</p> <p>Year launched: 2010</p> <p>Duration: 9 months</p> <p>Population: Children 6–12 years old</p> <p>Setting: Community</p>	<p>Objective: To develop and rigorously test an intervention aimed at increasing outdoor time among Singaporean children.</p> <p>Incentive features: The FIT intervention comprised of targeted education on myopia and good eye care habits, structured weekend outdoor activities and incentives for children to increase their daily steps via pedometers. Incentives were in the form of a toy store voucher worth 30 Singapore dollars (~£15, \$US 25). Family based prizes were also awarded monthly. These prizes had an average value of approximately 120 Singapore dollars (~£60, \$US 95), and included excursions to outdoor areas, for example, entrance fees to film studios or zoo tickets in Singapore.</p>	<p>Reach: 285 children, in which 147 were randomly assigned to the intervention arm and 138 to the control arm.</p> <p>Effect: At 6 months showed a significant increase in mean outdoor time per week in the intervention arm (14.75 h week) compared to the control arm (12.40 h week) as measured by the questionnaire ($p = 0.04$). However, greater outdoor time was not statistically significant at the end of the trial (15.95 h week vs 14.34 h in the control group ($p = 0.29$)).</p> <p>Adoption: The average percentage of park visits attended per month gradually declined from 42.9% in May 2011 to 6.6% in February 2012.</p> <p>Implementation [process]: Not reported.</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Research design: Cluster randomised controlled trial</p> <p>Theoretical underpinning: Not stated.</p> <p>Outcome/s measured: Outdoor time (WHO questionnaire and a 1-week diary), objectively measured physical activity (Omron HJ-720ITC pedometer)</p> <p>Budget: This study was funded by National Medical Research Council, NMRC/EDG/1024/2010.</p> <p>Other details: All families were given information about how to delay the onset or progression of myopia through regular exposure to the outdoor environment and by encouraging good eye care habits in their children. They also received resources like booklets and brochures about practical tips on eye care from National Myopia Prevention Programme run by Health Promotion Board. The families were encouraged to attend 2–3 h outdoor hikes/sports/activities organised in conjunction with National Parks and Nature Society guides on weekends at least twice per month. The activities primarily comprised of hikes at nature reserves and parks on Saturday mornings and Sunday afternoons.</p>	<p>Maintenance: There is no evidence that this intervention was extended for a longer period or expanded to reach more children in efforts to prevent myopia.</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
Name: Facilitated Fee Waiver program Evidence source: (48)	Region, Country: South Atlantic, United States Year launched: 2008 Duration: 12 months Population: Low-income families of children and adolescents Setting: Community	Objective: To identify if a facilitated waiver program increases the number of children enrolling in local sports programs; and understand if children that received a waiver continued to participate after enrolling in the sport. Incentive features: Simple tick box on registration form requesting a full or part waiver of sports registration fees. Research design: Mixed-methods. Theoretical underpinning: Not stated. Outcome/s measured: Waiver use, sport attendance (reported by coach) and parent focus groups. Budget: Grant funding from Robert Wood Johnson Foundation.	Reach: 173 children received waivers through the simple request form, compared to 14 children in the previous 12 months. Effect: Parents reported that the fee waiver had been of benefit to their children. Adoption: Children that attended Title 1 schools had a 78% increase in sports enrolments compared to non-title 1 schools that only increased 23% in the same period. 61% of children that used a waiver attended all games and practices in the season, compared to 76% of children that did not request a waiver. Implementation [process]: Not reported. Maintenance: Not reported.
Name: RIGHT TRACKS pilot trial Evidence source: (53)	Region, Country: North East, England Year launched: 2014 Duration: 3 months	Objective: To test the feasibility of an intervention to promote Active Travel to School. Incentive features: Lottery-based incentive scheme. Weekly prize draw for walking or cycling to school, all, or part of the journey. The prize was one £5 gift voucher (Love2Shop) which could be spent in several high street shops. This value approximated the amount	Reach: Four schools agreed to take part in the study (3.3% of those invited). Parental consent was gained from 29 of the 88 children approached (33.0%). Effect: Null or negative effects observed. Adoption: 15 participants in the intervention group were retained for the whole duration of the study

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
	<p>Population: Children aged 9–10 years old.</p> <p>Setting: School and Community</p>	<p>of weekly pocket money for children aged 8–15 in the North East of England at the time, £6.23.</p> <p>Research design: Cluster Randomised control trial – feasibility study.</p> <p>Theoretical underpinning: Not stated.</p> <p>Outcome/s measured: Active travel measured using parental reports, child reports and objectively measured physical activity (ActiGraph GT3X+ accelerometer).</p> <p>Budget: Research funding was provided by the Newcastle University Institute for Sustainability (£1750) and by the Catherine Cookson Foundation (£2104).</p> <p>Other details: Participant retention and accelerometer return were high, possibly due to £5 thank you vouchers issued to all participants who returned materials when requested.</p>	<p>Implementation [process]: Different recruitment for schools and students was recommended. Parental Active Travel to School reports by SMS, rather than on paper, may be a better option.</p> <p>Maintenance: Not reported.</p>
<p>Name: “läuft.” Evidence source: (47)</p>	<p>Region, Country: Schleswig-Holstein, Germany</p>	<p>Objective: To present immediate intervention effects of the cluster-randomised controlled trial “läuft.” “läuft.” focuses especially on increasing out-of-school PA of different intensities and in different contexts as</p>	<p>Reach: 29 schools with 61 classes and 1489 students decided to take part in the study. Data for 1,287 students were assessed during post-assessment. There was no dropout on school or class level. Data</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
	<p>Year launched: 2014</p> <p>Duration: 3 months</p> <p>Population: Children aged 12–15 years old.</p> <p>Setting: School</p>	<p>well as on establishing an active lifestyle in the long term.</p> <p>Incentive features: Lottery (class-based). Students received pedometers and self-monitored their daily steps on a web-based platform. Classes with the highest means of steps/week as well as with the largest increase were awarded with cash prizes (in total EUR 3250, ranging from EUR 750 to 100). Each class collected creative ideas on how to increase PA in everyday school life and kept record of these ideas. Classes with the most creative class projects were awarded (in total EUR 2750, ranging from EUR 750 to 100).</p> <p>Research design: Cluster-randomised controlled trial.</p> <p>Trial included three waves of assessment: (1) before intervention in January/February 2014, (2) immediately after the intervention in June/July 2014, and (3) 1 year after the end of intervention in June/July 2015.</p> <p>Theoretical underpinning: goal setting, self-monitoring, and social support</p>	<p>for 1,162 students were matched with baseline data.</p> <p>Effect: Findings provide evidence for the effectiveness of “läuft.” on students' out-of-school sports activities, weekly MVPA, and active commuting. The intervention effect on cardiorespiratory fitness missed significance marginally. Adolescents' SB was not affected and cardiorespiratory fitness only marginally.</p> <p>Adoption: not reported.</p> <p>Implementation [process]: not reported.</p> <p>Maintenance: 12 month follow up reporting was not identified.</p>

Identification <i>Name; Evidence source.</i>	Implementation context <i>Region, Country; Year launched; Duration; Population; Setting.</i>	Intervention details <i>Objectives; Intervention features; Research design; Theoretical underpinning; outcome/s measured; Budget; Other details</i>	Evaluation dimensions <i>Reach; Effect; Adoption; Implementation (process); Maintenance</i>
		<p>Outcome/s measured: Cardiorespiratory fitness (20-m shuttle run), and self-report physical activity (Prochaska screening measure); sedentary behaviour (Zabinski 2007), active commuting and doing chores (household and garden), and out-of-school sports activities.</p> <p>Budget: The “läuft.” physical activity trial is funded by the German Cancer Aid in the Priority Program Primary Prevention of Cancer (Nutrition and Physical Activity, reference number 110012).</p>	

2.5 PART A: DISCUSSION

New approaches to increasing school-aged children's physical activity behaviours are needed to improve public health(1, 77). This scoping review identified and collated emerging evidence on the implementation of financial incentive interventions to enhance children's participation in physical activity outside of school time. In the past two decades, sixteen published studies have investigated the role of eleven financial incentive interventions on increasing children and adolescents' physical activity participation.

The studies of financial incentives in increasing children's physical activity levels are heterogeneous. Interventions adopted various financial incentive designs regarding incentive type, incentive value, target audience, availability of the incentive (frequency and duration) and how the incentive could be used to motivate physical activity participation. Across identified financial incentive interventions (n=11), few were implemented with a theoretical underpinning (n=4) or used an evaluation framework (n=2); this limits understanding of the mechanisms behind financial incentives which influence children's physical activity behaviours outside of school. The effects were mixed with six of the interventions reporting no significant effects and five reporting some positive effect, and only one of these demonstrating the effects were maintained after 12 months. Therefore, it is challenging to understand whether financial incentives are effective, and how they may be implemented to promote physical activity participation outside of school among school-aged children. Key considerations for future research are discussed regarding the approach to generating good-quality evidence, outcome measurement, theoretical underpinnings, multicomponent interventions, partnerships, and eligibility criteria for financial incentive interventions.

2.5.1 Approach to evidence generation

Section 2.4.2 presented the study designs of the identified financial incentive interventions, with most being RCT designs which were not delivered to large populations in real-world conditions(43-45, 47, 49-51, 53). There is a clear gap between these researcher-led RCT's and what financial incentives are feasible for large-scale implementation. The financial incentives which were delivered to large populations in Canada and Germany were led by governments and studied retrospectively, i.e. evaluation was not planned or integrated within the intervention from the beginning(46, 55-60). The retrospective studies of large-scale financial incentives focus on outcomes and have not reported process evaluation evidence regarding the implementation of the intervention in real-world conditions(46, 55-60). Without process evaluation data it is challenging to understand whether the findings are generalisable to other contexts. There have been no prospective studies conducted with comprehensively evaluate large-scale financial incentive interventions.

2.5.2 Reported RE-AIM dimensions

This scoping review used the RE-AIM framework to inform an evidence-based structure to contrast the heterogeneous studies and better understand the evidence across financial incentive interventions. All interventions had reported reach and effect dimensions of the RE-AIM framework. Few interventions reported reach as a proportion of the population because they were only available to study participants. The effect of financial incentives on children's physical activity was mainly assessed within 12 months of the intervention, with only one following up longer-term effects (more than 12 months). Overall, there was insufficient evidence to determine the effectiveness of financial incentives in increasing school-aged children's physical activity participation. Adoption, Implementation and Maintenance dimensions of RE-AIM were less commonly reported, limiting the potential for replicating promising approaches. Details of the implementation process could help advance the design and implementation of future interventions by identifying mechanisms of change. For example,

the time between using the incentive and participating in physical activity may influence the effect the incentive has on behaviour change. Reward and lottery types of financial incentives often underreported implementation and adoption dimensions of interventions(44, 47); interventions that reported adoption found diminished engagement over time when the intervention remained the same(43, 53). Further understanding of implementation processes for financial incentive interventions is required to understand what contributes to the interventions' reach, effect, adoption, and maintenance.

Advancement in knowledge has been slow considering the strong evidence that cost is a major barrier to regular participation and the pressing global need to increase population physical activity levels(1, 4). Two out of eleven interventions had published evaluation protocols(47, 51). The ACTIVE intervention studies provided the most comprehensive evidence to understand the role of financial incentives in increasing children's physical activity participation by reporting on the implementation process and evidence of outcomes(50, 51). James et al. also presented reflections from qualitative research to guide future intervention design for teenagers toward flexible and unstructured physical activity options(52). Although Suchert et al. published a research protocol, their evaluation still lacked description of the implementation process, program adoption, or maintenance(47). The remaining studies did not provide clear research protocols or in-depth descriptions of their methodologies. Researchers should adopt evaluation frameworks to guide more comprehensive evaluations of financial incentive interventions to enable further reviews to draw firm conclusions regarding financial incentives.

2.5.3 Outcome measurement

Globally, a pitfall of much physical activity intervention research is the inconsistent and diverse measurement of physical activity behaviours(13, 78). Multiple measurement tools can be used to measure children and adolescents physical activity behaviours, but there are no standardised tools(13). Device-based measurement of physical activity is increasingly being used due to its reliability, validity, and ability to collect large amounts of data(79). In this scoping review, studies and reports measuring physical activity (n=12) used device-based measurement (pedometers or accelerometers) in combination with self-reported behaviour (activity logs, surveys) (n=8), or self-report measures alone, often reported by proxy (n=4); the remaining studies and reports (n=5) did not assess physical activity outcomes but were included in the review to provide additional details about the included interventions (n=11). Assessment of domain-specific physical activity or structured physical activity was limited, meaning a nuanced understanding of the intervention effects is unclear. While device-based measurement of physical activity in effectiveness studies is optimal, this may not be feasible for population-level interventions and should be combined with activity logs to gain domain-specific participation information. A significant challenge of self-report data collection in population-based research is reporting bias. In addition, self-report measurement tools are typically validated among discrete age groups, which may not align with the eligible population, and lack appropriate validity and/or reliability(80). There is a need for more comparable measurement tools which can be applied across different study types (RCTs and population-level studies) to allow comparison across interventions.

2.5.4 Theoretical underpinning

Evidence of effective interventions which address the 'high costs' of participation in structured physical activity programs is still in its infancy(4, 17). Financial incentives in this scoping review were used to reward physical activity participation, reduce the cost of registration in physical activity outside of school time, or reduce registration and other related costs, including equipment and clothing – most did not state any use of Theory to inform their intervention. The variations across financial incentive designs by intervention types, fiscal values, and theoretical underpinning (or lack thereof) highlight the need for theory driven interventions.

This is common to other physical activity interventions targeting children and adolescents in the literature(20). Health promotion research and research with adult populations suggest that behavioural economics principles should be applied and tested for financial incentives focused on children and adolescents behaviours(5, 9, 11, 22, 23, 27). These principles may help predict the outcome of an intervention considering socioecological influences, which can inform intervention design, implementation, and evaluation to strengthen the evidence base. Behavioural economics principles and lessons from their application among adult populations have not been utilised to inform best-practice interventions using financial incentives among children and adolescents(5, 9, 11, 22, 23, 27). Although financial incentives have the potential to make regular participation in structured physical activity more affordable for children and adolescents, theory should still underpin these innovative approaches.

2.5.5 Multicomponent interventions

Interventions should address multiple socioecological influences on behaviour and allow all children and adolescents to participate in accessible, affordable and enjoyable physical activity programs(77). Multicomponent interventions can be tailored to reduce inequalities in physical activity participation among children and adolescents through increased investment in intervention components targeting populations with the greatest need. Most identified studies had tested a single-component intervention, or had not reported on the contribution of additional intervention components to their outcomes through process evaluation. Examples of practical intervention components which could be part of a multicomponent financial incentive intervention to increase participation are lacking. The “KOMM! In den Sportverein” intervention provided a “starter kit”, which included a T-shirt with the initiative's logo and an advertising campaign(46). This approach led to high awareness of the program ten years after the intervention; however, it is unclear whether it increased subsidy use. The “läuft.” intervention demonstrated short term positive effects of providing adolescents with activity trackers and a web platform to log their physical activity behaviours(47). The ACTIVE trial used peer support to encourage the use of the subsidy however this was resource-intensive to deliver and ineffective(51). Research suggests social marketing campaigns (incorporating mass media), text message support, tailored programs, or transport assistance may be appropriate additional intervention components to explore in future financial incentive interventions(81). Further studies are required to identify effective intervention components which could complement financial incentives and be implemented at scale.

2.5.6 Partnerships

Partnerships between researchers, policymakers and practitioners in the sports and recreation sector are recommended to increase physical activity participation. In the identified interventions, partnerships were mainly between researchers and schools/school teachers. While engaging with the education sector showed promise for increasing the reach and engagement of children with financial incentive interventions, sport and recreation sector organisation partnerships are mainly unexplored. Some interventions reported working with organisations during implementation(43, 44, 51). The ACTIVE study reported working with sports organisations to provide flexible activity options that didn't require an ongoing commitment to participation. The FIT interventions organised 2–3-hour outdoor hikes/sports/activities in conjunction with National Parks and Nature Society guides on weekends during the study; however, it is unclear whether children could have maintained participation in these activities after the study finished(43, 44). Financial incentives implemented in partnership with organisations in the sport and recreation sector and/or policymakers may increase the accessibility of physical activity programs in community settings and the scalability of interventions.

Government-led financial incentives were studied by research groups in isolation; policymakers and/or government departments did not appear to be directly engaged in the evaluation of their interventions. These studies used cross-sectional designs with no pre-intervention comparison to evaluate the intervention, which provides low-quality evidence(46, 60, 71, 72). Stearns et al. conducted a more robust evaluation of the Canadian Fitness Tax Credit through secondary analysis of repeat cross-sectional pedometer data collected as part of an intervention during implementation. This study compared self-reported use of the Canadian Fitness Tax Credit to children that reported not using it(61). This study included a select group of children and suggests tax credits are not effective at promoting physical activity, which may have contributed to the conclusion of the Canadian Fitness Tax Credit in 2017. Researcher-led interventions generated robust evidence of effects however, none were maintained after the study period and/or scaled up for delivered at the population level. Ogilvie et al. recommend that partnerships between policymakers, researchers and practitioners are strengthened to generate good quality evidence of what works to increase children and adolescents' physical activity participation(82).

2.5.7 Eligibility criteria

There is a need to understand the rationale behind the definition of eligible populations in studies using financial incentives for children and adolescents. Most interventions targeted children and adolescents based on age (e.g., 9–10-year-old children) or socio-economic status (e.g., disadvantaged schools), while others had broad inclusion criteria (e.g., 2–16-year-old children, primary school children). The targeted interventions (n=5) generally achieved higher adoption rates and showed promise for increasing children's physical activity participation however, these were only explored in studies with <1500 participants. Interventions implemented at the population level reached the greatest number of participants but were not uniformly adopted, with physically active and socio-economically advantaged children adopting financial incentives at the highest rates. It is unclear whether targeted interventions delivered in natural conditions (not part of an RCT) would achieve the same results. The Global Action Plan on Physical Activity recommends that interventions delivered at the population level are designed using proportionate universalism to reduce inequalities(1). The current studies have either taken a universal or targeted approach and have not addressed inequalities in the intervention delivery. In some cases, inequalities in participation were reinforced through financial incentive interventions rather than overcome, which is undesirable. Approaches that reduce inequalities in school-aged children's physical activity participation at the population level are warranted.

2.5.8 Strengths and limitations of Part A

This scoping review used a conventional approach to search and synthesise evidence from the peer-reviewed literature on interventions that used financial incentives to encourage children and adolescents to participate in physical activity outside of school(30, 31). The RE-AIM framework provided structure to the scoping review and enabled comparisons across interventions(83). It became clear that studies focused mainly on reach and effectiveness but did not include reporting on the other dimensions of the RE-AIM framework. This is similar to the application of RE-AIM more broadly, in which reach is the most commonly reported dimension however, details of implementation and adoption are typically more common than effectiveness(35). The scoping review approach does not have the same rigour as a systematic review because the quality of the studies or risk of bias in the studies was not formally assessed. There is a possibility that research on financial incentives published in languages other than English exists however, only research published in English was included. It is also possible that financial incentive interventions have been implemented and

evaluated but are not subject to the peer-review process – this is explored in the Australian context in Part B of the scoping review.

2.6 PART A: CONCLUSIONS

This scoping review found insufficient evidence to determine whether financial incentives increase physical activity participation for children and adolescents. Sixteen studies have investigated the role of eleven financial incentives on increasing children and adolescents' physical activity participation. Future financial incentives should be designed, implemented, and evaluated using theoretical frameworks to strengthen the evidence base. Studies should prioritise process evaluation to explore the mechanisms leading to behaviour change whilst transparently reporting the implementation process to facilitate replication of practical approaches. Longitudinal studies on the maintenance and effectiveness of financial incentives over time are required to justify ongoing investments.

PART B: AUSTRALIAN FINANCIAL INCENTIVE PROGRAMS

Part A of this scoping review provided a synthesis of the peer-reviewed publications regarding financial incentives to address the cost barrier to physical activity participation for school-aged children. The review found twenty-six publications from the past two decades, showing increased momentum behind financial incentive programs. Despite inconclusive evidence from peer-reviewed publications regarding the effectiveness of financial incentive programs in increasing children's physical activity levels, every State and Territory government in Australia have implemented at least one financial incentive program. Australian programs have been implemented at scale with significant government investment but are often not subjected to the peer-reviewed academic process. Part B presents a summary and critique of government-led financial incentive programs for children's participation in structured physical activity that have been implemented across Australian States and Territories.

2.8 PART B: INTRODUCTION

2.8.1 Government intervention to increase physical activity participation

The significance of government interventions to promote physical activity and improve population health has been long-recognised in socio-ecological models of health promotion and frameworks for action to address factors beyond an individual's control(84). Physical activity interventions have received insufficient investment resulting in fragmented actions and a lack of meaningful change at the population level in the past two decades(1, 85). A recent review of reviews on physical activity promotion among children and adolescents found that most interventions did not include policy-level components; only interventions delivered in school settings involved intervention components at each level of the socio-ecological model(20). Interventions delivered outside-of-schools focused primarily on interpersonal and intrapersonal factors using educational programs or health professional support(20). Messing et al. did not identify any evidence on effective physical activity interventions delivered by sport and recreation organisations(20). There is a need to build evidence of the effectiveness of public-policy level interventions that reduce barriers and incentivise children and adolescents to participate in structured physical activity outside-of-school hours(1).

The evidence base for physical activity interventions is composed mainly of rigorous research trials conducted in controlled settings with participants that are systematically different from the general population; this approach is influenced by selection biases(20, 86). Whether the same outcomes would be achieved if an intervention are delivered in real-world conditions to large populations (i.e., scaled-up) is unclear, resulting in a gap between research and practice. Government-led interventions provide an important opportunity to strengthen the evidence base and provide practical guidance for large-scale interventions to increase population levels of physical activity(77).

2.8.2 Government-led financial incentives interventions

The importance of government interventions to reduce barriers to structured physical activity participation for school-aged children is clear, yet, as shown in Part A of Chapter 2, there is limited evidence of effective government-led actions in the peer-reviewed literature(20, 86). To overcome this knowledge gap, governments should integrate good quality evaluations within new interventions with the potential to support children's physical activity participation with evidence-based programs, such as financial incentives(1, 77, 82).

In Australia, there appears to be a strong political commitment to reduce the cost barrier to structured physical activity participation outside-of-school for children and adolescents, demonstrated by an estimated investment of \$470 million in financial incentive programs nationally(87). Australia has a federated political system with one national government and eight sub-national governments known as States (n=6) and Territories (n=2). From 2011 to 2018, five State and Territory governments had implemented financial incentive programs, with a median value of AU\$150(88). In 2022, all State and Territory jurisdictions were implementing financial incentive programs of various program designs yet, all aimed to reduce barriers to structured physical activity participation for children.

Part B of this scoping review was undertaken to collate information about the government-led financial incentives in Australia that aim to address the cost barrier to structured physical activity participation. This complements the academic literature review conducted in part A of the scoping review. This is centrally relevant to this thesis, as one of these government led financial incentive programs is evaluated in detail in subsequent chapters.

2.9 PART B: METHODS

A scoping review was conducted to understand how financial incentives were being implemented and evaluated in the Australian context. Part B adapted the five-stage scoping review framework described in Part A of this Chapter to explore grey literature (information published outside of academic peer-review process in reports, websites, government documents, media etc.)(30, 31). The five stages for conducting the scoping review are described below.

1. Identifying the research question

The research questions were defined as:

- III. To what extent have government-led financial incentives that promote physical activity participation outside-of-school among school-aged children ² been implemented in Australia?
- IV. Are government-led financial incentives effective to promote physical activity participation outside-of-school among school-aged children?

2. Identifying relevant studies

The search strategy combined terms for the population of interest (children or adolescents or youth or child or teenager or kids or students), the jurisdiction (Australia, Australian Capital Territory [ACT], Queensland [QLD], New South Wales [NSW], Northern Territory [NT], South Australia [SA], Tasmania [Tas], Victoria [VIC], Western Australia [WA]), the intervention/concept (incentive or voucher or rebate or subsidy or tax or reimbursement or economic or financial or lottery) and the outcome of interest (physical activity or exercise or fitness or physical exercise or sport or recreation). Literature searches were conducted using public databases (Google, Google Scholar, Analysis and Policy Observatory). The first five results pages were reviewed for relevant literature. Government websites were also searched for evaluation reports of identified financial incentive programs.

Search results were screened using the inclusion criteria below:

- School-aged children (4.5–18 years) in non-clinical settings, residing in Australia.
- Provision of financial incentives i.e., vouchers, tax incentives, financial reimbursements or subsidies, cash rewards, deposit contracts, lottery with financial prize, or discounts – that aim to minimise the cost of total physical activity participation on children/families. Include travel subsidies or social prescription of physical activity to children free from chronic conditions.
- Must written be in English.

² School-aged children are defined as 4.5–18 years old.

- Intervention implemented between January 1, 2002, and February 5, 2022. A twenty-year limit was chosen to ensure relevance to the present time.

Search results were excluded if they described:

- financial incentives for schools, sports clubs or organisations which minimise the cost of delivering physical education or sports programs.
- Unconditional free provision of physical activity programs to children.
- Incentives that were not financial (e.g., heart-rate feedback, academic points).

This search was initially conducted in 2017 and updated in February 2022 to ensure all relevant interventions were included.

3. Program selection

All financial incentives delivered by State and Territory Governments in Australia meeting the inclusion criteria were selected. Relevant policy documents and websites describing the financial incentives were examined to summarise these programs. Additional searches were conducted from the information in the identified documents to gather specific program details, adopting snowballing techniques. In cases where the candidate and research team were aware evaluation may have been undertaken but not reported externally, staff in relevant government departments and agencies were contacted to seek additional information and evaluation reports for inclusion in the study.

4. Charting the data

Identified interventions had information across multiple sources of data that provided contextual and process information about the financial incentive. The same table headings were used to describe the grey literature information, as used in Part A of this chapter.

The data extracted from included programs included details for identification of the financial incentive; contextual information that may influence the effectiveness of the intervention or transferability of the findings; details about the design and implementation of the financial incentive; and evidence of the effectiveness of the financial incentive. Specifically, data was extracted under the following headings:

- *Identification — Name of the financial incentive, and source of evidence used to collate details about the financial incentive.*
- *Implementation context — Details about the Region, year launched, political party in power at launch, duration, the target population, and delivery setting.*
- *Intervention details — Objectives and key features of the incentive, the research/evaluation approach, theoretical underpinning, outcome/s measured, budget allocation and other details such as modifications to the program.*
- *Evaluation — Process and outcome assessment of the intervention's effectiveness.*

5. Collating, summarising, and reporting the results

Based on the approach taken in Part A, the RE-AIM framework was used to summarise the process and outcome evaluation data available. The definitions for each element of the RE-AIM framework described in Part A were maintained for this part of the scoping review. There was substantially less evaluation information available in Part B than in Part A of the scoping review. The information in Table 1 was extracted from Government websites, government documents, media releases and publicly available reports.

2.10 PART B: RESULTS

In 2022, all Australian States and Territories were implementing at least one financial incentive program to promote physical activity participation outside-of-school. These programs adopted various program designs, implementation, and evaluation approaches. The twelve unique financial incentive programs implemented in Australia are summarised in Table 3.

2.10.1 Financial incentive program design

Financial incentives in Australia were all designed as subsidies (n=12). The subsidies supported the costs of registration/membership fees for structured physical activity programs, including sports and active recreation (dance, bush skills etc.); three could also be used to reduce the cost of equipment and uniforms (Table 3). Six subsidies reduced costs at the point of sale using a voucher, and six provided a delayed reimbursement of the payment (Table 3). Government subsidies were available for use either once (n=7) or twice per year (n=4); the median value of government subsidies per year was \$150 p.a (range \$100–\$600 p.a). The rationale underpinning the design, value, and costs eligible for subsidy use were not described (Table 3). Two programs specified that subsidies needed to provide regular participation opportunities i.e., at least 8 weeks for the NSW voucher or 10 weeks for SA voucher, which suggests consideration of behaviour change concepts(89, 90). None of the government-led financial incentive interventions in Australia explicitly applied a theoretical underpinning in the design of the intervention.

The age of the children eligible to receive subsidies varied by jurisdiction (Table 3). Most programs were available to a wide age range of participants; Nine programs were available to primary and secondary school students (5–18 years), with the VIC government program extending to children 0–18 years. The SA government program was available only to primary school children (and was recently extended up to children in Year 9), and the WA Athlete Travel subsidy available only to older children aged 13–21 years. The NSW First lap voucher program focused specifically on younger children (3–6 years) and only supported swimming lessons.

Two financial incentives (WA and QLD) were specifically for athlete development, providing proportional incentive values based on the levels of competition. These were higher value incentives with QLD offering \$200–\$600 for athletes competing in events and WA providing athletes with a share in funding by regional area they lived in; a limited number of subsidies were available to athletes once per year.

Many financial incentive programs also included eligibility criteria of socio-economic disadvantage (n=6), only providing financial support to people receiving other government supports such as concession card holders or those living in public housing (Table 3). One of these means-tested incentives provided additional support to those who demonstrated severe disadvantage levels. Two financial incentives were available to all primary and secondary school-aged children in the jurisdiction (NT and NSW), but the NT incentive used different models in urban and remote areas, whilst the NSW incentive was offered equally to school-enrolled children.

2.10.1.1 Delivery partners

All subsidy programs were led by the government departments that oversee the sport and active recreation sector in the jurisdiction. Three programs described their engagement with locally-based partners for delivery (WA, NT, and NSW). The WA program used a community partnership model for delivery, drawing on existing local systems and networks, including local government and sport and active recreation clubs. The remote model of the NT scheme was administered through regional councils (municipalities, local government administrative areas)

to ensure the subsidised activities suited community preferences. These two programs are the longest-run government-led financial incentive programs in Australia and have achieved high reach and adoption in disadvantaged areas. The more recent NSW Government Active Kids program included providers in the sport and recreation sector within the programs theory of change (see Chapter 3). The remaining government-led programs reported engaging other government departments in advisory roles, except athlete development programs delivered solely by the sport and recreation department of government. Partnerships within government and between government departments and organisations in the community have the potential to enhance program implementation. Further exploration of the partnership delivery model should be undertaken to build evidence of how to best implement financial incentive programs in communities.

2.10.2 Evaluation Details

Most (n=9) Australian government-led financial incentive programs had not conducted program evaluations. Three programs conducted evaluations of their interventions — the WA Government KidSport program (2011–2017), the WA Government’s Regional Athlete Travel Subsidy, and the NSW Government Active Kids program (2018–2023)(66, 91, 92). An overview of these evaluations is briefly summarised below.

The WA Government KidSport program (2011–2017) was a mixed methods evaluation with repeat-cross sectional data collection in 2012, 2014 and 2016(92). The evaluation was conducted by an independent research consultant for the WA Government, as part of a multicomponent government intervention responding to a range of issues and opportunities facing the sport and active recreation sector in WA. The research consultants were engaged after the program had started, therefore measures collected in 2012 may not reflect a true baseline. WA evaluation focused on outputs (reach to children and partners), and indicators of program success including (‘Value/Importance of sport and active recreation’, ‘Attitudes towards sport and active recreation’). These indicators were measured in surveys and qualitative interviews. The KidSport evaluation did not measure changes in children’s physical activity participation(92). The WA Government’s Regional Athlete Travel Subsidy used case studies of selected athletes to evaluate the impact of the subsidy program; these were not systematically collected(91).

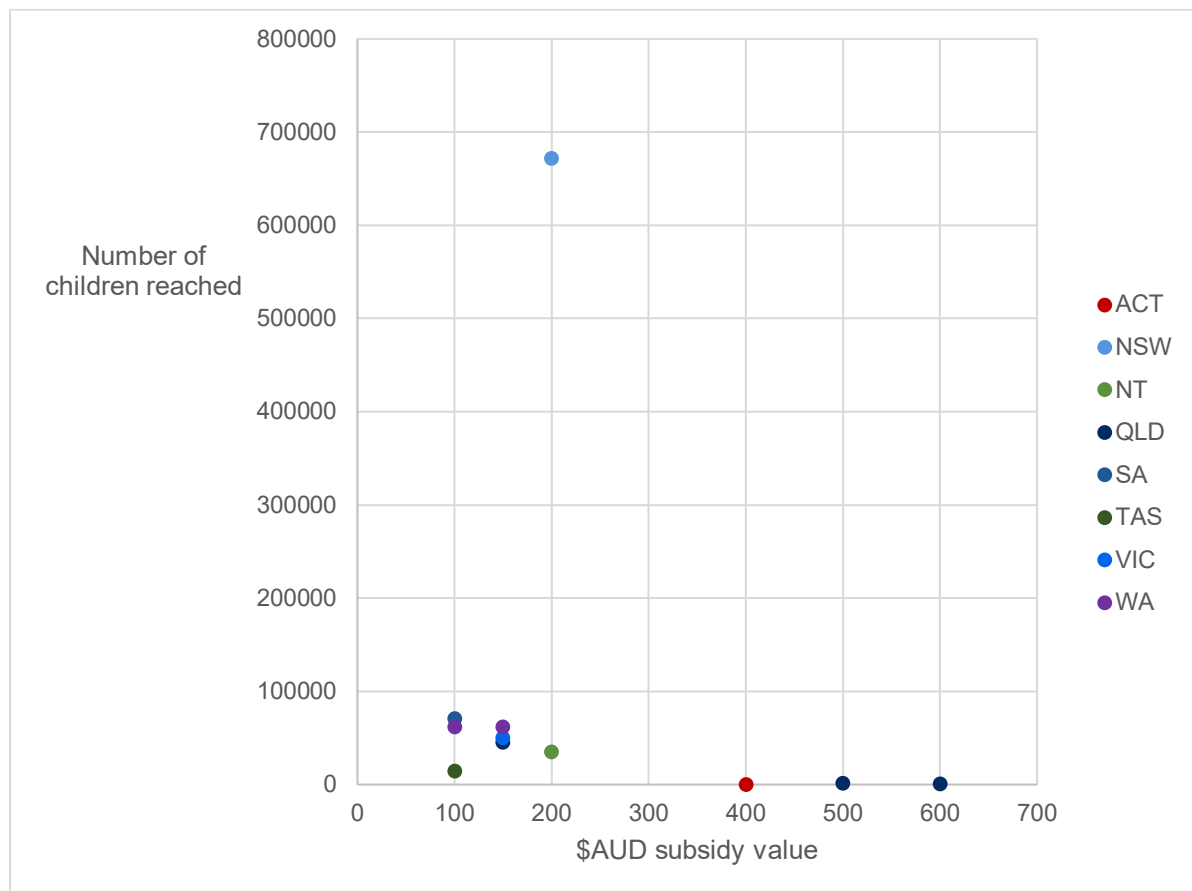
The NSW Active Kids voucher program evaluation (described in detail throughout this thesis) was a quasi-experimental mixed-methods evaluation with a nested prospective cohort study(88). An independent University research group conducted the evaluation in partnership with the NSW Government. A co-designed logic model underpinned the evaluation. The NSW Active Kids program was the only program that reported using an evaluation framework (the RE-AIM framework), and published research protocol and clinical trial registration describing the evaluation approach in detail(88). The primary outcome of the Active Kids program evaluation was children’s physical activity participation, measured using a validated survey item upon registration in the program and throughout the intervention. The methodology for evaluating the Active Kids voucher program will be discussed in detail in Chapter 3.

2.10.3 Reach

The number of subsidies accessed by the target population was the most reported evaluation component, yet few included reach as a proportion of the total eligible population (Table 3). The number of children and adolescents reached within a calendar year ranged between 115–671,375 school-aged children. It is estimated that over 950,000 (23.6%) of school-aged children in Australia are eligible for a subsidy through the identified programs in 2021(88). Figure 5 shows the number of children reached by vouchers in each jurisdiction, and the value

of those vouchers. Chapter 4 will present a detailed description of the reach of the Active Kids program compared to the census.

Figure 5 Annual reach of Australian financial incentive programs to school-aged children



Half of the programs (n=6) were administered using an application process for a limited number of available subsidies(91, 93-97). The number of applications received was not clear; these programs appeared to have exhausted the supply available, but whether unmet remaining demand (applicants that did not receive subsidies that were eligible) was not reported. More consistent and transparent reporting is required to understand the reach of these interventions and particularly the reach to socio-economically disadvantaged populations.

2.10.4 Effect

The effect of financial incentive programs on children’s physical activity behaviours or other outcomes were not routinely measured or reported by government-led programs in Australia (Table 3). NSW was the only jurisdiction to monitor and report the effect of the intervention on children’s physical activity behaviours — findings are presented in Chapters 5 and 8 of this thesis. The WA KidSport program assessed family’s satisfaction with program delivery, the value/importance of sport to children and children’s attitudes to sport and recreation using survey items with no validation or reliability testing; information regarding the effect of the intervention physical activity was not collected(92). Among participants, the self-reported value/importance of sport and recreation remained stable or declined, in children under 12-years-old and over 12-years-old, respectively; some positive changes in attitudes to sport and recreation were reported(92). A limitation of these measures is that the baseline cross sectional survey was conducted 1 year into program delivery. The remaining government-led financial incentives did not collect data on the effects of the subsidies.

2.10.5 Adoption

Two programs clearly reported program adoption among participants – SA Sports Voucher program (using a public dashboard(90)) and the NSW Active Kids program (see Chapter 6). The SA voucher program defined indicators of success for the intervention as program adoption and produced a transparent dashboard to display voucher use publicly. The number of SA vouchers used each year increased over time, from approximately 43,000 to 71,000 vouchers used each year; vouchers were consistently used by a higher proportion of boys than girls in SA (see Table 3). The adoption of the NSW Active Kids voucher program is reported in Chapter 6 of this thesis. The remaining programs in Australia did not report voucher adoption (Table 3).

2.10.6 Implementation

Two financial incentive programs trialed their intervention before making it available to the larger cohorts(98-101). The WA Government piloted the KidSport program at a small scale in five communities(99). The NT Government piloted a \$75 voucher in 2012 which anecdotally achieved good engagement(101). Reports on the pilot studies are not available however both interventions were scaled up after the pilot concluded, and the NT government adapted the program design after their pilot study, increasing the subsidy value to \$100.

Five programs had been modified from their original program design during implementation by reducing the value of the voucher, making a second voucher available, or broadening the program eligibility criteria(89, 90, 95, 97, 99, 102). The QLD 'Get Started Vouchers' (2013–2018) were revised to be entitled 'Fair Play vouchers' in 2019(95, 97). The value of these QLD vouchers remained the same, however an additional component which subsidised up to \$500 was added to provide targeted support to the most disadvantaged families and young people who are at risk of offending or re-offending(97). After the first year of implementation, the NSW Active Kids program doubled the subsidy, from one \$100 voucher per year to two \$100 vouchers per year in 2019 (1st voucher available January 1–December 31; 2nd voucher available July 1–December 31)(89). The Ticket to Play program in Tasmania also doubled the value of their voucher in the second year of implementation, from \$100 per year to \$200 per year(102). The KidSport voucher in WA also added a second \$150 voucher to their program in 2021(99). These changes were made to encourage children to participate in structured physical activity programs all year round. In 2022, the SA government expanded the eligibility of their primary school only program to include early years of secondary school (Grades 7–9) due to COVID-19 impacts(90). There is no information available regarding whether these modifications enhanced the intervention.

The role of partners and stakeholders in the implementation process was evident across some jurisdictions. The NT Sport Voucher Scheme reported conducting information sessions in to engage with local communities. This was well suited to their regional delivery model where structured physical activity programs were designed based on community activity preferences and facilitated by regional councils(100). The NT Sport Voucher Scheme engaged over 300 organisations as registered providers and maintained a consistent level of provider engagement over the implementation period(100). The WA Government KidSport program used a partnership delivery model reported program engagement of partners. The WA program reported engaging with 88 sports, and 131 out of 141 local governments to assist with administration of the program; and received referrals to the program from 923 organisations and agencies including schools and community groups(92). The SA program reported the number of locations where a voucher could be used on their online dashboard which was typically over 1,000 locations however this fluctuated during implementation(90). Families were able to search for providers through the online platform on the SA programs

website, which may have improved voucher use. The implementation of the NSW Active Kids program among structured physical activity providers is described in Chapter 7.

Overall, implementation strategies for financial incentive programs were not well-documented (Table 3). Eleven financial incentive programs used online application processes through a government website to administer their programs, while one (NT) engaged directly with communities(100). Two interventions were part of a larger government whole-population physical activity plans/strategies to promote physical activity (QLD, WA), while all other subsidies were delivered in isolation(95, 97, 99). Complementary strategies such as community engagement or mass-media campaigns to improve community awareness, population reach, and adoption of the financial incentive programs were unclear. The programs are likely to have used staff and other resources to boost program engagement however detail of the approaches used could not be identified.

2.10.7 Maintenance

Measurement of long-term effects of Australian financial incentives on children's physical activity levels has not been undertaken, except for the Active Kids program evaluation discussed in this thesis (Chapter 8). Once introduced, all States and Territories have continued their subsidy programs over multiple years, institutionalising it as part of government practice. In the past five years, the number of government-led subsidies in Australia has nearly doubled, with five new financial incentives launched across four jurisdictions (Figure 6).

Figure 6 Timeline of financial incentive program implementation in Australia

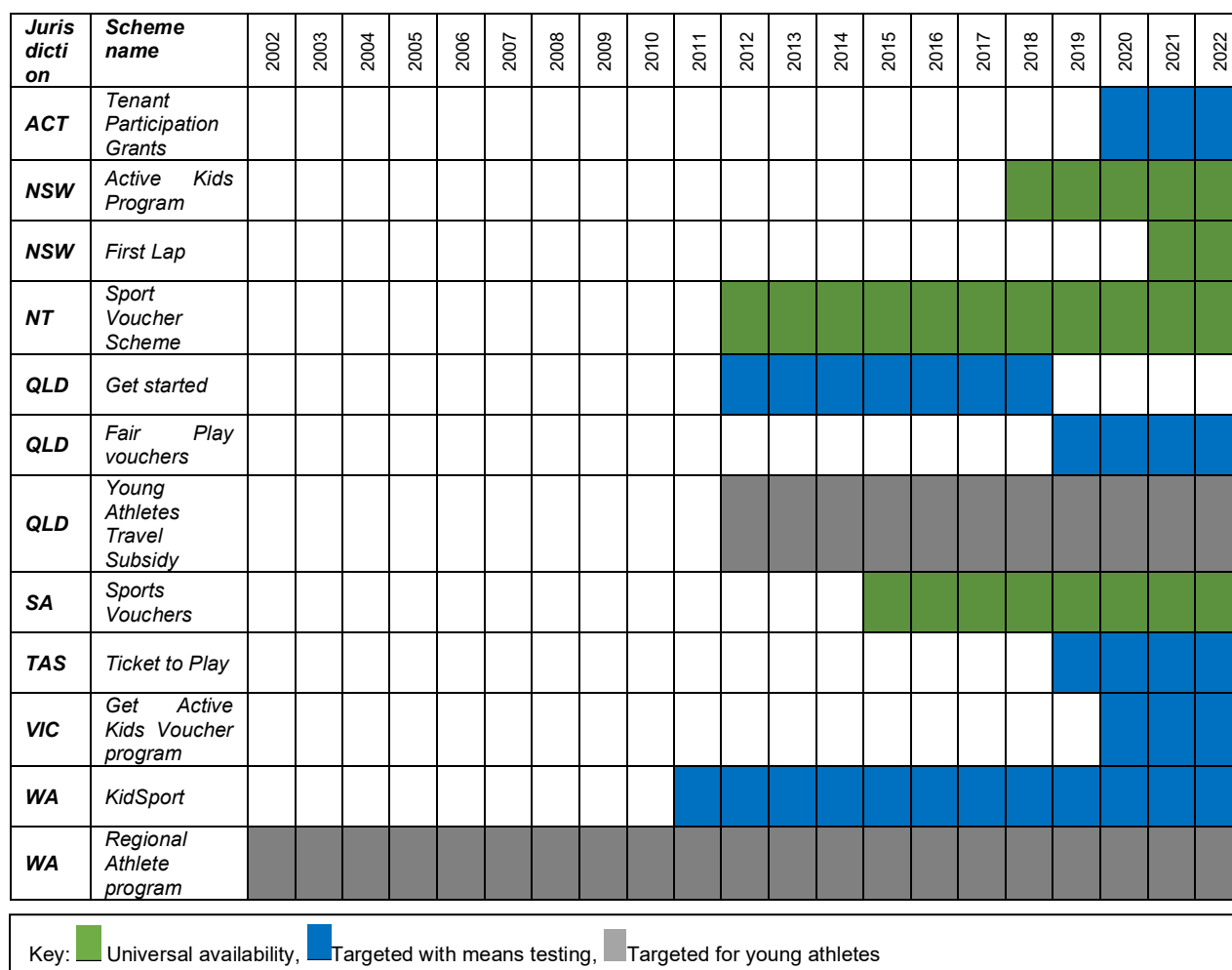


Table 3 Summary of Australian financial incentive programs

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
<p>Name: Tenant Participation Grants</p> <p>Evidence source: (94, 103)</p>	<p>Region: Australian Capital Territory (ACT)</p> <p>Year launched: 01/08/2020</p> <p>Political party in power at launch: Labor</p> <p>Duration: Ongoing</p> <p>Population: Public and community housing tenants and their families</p> <p>Setting: Community</p>	<p>Objectives: To support tenants to get involved and stay connected with their community through a range of digital, sporting, arts, cultural, education, employment, and training activities</p> <p>Intervention features: Each tenant, resident and/or child can access up to \$400 for one activity per person. You can use the grant to participate in activities and/or purchase the equipment you need to participate.</p> <p>Research design: Nil.</p> <p>Budget: In 2021 in response to COVID-19, \$69,530 was allocated to 120 social housing participants. Budget details for other years of the program are not available.</p> <p>Other details: Was a one-off grant, but repeated in 2021 focusing on Wellbeing i.e. Not specifically for children, and not only for sports activities.</p>	<p>Reach: Among all Public and community housing tenants and their families that received funding in 2020–2021, just over half were children and young people aged up to 25 years old (~115 young people).</p> <p>Effect: Not reported.</p> <p>Adoption: Not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
<p>Name: Active Kids Program</p> <p>Evidence source: (89)</p>	<p>Region: New South Wales (NSW)</p> <p>Year launched: 2018</p> <p>Political party in power at launch: Liberal</p> <p>Duration: 31 January 2018 to 31 December 2022</p> <p>Population: School-enrolled children (4.5–18 years)</p> <p>Setting: Community</p>	<p>Objectives: The objectives of the program are to:</p> <ol style="list-style-type: none"> 1. Increase participation of school-enrolled children in sport and active recreation 2. Support the delivery of the Premier's Priority to reduce childhood overweight and obesity by increasing physical activity levels in children aged 4.5–18 years living in NSW 3. Help change the physical activity behaviours of children and young people in NSW. <p>Intervention features: Vouchers to reduce the cost of sport and structured physical activity valued up to \$100 each. In 2018 one voucher was available. The program was extended to provided Two \$100 voucher per child per calendar year from 2019.</p> <p>Research design: Independent evaluation undertaken by the SPRINTER</p>	<p>Reach: Live dashboard on the Office of Sport website states: In 2018, 53% of the eligible population created a voucher (46% Female, 54% Male). In 2019, 62% of the eligible population created a voucher (48% Female, 52% Male). In 2020, 64% of the eligible population created a voucher (48% Female, 52% Male). In 2021, 66% of the eligible population created a voucher (48% Female, 52% Male).</p> <p>Additional insights in peer-review publication, Chapter 4, and Active Kids Evaluation Report 2018-2021.</p> <p>Effect: Details presented in Chapter 5 and evaluation reports by the SPRINTER group.</p> <p>Adoption: Details presented in Chapter 6 and evaluation reports by the SPRINTER group.</p> <p>Implementation (process): Details presented in Chapter 7 and evaluation reports by the SPRINTER group.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>group at the University of Sydney. Mixed method pragmatic evaluation.</p> <p>Budget: \$650 million over five years</p> <p>Other details: 11 Research publications adopting various designs.</p>	<p>Maintenance: Details presented in Chapter 8 and evaluation reports by the SPRINTER group.</p>
<p>Name: First Lap</p> <p>Evidence source: (104)</p>	<p>Region: NSW</p> <p>Year launched: 2021</p> <p>Political party in power at launch: Liberal</p> <p>Duration: 1 December 2021 to 30 June 2023.</p> <p>Population: Children (3–6 years)</p> <p>Setting: Community</p>	<p>Objectives: Reduce the cost of swimming lessons.</p> <p>Intervention features: One \$100 voucher per child per financial year for swimming lessons with an approved provider. Administered through Service NSW.</p> <p>Research design: Nil.</p> <p>Budget: \$54 million over two financial years</p> <p>Other details: Started December 1st, 2021. Too early in implementation to gather evaluation data for this review.</p>	<p>Reach: N/A.</p> <p>Effect: N/A.</p> <p>Adoption: N/A.</p> <p>Implementation (process): N/A.</p> <p>Maintenance: N/A.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		Kindergarten children are eligible for both Active Kids and First Lap voucher.	
Name: Sport Voucher Scheme Evidence source: (100, 101)	Region: Northern Territory (NT) Year launched: 2012 Political party in power at launch: Liberal Duration: Ongoing Population: Primary and Secondary school-aged children (a) Urban Schools Model (b) Remote Schools Model Setting: Community	Objectives: 1. develop core aquatic skills through structured play and water confident children; 2. increase participation of school-enrolled children in sport and active recreation. and cultural activities; 3. support the delivery of the Department's focus on increasing activity in school-enrolled children living in the NT; and 4. help change the physical activity behaviours of children in the NT Intervention features: In urban areas, school-enrolled students can apply for a \$100 Sport Voucher twice per year (January and July). The Remote Sport Voucher model is administered by the Department either through regional councils or based on community activity preferences provided to regional councils. Funding allocation for the Remote Sport Voucher model is based	Reach: In 2016/17 a total 34,845 sports vouchers redeemed. In 2017/18 a total of 34,470 urban vouchers were redeemed. 10 regional councils and five Aboriginal Corporations delivered sport and active recreation initiatives in over 70 communities through remote sport voucher funding. Effect: Not reported. Adoption: Not reported. Implementation (process): Information sessions to engage with the community were held at the Teddy Bears' Picnic, Splash Fest, welcome to Katherine Region Community Services Expo, Come and Try Sports Expo at Katherine and welcome to the Top End Community Services Expo in 2015/16.

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>on enrolment data from the NT Department of Education.</p> <p>Under the Sport Voucher Scheme, vouchers can be used for registration, essential equipment and uniform costs at any registered sporting or recreation club, group, or organisation.</p> <p>Research design: Nil.</p> <p>Budget: 2013/14 \$4.0 million. 2014/15 \$7.2 million (Sport + Swim Vouchers). 2015/16 \$5.2 million for the Sports Voucher program. 2016/17 \$5.4 million for the Sports Voucher program. 2017/18 \$5.5 million for the Sports Voucher Program. 2019/2020 \$4.6 million for Sports Voucher Program.</p> <p>Other details: \$75 voucher was trialled in 2012.</p>	<p>2014/15 300 organisations were registered as providers.</p> <p>2015/16 354 organisations were registered as providers.</p> <p>2016/17 374 organisations were registered as providers.</p> <p>2017/18 367 organisations were registered as providers.</p> <p>2018/19 367 organisations were registered as providers.</p> <p>2019/2020 326 organisations were registered as providers (Pandemic impacts)</p> <p>Maintenance: There is a strong political commitment, demonstrated by the longevity of this program. Maintenance of the program effects are not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>The remote sport voucher model was revised in 2016/17. NT also have a swim voucher for children aged 0-5 years old.</p>	
<p>Name: Get started vouchers</p> <p>Evidence source: (95)</p>	<p>Region: Queensland (QLD)</p> <p>Year launched: January 2013</p> <p>Political party in power at launch: Liberal National</p> <p>Duration: 2013 -2018</p> <p>Population: Children aged from 5–17 years (inclusive) at the time of application who hold or whose parent, carer or guardian hold a valid Centrelink Health Care Card or Pensioner Concession Card and</p>	<p>Objectives: Get Started Vouchers assists children and young people who can least afford or may otherwise benefit from joining a sport or active recreation club.</p> <p>Intervention features: Parents, carers or guardians can apply for a voucher valued up to \$150 for their child, which can be used towards sport and active recreation membership, registration, or participation fees with registered activity providers. There is a limit of 1 voucher per child per calendar year.</p> <p>Research design: Nil.</p> <p>Budget: \$7 million per year.</p> <p>Other details: Part of the Queensland Government’s Get in the Game initiative</p>	<p>Reach: Vouchers are distributed in two rounds each year on a first come, first served basis. During round 10, 9,300 vouchers were issued.</p> <p>At the end of 2017, total number of vouchers issued since the program began to more than 220,000.</p> <p>Effect: Not reported.</p> <p>Adoption: In rounds 9 and 10, 20% of vouchers were redeemed by children who had not played club sport before. The total proportion of vouchers redeemed was not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	<p>who are residents of Queensland</p> <p>Setting: Community</p>	<p>to support sport and active recreation at the grassroots level.</p>	
<p>Name: Fair Play vouchers (previously known as Get started vouchers)</p> <p>Evidence source: (97)</p>	<p>Region: Queensland (QLD)</p> <p>Year launched: 2012 under “Get started vouchers”</p> <p>Political party in power at launch: Rebranded by Labor</p> <p>Duration: 2019 - 2022</p> <p>Population: Children aged from 5–17 years (inclusive) at the time of application who hold or whose parent, carer or guardian hold a valid Centrelink Health Care Card or Pensioner Concession Card and</p>	<p>Objectives: FairPlay is a program aimed at breaking down financial barriers to participation at the grassroots level.</p> <p>Intervention features: Parents, carers or guardians can apply for a voucher valued up to \$150 for their child, which can be used towards sport and active recreation membership, registration, or participation fees with registered activity providers. There is a limit of 1 voucher per child per calendar year.</p> <p>Research design: Nil.</p> <p>Budget: \$25.5 Million over 3 years. Vouchers of up to \$150 for at least 45,000 children and young people from low-income families towards physical activity participation; and targeted support of up to \$500 per participant to</p>	<p>Reach: Vouchers are distributed in two rounds each year on a first come, first served basis. Once the allocation for each round is exhausted, the program is close, and no further vouchers are offered for that round.</p> <p>Effect: Not reported.</p> <p>Adoption: Not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	<p>who are residents of Queensland</p> <p>Setting: Community</p>	<p>address additional barriers experienced by the most disadvantaged children and young people, including young people who are at risk of offending or re-offending.</p> <p>Other details: Part of the Activate! Queensland Strategy, a 10-year strategy to get Queenslanders moving more often.</p>	
<p>Name: Young Athlete Assistance Program (YAAP) grants (renamed in 2015 to Young Athletes Travel Subsidy)</p> <p>Evidence source: (96)</p>	<p>Region: QLD</p> <p>Year launched: 2011</p> <p>Political party in power at launch: Labor</p> <p>Duration: 2011-2019</p> <p>Population: Children under 18 years who compete or officiate (as a coach, referee, or scorer) at an eligible Queensland state or state school event, Australian national</p>	<p>Objectives: Foster the development of young athletes and support elite athlete pathways.</p> <p>Intervention features: Funding allocation pre-determined depending on the event tiers (State = \$200/National = \$400/International \$600). Eligible athletes and officials can apply for 1 eligible event at each tier, once every 2 calendar years. Funding is provided retrospectively to eligible applicants.</p>	<p>Reach: Recipients listed for each year of the program: https://www.data.qld.gov.au/dataset/young-athlete-assistance-program-recipients</p> <p>Effect: Not reported.</p> <p>Adoption: Not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	or national school event or international event Setting: Community	Research design: Nil. Budget: Unknown. Other details: Evaluation November 2017; report not obtained.	
Name: Sports Vouchers Evidence source: (90)	Region: South Australia (SA) Year launched: 2015 Political party in power at launch: Labor Duration: Ongoing Population: Primary school-aged children, meaning if the child is attending or is eligible to attend primary school (Reception to Year 7, even if Year 7 is based at a secondary school). Expanded to Years 8 and 9 in 2022.	Objectives: Provide a \$100 discount on sports or dance membership/registration fees and learn to swim programs. Intervention features: Vouchers can be used towards membership fees which provide access to a minimum 10-week sports program. Research design: Nil. Budget: \$7.7 Million over 4 years. Other details: Sports Voucher Program Website includes a Dashboard with voucher use information and a Provider search tool.	Reach: Not reported. Effect: Not reported. Adoption: Dashboard data shows: In 2015, 43,198 vouchers were claimed (Female 43%, Male 57%). In 2016, 51,960 vouchers were claimed (Female 42%, Male 58%). In 2017, 55,515 vouchers were claimed (Female 42%, Male 58%). In 2018, 58,324 vouchers were claimed (Female 43%, Male 57%). In 2019, 74,668 vouchers were claimed (Female 47%, Male 53%).

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	Setting: Community		<p>In 2020, 74,668 vouchers were claimed (Female 47%, Male 53%).</p> <p>In 2021, 70,931 vouchers were claimed (Female 47%, Male 53%).</p> <p>Implementation (process): The number of provider locations are reported each year on the dashboard ranging from 1047 locations to 1168 locations.</p> <p>Maintenance: Not reported.</p>
<p>Name: Ticket to Play</p> <p>Evidence source: (102, 105)</p>	<p>Region: Tasmania (Tas)</p> <p>Year launched: 2019</p> <p>Political party in power at launch: Liberal</p> <p>Duration: Ongoing</p> <p>Population: Children aged 5-18 years and listed on a Centrelink Health Care or Pensioner Concession Card or in Out of Home Care</p>	<p>Objectives: A community sports voucher program designed to reduce the cost of children and young people participating in club sports. The key objective of Ticket to Play is to increase the number of young Tasmanians participating in sport and getting active.</p> <p>Intervention features: Ticket to Play provides two vouchers up to \$100 each towards club membership for children aged 5-18 years and listed on a Centrelink Health Care or Pensioner Concession Card or in Out of Home</p>	<p>Reach: Under the 2020-21 program, more than 14,000 vouchers were issued.</p> <p>Effect: Not reported.</p> <p>Adoption: Not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	Setting: Community	<p>Care. Sporting clubs, Scouts, Girl Guide and Cadet organisations are eligible to be activity providers where they meet the Activity Provider Conditions.</p> <p>Research design: Nil.</p> <p>Budget: \$300,000 in 2018-19, \$1 million in 2019-20.</p> <p>In 2020-201 the government announced an investment of \$3 million over three years.</p> <p>Other details: Vouchers were doubled to \$200 in the 2020-21 Budget and the program will continue for a further three years (to 2023). Vouchers can be used for two different activities.</p>	
Name: Get Active Kids Voucher Program Evidence source: (93)	Region: Victoria (Vic) Year launched: 2020 Political party in power at launch: Labor	Objectives: An increased proportion of Victorians participate in sport and active recreation. Intervention features: Participants apply for vouchers to reimburse the cost of membership and registration fees,	Reach: Not reported. Effect: Not reported. Adoption: Not reported. Implementation (process): Not reported.

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	<p>Duration: Ongoing</p> <p>Population: Child aged 0 to 18 years a resident in Victoria named on a valid and issued Australian Government Health Care Card or Pensioner Concession Card or hold their own valid Australian Government Health Care Card (at the time of your application) and named on a valid Australian Government Medicare card (at the time of your application).</p> <p>Setting: Community</p>	<p>uniforms, and equipment. Eligible children may be able to receive up to \$200 each per round.</p> <p>Research design: Nil.</p> <p>Budget: \$21 million to deliver 100,000 vouchers over two years.</p> <p>Other details: The program will be delivered across four Rounds over the period 1 March 2021 until 15 April 2022.</p> <p>Part of the Active Victoria Strategic Framework.</p>	<p>Maintenance: Not reported.</p>
<p>Name: KidSport</p> <p>Evidence source: (92, 98, 99, 106)</p>	<p>Region: Western Australia (WA)</p> <p>Year launched: 2011</p>	<p>Objectives: KidSport aims to increase opportunities for young people aged 5–18 years from lower socio-economic backgrounds to participate in sport and active recreation via the provision of vouchers to contribute towards the cost</p>	<p>Reach: From 2011 to December 2016 over 118,394 vouchers had been distributed to support 62,208 children from lower socio-economic backgrounds to participate in sport and active recreation. Around 70% of eligible children in WA received at least one voucher,</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
	<p>Political party in power at launch: Liberal</p> <p>Duration: Ongoing (10 years+)</p> <p>Population: Children aged 5–18 with a valid Health Care Card or Pensioner Concession Card.</p> <p>Setting: Community</p>	<p>of sporting and active recreation club fees.</p> <p>Intervention features: The program provides eligible Western Australian children with up to \$200 per calendar year to assist in registering with an approved KidSport sporting club or organisation. In 2017 the value of the voucher was reduced to \$150 to be closer to the typical cost of sport and recreation program fees. In 2021, the KidSport program was doubled, allowing families able to access two \$150 KidSport vouchers to help pay club fees.</p> <p>KidSport voucher codes represent payment, or part thereof of registration/membership fees. KidSport voucher codes are valid for 90 days from the date of approval. KidSport voucher codes can only be redeemed through approved KidSport Clubs.</p> <p>The program is an initiative of the State Government, administered by the</p>	<p>compared to Centrelink figures (2017) of children currently holding healthcare concession cards (n=88,000).</p> <p>Reach to children from CALD backgrounds: 11,639 vouchers (9.8% of total)/ 6,573 children (10.6% of total)</p> <p>Reach to Aboriginal and Torres Strait Islander children: 22,053 vouchers (18.6% of total)/ 11,066 children (17.8% of total)</p> <p>Reach to children with a disability: 6,879 vouchers (5.8% of total) / 3,486 children (5.6% of total)</p> <p>UPDATE: Since 2011, more than 245,000 vouchers have supported more than 100,000 children to participate in club sport and swimming lessons.</p> <p>Effect: The effect of the voucher on physical activity and sport and active recreation participation was not assessed.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>Department of Local Government, Sport and Cultural Industries with the support of Western Australian local governments.</p> <p>Research design: Evaluation was conducted by ‘Research Solutions’ using a repeat-cross-sectional design with data collected through qualitative research, surveys, case studies and data regarding program outputs from the department. Data were collected in 2012, 2014 and 2016.</p> <p>The study included 724 participants at baseline, 955 participants as mid-term and 1085 participants at the final evaluation.</p> <p>The program was initially piloted using small scale interventions in the Cities of Cockburn, Swan, Melville, Fremantle, and the Town of Kwinana.</p> <p>Budget: \$31 million worth of vouchers 2011-2021.</p>	<p>Evaluation measured key outcomes in participants under 12 and over 12 years old in the following two areas.</p> <ol style="list-style-type: none"> <i>Value/Importance of sport and active recreation</i> = 87% of U12 participants rated it very to extremely important at baseline, and this did not change. 84% of children 12+ rated it very to extremely important at baseline and declined to 74% at final evaluation. <i>Attitudes towards sport and active recreation</i> = 75% of U12 participants agree or strongly agree. In comparison with the benchmark study, there were three statistically significant changes recorded in participant attitudes, with a stronger proportion now feeling that their family is proud of their sporting achievements, that playing sport helps to keep children fit and healthy, and that playing sport has helped their child to get on better with family and other children at school. <p>75% of children 12+ agree or strongly agree. There was one positive statistically significant</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>Other details: KidSport was one of three components in the WA Governments' Sport4All project 2011-2017.</p>	<p>change recorded in participant attitudes, with a stronger proportion now feeling that their family is proud of their sporting achievements – a change related to self-confidence and esteem and family relationships. This result is similar to that recorded by parents of children under 12 years, as detailed above.</p> <p>Adoption: Not reported.</p> <p>Implementation (process): KidSport has successfully engaged with 88 sports and active recreation organisations and their clubs, 131 (of 141) local governments, and received referrals to the program from 923 schools, not-for-profit groups, and state government agencies.</p> <p>Parental satisfaction with KidSport (satisfied or very satisfied) remained high at 80%.</p> <p>Maintenance: The program has been delivered since 2011.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
<p>Name: Regional Athlete Travel Subsidy</p> <p>Evidence source: (91, 107)</p>	<p>Region: WA</p> <p>Year launched: 1995</p> <p>Political party in power at launch: Liberal</p> <p>Duration: Ongoing</p> <p>Population: Regional athletes aged 13 to 21. Athletes must have undergone a selection process endorsed by their respective Regional/State/National Sporting Association to participate at an event/competition within their pathway that is essential to be considered for selection to a higher-level team/event.</p> <p>Setting: Community</p>	<p>Objectives: To assist talented athletes who reside in regional Western Australian with out-of-pocket travel and accommodation costs to compete at regional, state, and national championships or events.</p> <p>Intervention features: Regional athletes can apply for the travel subsidy to complete in their chosen sport. There is an assessment criterion to determine the amount of funding available, based on the region the athlete resides as well as factors such as whether the event represents a milestone for progress in the athlete's development. Applications are open all year round. The program is part of the State Government's Regional Athlete Support Program, administered by the Department of Local Government, Sport and Cultural Industries, supported by the Royalties for Regions Program.</p> <p>Research design: Athlete case studies.</p>	<p>Reach: List of funded athletes in each region. Regional athletes across different regions have received the following in subsidies:</p> <ul style="list-style-type: none"> South West Academy of Sport — \$235,000 Midwest Academy of Sport — \$200,000 Peel Regional Academy of Sports — \$100,000 Broome Talent Program — \$60,000 Pilbara Sports Academy — \$60,000 Great Southern Sports Talent Association — \$50,000 Goldfields Sport Development Network — \$30,000 Esperance Talent Development Program — \$25,000 Wheatbelt Athlete Support Program — \$25,000. <p>Effect: Case studies from successful athlete and their families.</p>

Identification <i>Name; Evidence source; Citation URL Link</i>	Implementation details <i>Region; Year launched; political party in power at launch; Duration; Population; Setting</i>	Intervention details <i>Objectives; Intervention features; Research design; Budget; Other details</i>	Evaluation <i>Reach; Effect; Adoption; Implementation [process]; Maintenance</i>
		<p>Budget: In 2021, the government invested a further \$3 million of funding delivered over three years</p> <p>Other details: The Western Australian State Government has provided funding assistance for talented regional athletes since 1995 via the Department of Sport and Recreation's Country Athlete Scholarship Program. The ATSS replaces CASP with the continued aim of providing funding support for Western Australian athletes representing Western Australia or Australia at national or international events.</p>	<p>Adoption: Not reported.</p> <p>Implementation (process): Not reported.</p> <p>Maintenance: Not reported.</p>

2.11 PART B: DISCUSSION

Part B of this scoping review collates information about government-led financial incentive programs in Australia. Each State and Territory government in Australia had at least one financial incentive (subsidy) program to support school-aged children to participate in structured physical activity at the time of this review. The subsidies were available to reduce the registration cost in structured physical activity programs, purchase clothing and equipment, and travel subsidies for athlete development. Over time, over \$470 million has been invested in financial incentive programs by sub-national governments(87). About a quarter of school-aged children in Australia are eligible to receive a financial incentive from the government towards the costs associated with structured physical activity participation. Australia's widespread delivery of financial incentives highlights the policy interest in using economic incentives to remove barriers to structured physical activity for school-aged children. Each government-led financial incentive program in Australia had a similar aim but took a different approach to reduce the costs associated with structured physical activity participation, informed by a limited evidence base. There was variation in program design, intervention components, partners, and eligible target populations, and a lack of program theory, evaluation, or measurement of program effects. These differences between financial incentive programs in Australia are discussed under the following subheadings.

2.11.1 Approach to generating evidence

The government-led financial incentive programs in Australia have not been rigorously evaluated. One evaluation report was identified by contacting the government agency delivering the intervention in WA (KidSport) using repeat cross-sectional studies, initiated one year after the program commenced. This report was not publicly available but provided some detail about the implementation and effects of the KidSport program(92). While some evaluation data were available, information about the remaining intervention's reach, adoption, and implementation was drawn from media releases, online dashboards, and government documents such as budget reports rather than detailed evaluation reports or peer-reviewed publications. This suggests that some data about program implementation in Australian programs may be routinely collected but is not transparently reported to increase understanding of large-scale interventions. Two pilot studies were referenced in literature about the WA KidSport program and NT Sports Vouchers scheme however reports of these pilots were not available.

The Active Kids program in NSW was the only intervention that engaged a university partner to evaluate the government-led intervention, embedded evaluation from the outset, and had published its findings externally. The Active Kids evaluation used the RE-AIM framework to plan and conduct the evaluation, a logic model to understand the theory of change, and published an evaluation protocol (described in more detail throughout this thesis) providing a strong underpinning to the evaluation. These methods are described in detail in Chapter 3. Although embedding evaluation from the outset is not always possible, all such programs should consider using best practice methods to generate and publish their evaluation findings. Evaluation frameworks (such as the RE-AIM framework) should be used as a guide to enhance evidence generations(88). The limited reporting of financial incentive programs that aim to make structured physical activity participation more affordable for school-aged children makes gaining practice-relevant insights from these large-scale interventions challenging.

2.11.2 Outcome measurement

The objectives of government-led programs were generally similar, aiming to increase the number or proportion of school-aged children participating in structured physical activity programs outside of-school hours or total physical activity levels. Most available reports did

not assess whether these programs achieved their aims or progressed towards them. Some programs reported process evaluation data such as awareness, reach or adoption/use of the subsidy, but the association between these indicators and program effects have generally not been explored. It is important to understand whether financial incentive programs implemented at scale are effective and the mechanisms influencing program outcomes.

In Australia, a national survey (AusPlay) routinely monitors participation in sports and recreation. Aligning evaluation outcomes with existing population surveillance can enable comparisons across jurisdictions and to population data. The AusPlay questions were adopted in the independent evaluation of the Active Kids program to measure changes in sport participation (see Chapter 3); no other jurisdiction has adopted this approach. Some jurisdictions may intend to monitor intervention outcomes using AusPlay data no evidence of this was identified. One limitation of relying on AusPlay for a jurisdiction's outcome evaluation is the absence of questions within the AusPlay surveys about whether participants had engaged with a financial incentive program. Furthermore, AusPlay does not categorise children's level of disadvantage in the same way as the various States and Territories have for their program eligibility, so it would not be clear which AusPlay responses came from parents/caregivers with eligible children. Another limitation of using the national population survey is that AusPlay has low response rates from disadvantaged groups, particularly in States and Territories with smaller populations. The AusPlay data does collect relevant outcomes about population physical activity and sport participation behaviours, but this should not be relied on as the only indicator of program effects.

2.11.3 Theoretical underpinning

Reports of financial incentive programs do not clearly describe any underpinning behaviour change theories or behavioural economics principles. Some may have considered behaviour change theories (e.g., requiring participation in multiple sessions, not just once-off activities). Still, there is a need to report the theoretical underpinning of government-led financial incentive programs. The Active Kids program was underpinned by a logic model, which is described in detail in Chapter 3.

2.11.4 Multicomponent interventions

Multicomponent interventions are ideal for addressing practical barriers to regular participation in structured physical activity programs, including costs, time and access(4). While financial incentives reduce the costs associated with structured physical activity participation, 40–73% of Australian children's structured physical activity participation costs remain(10). Children living in disadvantaged areas had the greatest proportion of their activity costs supported, but this was because they spend less on structured physical activity than their socio-economically advantaged counterparts. Financial support and other strategies should be used to encourage equal participation in structured physical activity programs among all children, independent of their socio-economic status, gender, age, or cultural background. Some Australian programs are one part of a larger, multicomponent government strategy to increase sport and recreation participation or population physical activity levels. This approach is evidence-based yet the States taking this approach (QLD, VIC) are yet to report on the contribution of their financial incentive programs to the more extensive government strategy. Further understanding of implementation processes and intervention components which contribute to program success is required.

2.11.5 Partnerships

Government partnerships that enabled the implementation of financial incentive programs in Australia were varied. WA delivered their intervention using a partnership model, engaging local governments as key stakeholders, along with schools, non-government organisational

and sports and recreation providers. The NT program used two different engagement models for urban and regional areas. The regional model in the NT involved a more resource-intensive community engagement approach to enhance program implementation in traditionally difficult to reach areas. All programs had developed resources to share information about the programs with sport and recreation sector organisations; the approach taken to share the information and resources was not clearly reported. The number of organisations engaged as partners in the financial incentives programs was reported by WA, SA, and NSW programs. There is no evidence available to determine the denominator for the proportion of organisations adopting the program.

Partnerships between government agencies/policymakers leading the implementation of the financial incentive program and researchers are needed. Close relationships involving regular communication between policymakers and researchers can shape the nature of evaluations(108). However, in most cases, evaluation partnerships were not established. Research-policy partnerships are proposed as a promising approach to address the gaps between research, policy, and practice in physical activity interventions(82). The NSW Government's Active Kids program was one example of establishing a university partnership, as described in Chapter 3.

2.11.6 Eligibility criteria

Various eligibility criteria were adopted for school-aged children to receive government subsidies across all States and Territories. Seven subsidies were only available to disadvantaged children after a form of means-testing, three subsidies were universally available to children attending school, and two were provided upon application to athletes (Figure 6). There is no clear relationship between the eligibility criteria and effectiveness, maintenance, or other implementation factors.

2.11.7 Strengths and limitations of Part B

Part B of this scoping review focused on government-led financial incentives implemented in Australia to address the cost barrier to participation in structured physical activity. The search was undertaken after few government-led interventions of this type were identified in peer-review literature. Grey literature was explored to fill the gap in evidence in this emerging field. The focus on Australian programs illustrated the momentum in the region for using economic incentives to promote physical activity, and to underpin the research work undertaken in this thesis. We are confident that we captured all government-led financial incentives in Australia in Part B of the scoping review and verified this with industry connections in policy and research. It may be that, internationally, financial incentive programs have also had limited evaluation, based on our assessment of the peer-review literature. Local knowledge of intervention names and industry connections in Australia enabled the candidate to access evaluation data that was not always publicly available. If the candidate had conducted this scoping review looking for global evidence, internal reporting documents would have been challenging to obtain. The approach to access internal evaluation reports from State and Territory governments in Australia was not repeated when the review was updated in 2022.

2.12 CHAPTER CONCLUSIONS

The costs associated with structured physical activity are a well-known barrier to participation. Interventions are required to ensure that participation in structured physical activity outside-of-school is affordable for all; however, there is insufficient evidence of effective interventions that overcome the cost barrier. Financial incentives that support school-aged children to participate in structured physical activities may be only one solution.

This two-part scoping review explored global peer-reviewed evidence and Australian grey literature using an established approach(30, 31). The peer-review literature identified twelve financial interventions that met the inclusion criteria, described across 24 studies and two reports. Critique of these heterogeneous studies using the RE-AIM framework found insufficient evidence to determine whether financial incentives could influence children's physical activity participation. Despite the lack of evidence, all States and Territories across Australia have commenced and maintained at least one government-led financial incentive program since 2011. Grey literature searches for information about these financial incentive programs were conducted, identifying twelve Australian programs meeting the inclusion criteria. There was a significant disparity between evidence-based financial incentives described in peer-review literature and practice in Australian States and Territories. A clear example is the eligibility criteria, in which peer-review evidence suggests that interventions were most effective when targeting children in small age ranges (<3 years age range) however, most Australian financial incentives targeted children in primary and secondary school (6–12 years of total range in ages). The wide age range adopted by government-led financial incentive programs in Australia and Canada suggests governments are committed to supporting children throughout this life stage. Implementing the same intervention for all school-aged children lacks sensitivity to the well-documented differences in physical activity participation and structured physical activity expenses during school years. Interventions in the peer-reviewed literature which targeted specific age groups achieved high program reach and engagement in disadvantaged areas by tailoring the intervention to the life stage of the participants. Whilst there is limited understanding of additional intervention components that may complement financial incentive implementation, these should be explored considering age and other socio-demographic factors.

This scoping review used the RE-AIM framework when summarising evidence across peer-review studies and Australian financial incentive programs, which identified gaps in knowledge. The RE-AIM framework's Reach, Adoption and Implementation components were least reported in peer-review literature; Most peer-review studies focused on effectiveness and included limited reporting of all other RE-AIM components. Conversely, the Australian programs identified in Part B focused on reach and reporting across the other RE-AIM elements were scarce. The Maintenance component was only reported in terms of duration of program delivery; only one study had explored the effects of financial incentives on children's physical activity behaviours after more than 12-months. The disparity between the evidence generated in research and in practice makes comparison difficult.

Few studies and reports identified in this two-part scoping review used an evaluation framework, published evaluation protocols, or described the application of any theoretical underpinning in the intervention or evaluation design. There is a clear need for more comprehensive reporting of financial incentive interventions to increase school-aged children's physical activity participation. Policymakers and researchers should increase the use of evaluation frameworks and logic models to enhance the quality of evidence generated from implementing new approaches to reduce this cost barrier to participation. Given Australia's substantial investment in government-led financial incentives and the paucity of evidence, the generation of practice-based evidence is warranted.

Collectively, this scoping review has synthesised peer-review evidence and specifically, Australian programs that used financial incentives to reduce the cost barrier to structured physical activity participation for school-aged children. The next Chapter will present the methods used to evaluate the NSW Government's Active Kids voucher program, a government-led financial incentive program available to all school-aged children in NSW. Table 4 presents a summary of the evidence and insights from this two part review, discussed in more details in sections 2.5 and 2.11 of this chapter.

Table 4 Summary of the emerging evidence of financial incentives that address the cost barrier for children and adolescents' physical activity presented in this two-part scoping review (Chapter 2).

Current evidence critique	Opportunities to address the evidence gaps
<p>Approach to evidence generation</p> <p>Most studies were conducted under controlled research conditions. Programs led by researchers achieved limited population reach and were not institutionalised or scaled up after their study period. Research studies have not translated into large-scale implementation. Evaluation of interventions conducted in real-world conditions is rarely undertaken. Only one study used an evaluation framework to gain a more comprehensive understanding of the intervention.</p>	<p>Research-policy partnerships are required to generate evidence that is suitable for government-led delivery after initial testing. The studies in this thesis examine a large-scale financial incentive delivered in real-world conditions through a natural experiment approach. Evaluation frameworks should be used to guide comprehensive evaluations. The evaluation reported this thesis used the RE-AIM evaluation framework.</p>
<p>Types of financial incentive</p> <p>Vouchers appear most suitable for large-scale implementation, particularly when costs are removed or reimbursed immediately (<7days). Tax-credits are too delayed to motivate physical activity participation.</p>	<p>The evaluation presented in this thesis are focused on a financial incentive voucher program and will generate evidence suitable to inform the design of future large-scale interventions using vouchers.</p>
<p>Intervention components</p> <p>Financial incentives were often delivered in isolation or did not report implementation details of additional intervention components that may have addressed socioecological factors influencing children's physical activity behaviours. Interventions that were administered through schools achieved high population reach. Process evaluation was scarcely conducted/reported in the identified financial incentive interventions.</p>	<p>Financial incentives should be part of comprehensive interventions that enable children and adolescents to be more active. Program implementation strategies should be monitored during delivery to inform future intervention design. The evaluation reported this thesis used the RE-AIM evaluation framework to enhance monitoring and reporting of the intervention throughout its implementation.</p>
<p>Application of Theory in program design</p> <p>Few interventions were designed using theories of behaviour change or behavioural economics.</p>	<p>Financial incentive interventions should be designed using theory driven approaches. The rationale for the various features of financial incentives should be more transparently reported. This was not addressed in the thesis, as the researchers did not have control of the program design.</p>

Current evidence critique	Opportunities to address the evidence gaps
<p>Eligible populations or target groups</p> <p>Most financial incentives have targeted younger children, and/or disadvantaged communities.</p> <p>Universal programs may increase inequalities in participation however more evidence is needed to determine what works for specific population groups.</p>	<p>Additional research should report intervention effects in detail, looking at differences between population sub-groups. This may inform how financial incentive programs adopt proportionate universalism principles in their design. The program studies in this thesis was available to all school-aged children and includes sub-group analysis of short and long term effects.</p>
<p>Measurement of children’s physical activity</p> <p>Few mixed methods studies were conducted.</p> <p>A variety of methods were used to measure physical activity outcomes in research studies. Physical activity was not commonly measured in government-led programs.</p> <p>Research studies did not assess the contribution of the activity gained through the financial incentive to total physical activity.</p>	<p>Financial incentive interventions should monitor the effects of the intervention on children’s physical activity and the discrete change in structured physical activity (sport/recreation) the intervention aims to influence.</p> <p>Best practice approaches for measuring structured physical activity participation, as a discrete aspect of physical activity, are required.</p> <p>A combination of device-based and self-report data and qualitative data may be required to understand intervention effects.</p> <p>The studies in this thesis used self-report data (collected by-proxy) to measure children’s physical activity.</p>
<p>Intervention effects</p> <p>Overall, the evidence for the effectiveness of financial incentives on improving children’s physical activity behaviours is mixed. Most studies assessed effects within a 6 month period and did not assess long-term changes in children’s physical activity. No prospective cohort studies have been conducted.</p>	<p>Additional research is required to understand the effect of financial incentive interventions of children’s physical activity behaviours.</p> <p>The evaluation reported in this thesis adopted a quasi-experimental prospective cohort study design to monitor intervention effects.</p> <p>This thesis includes studies reporting the intervention effects and maintenance of the effects after 2 years of program implementation.</p>

2.13 REFERENCES

1. World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018.
2. Bronfenbrenner U. *The Ecology of Human Development*: Harvard University Press; 1979.
3. Vella SA, Cliff DP, Okely AD. Socio-ecological predictors of participation and dropout in organised sports during childhood. *The international journal of behavioral nutrition and physical activity*. 2014;11:62.
4. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
5. Mitchell MS, Orstad SL, Biswas A, Oh PI, Jay M, Pakosh MT, et al. Financial incentives for physical activity in adults: systematic review and meta-analysis. *British Journal of Sports Medicine*. 2020;54(21):1259-68.
6. Molema CCM, Wendel-Vos GCW, Puijk L, Jensen JD, Schuit AJ, de Wit GA. A systematic review of financial incentives given in the healthcare setting; do they effectively improve physical activity levels? *BMC Sports Science, Medicine and Rehabilitation*. 2016;8(1):15.
7. Barte JCM, Wendel-Vos GCW. A Systematic Review of Financial Incentives for Physical Activity: The Effects on Physical Activity and Related Outcomes. *Behavioral Medicine*. 2017;43(2):79-90.
8. Gong Y, Trentadue TP, Shrestha S, Losina E, Collins JE. Financial incentives for objectively-measured physical activity or weight loss in adults with chronic health conditions: A meta-analysis. *PLOS ONE*. 2018;13(9):e0203939.
9. Luong M-LN, Hall M, Bennell KL, Kasza J, Harris A, Hinman RS. The Impact of Financial Incentives on Physical Activity: A Systematic Review and Meta-Analysis. *American Journal of Health Promotion*. 2020:0890117120940133.
10. Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.
11. Vlaev I, King D, Darzi A, Dolan P. Changing health behaviors using financial incentives: a review from behavioral economics. *BMC Public Health*. 2019;19(1):1059.
12. Hulteen RM, Smith JJ, Morgan PJ, Barnett LM, Hallal PC, Colyvas K, et al. Global participation in sport and leisure-time physical activities: A systematic review and meta-analysis. *Preventive medicine*. 2016;95:14-25.
13. Aubert S, Brazo-Sayavera J, González SA, Janssen I, Manyanga T, Oyeyemi AL, et al. Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: a narrative review. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):81.
14. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. *The Lancet Child & adolescent health*. 2020;4(1):23-35.
15. Sport Australia. *Children's Organised Out-of-school Participation*. 2018.

16. Owen KB, Nau T, Reece LJ, Bellew W, Rose C, Bauman A, et al. Fair play? Participation equity in organised sport and physical activity among children and adolescents in high income countries: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*. 2022;19(1):27.
17. Howie EK, Guagliano JM, Milton K, Vella SA, Gomersall SR, Kolbe-Alexander TL, et al. Ten Research Priorities Related to Youth Sport, Physical Activity, and Health. 2020;17(9):920.
18. Cushing CC, Brannon EE, Suorsa KI, Wilson DK. Systematic Review and Meta-Analysis of Health Promotion Interventions for Children and Adolescents Using an Ecological Framework. *Journal of Pediatric Psychology*. 2014;39(8):949-62.
19. Kane RL, Johnson PE, Town RJ, Butler M. A structured review of the effect of economic incentives on consumers' preventive behavior. *American Journal of Preventive Medicine*. 2004;27(4):327-52.
20. Messing S, Rütten A, Abu-Omar K, Ungerer-Röhrich U, Goodwin L, Burlacu I, et al. How Can Physical Activity Be Promoted Among Children and Adolescents? A Systematic Review of Reviews Across Settings. *Frontiers in Public Health*. 2019;7.
21. Thirumurthy H, Asch DA, Volpp KG. The Uncertain Effect of Financial Incentives to Improve Health Behaviors. *JAMA*. 2019;321(15):1451-2.
22. Haff N, Patel MS, Lim R, Zhu J, Troxel AB, Asch DA, et al. The role of behavioral economic incentive design and demographic characteristics in financial incentive-based approaches to changing health behaviors: a meta-analysis. *Am J Health Promot*. 2015;29(5):314-23.
23. McGill B, O'Hara BJ, Bauman A, Grunseit AC, Phongsavan P. Are Financial Incentives for Lifestyle Behavior Change Informed or Inspired by Behavioral Economics? A Mapping Review. *Am J Health Promot*. 2019;33(1):131-41.
24. Tversky A, Kahneman D. An analysis of decision under risk. *Econometrica*. 1979;47(2):263-92.
25. Chokshi NP, Adusumalli S, Small DS, Morris A, Feingold J, Ha YP, et al. Loss-Framed Financial Incentives and Personalized Goal-Setting to Increase Physical Activity Among Ischemic Heart Disease Patients Using Wearable Devices: The ACTIVE REWARD Randomized Trial. *Journal of the American Heart Association*. 2018;7(12):e009173.
26. Patel MS, Volpp KG, Rosin R, Bellamy SL, Small DS, Fletcher MA, et al. A Randomized Trial of Social Comparison Feedback and Financial Incentives to Increase Physical Activity. *American Journal of Health Promotion*. 2016;30(6):416-24.
27. Mitchell MS, Goodman JM, Alter DA, John LK, Oh PI, Pakosh MT, et al. Financial Incentives for Exercise Adherence in Adults: Systematic Review and Meta-Analysis. *American Journal of Preventive Medicine*. 2013;45(5):658-67.
28. Corepal R, Tully MA, Kee F, Miller SJ, Hunter RF. Behavioural incentive interventions for health behaviour change in young people (5–18 years old): A systematic review and meta-analysis. *Preventive Medicine*. 2018;110:55-66.
29. Kenyon CC, Flaherty C, Floyd GC, Jenssen BP, Miller VA. Promoting Healthy Childhood Behaviors With Financial Incentives: A Narrative Review of Key Considerations and Design Features for Future Research. *Acad Pediatr*. 2021.

30. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*. 2005;8(1):19-32.
31. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implementation Science*. 2010;5(1):69.
32. Services Australia. School years: Australian Government,; 2022 [17 June 2022]; Available from: <https://www.servicesaustralia.gov.au/school-years?context=60007#:~:text=Primary%20and%20secondary%20school%20are,to%20year%206%20or%207>.
33. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322-7.
34. Glasgow RE, Harden SM, Gaglio B, Rabin B, Smith ML, Porter GC, et al. RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*. 2019;7.
35. D'Lima D, Soukup T, Hull L. Evaluating the Application of the RE-AIM Planning and Evaluation Framework: An Updated Systematic Review and Exploration of Pragmatic Application. *Frontiers in Public Health*. 2022;9.
36. Gaglio B, Shoup JA, Glasgow RE. The RE-AIM framework: a systematic review of use over time. *American journal of public health*. 2013;103(6):e38-e46.
37. Fynn JF, Hardeman W, Milton K, Jones AP. A scoping review of evaluation frameworks and their applicability to real-world physical activity and dietary change programme evaluation. *BMC Public Health*. 2020;20(1):1000.
38. Sanchez-Flack JC, Herman A, Buscemi J, Kong A, Bains A, Fitzgibbon ML. A systematic review of the implementation of obesity prevention interventions in early childcare and education settings using the RE-AIM framework. *Translational behavioral medicine*. 2020;10(5):1168-76.
39. Haire-Joshu D, Morshed AB, Phad A, Johnston S, Tabak RG. Applying RE-AIM to evaluate the external validity of weight gain prevention interventions in young adults: A systematic review. *Journal of Public Health Management and Practice*. 2021;27(2):154-65.
40. Craike M, Hill B, Gaskin CJ, Skouteris H. Interventions to improve physical activity during pregnancy: a systematic review on issues of internal and external validity using the RE-AIM framework. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2017;124(4):573-83.
41. Shaw RB, Sweet SN, McBride CB, Adair WK, Martin Ginis KA. Operationalizing the reach, effectiveness, adoption, implementation, maintenance (RE-AIM) framework to evaluate the collective impact of autonomous community programs that promote health and well-being. *BMC Public Health*. 2019;19(1):803.
42. Kwan BM, McGinnes HL, Ory MG, Estabrooks PA, Waxmonsky JA, Glasgow RE. RE-AIM in the Real World: Use of the RE-AIM Framework for Program Planning and Evaluation in Clinical and Community Settings. *Frontiers in Public Health*. 2019;7.
43. Finkelstein EA, Lim RSM, Ward DS, Evenson KR. Leveraging family dynamics to increase the effectiveness of incentives for physical activity: the FIT-FAM randomized controlled trial. *The international journal of behavioral nutrition and physical activity*. 2020;17(1):113.

44. Finkelstein EA, Tan Y-T, Malhotra R, Lee C-F, Goh S-S, Saw S-M. A Cluster Randomized Controlled Trial of an Incentive-Based Outdoor Physical Activity Program. *The Journal of Pediatrics*. 2013;163(1):167-72.e1.
45. Ngo CS, Pan C-W, Finkelstein EA, Lee C-F, Wong IB, Ong J, et al. A cluster randomised controlled trial evaluating an incentive-based outdoor physical activity programme to increase outdoor time and prevent myopia in children. *Ophthalmic & physiological optics : the journal of the British College of Ophthalmic Opticians (Optometrists)*. 2014;34(3):362-8.
46. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. *ZA Institute of Labor Economics*. 2021(14246).
47. Suchert V, Isensee B, Sargent J, Weisser B, Hanewinkel R. Prospective effects of pedometer use and class competitions on physical activity in youth: A cluster-randomized controlled trial. *Preventive Medicine*. 2015;81:399-404.
48. Berk M, McGivern LM. Effects of a Facilitated Fee Waiver Program on Participation in Youth Sports Programs. *Journal of Park & Recreation Administration*. 2016;34(3):99-105.
49. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J Phys Act Health*. 2015;12(6):840-53.
50. Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC public health*. 2016;16:890.
51. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
52. James M, Christian D, Scott S, Todd C, Stratton G, Demmler J, et al. What works best when implementing a physical activity intervention for teenagers? Reflections from the ACTIVE Project: a qualitative study. *BMJ open*. 2019;9(5):e025618.
53. Ginja S, Arnott B, Araujo-Soares V, Namdeo A, McColl E. Feasibility of an incentive scheme to promote active travel to school: a pilot cluster randomised trial. *Pilot and feasibility studies*. 2017;3:57.
54. James M, Christian D, Scott S, Todd C, Stratton G, McCoubrey S, et al. Active children through individual vouchers - evaluation (ACTIVE): protocol for a mixed method randomised control trial to increase physical activity levels in teenagers. *BMC public health*. 2017;18(1):7.
55. von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *American journal of public health*. 2011;101(8):e10-6.
56. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC public health*. 2010;10:356.
57. Fisher K, Von Tigerstrom B, Larre T, Mawani A, Cameron C, Chad K, et al. The children's fitness tax credit (CFTC): Awareness and use in the first three years (2007-2009). *Canadian Journal of Diabetes*. 2013;37(SUPPL. 2):S224.
58. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of physical activity & health*. 2021;18(9):1067-73.

59. Lott DMDFR. Report on Federal Tax Expenditures - Concepts, Estimates and Evaluations 2017. Department of Finance Canada; 2017.
60. Spence JC, Holt NL, Sprysak CJ, Spencer-Cavaliere N, Caulfield T. Non-refundable tax credits are an inequitable policy instrument for promoting physical activity among Canadian children. *Can J Public Health*. 2012;103(3):175-7.
61. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.
62. Foley BC, Owen KB, Bellew W, Wolfenden L, Reilly K, Bauman AE, et al. Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach? *International journal of environmental research and public health*. 2020;17(16).
63. Foley BC, Owen KB, Bauman AE, Bellew W, Reece LJ. Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention. *BMC public health*. 2021;21(1):22.
64. Owen KB, Foley BC, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *Journal of science and medicine in sport*. 2020.
65. Owen KB, Bellew B, Foley BC, Bauman A, Reece LJ. Body mass Index of children and adolescent participants in a voucher program designed to incentivise participation in sport and physical activity: A cross-sectional study. *Preventive Medicine Reports*. 2021;22:101349.
66. Reece LJ, Foley, B.C ., Bellew, B ., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.
67. Reilly K, Bauman A, Reece L, Lecathelinais C, Sutherland R, Wolfenden L. Evaluation of a voucher scheme to increase child physical activity in participants of a school physical activity trial in the Hunter region of Australia. *BMC Public Health*. 2021;21(1):570.
68. Virgona N, Foley BC, Ryan H, Nolan M, Reece L. 'One hundred dollars is a big help, but to continue, it's a challenge': A qualitative study exploring correlates and barriers to Active Kids voucher uptake in western Sydney. *Health Promotion Journal of Australia*. 2021;11:11.
69. Reece LJ, Owen KB, Foley BC, Rose C, Bellew W, Bauman AE. Understanding the impact of COVID19 on children's physical activity levels in NSW, Australia. *Health Promotion Journal of Australia*. 2020.
70. Macniven R, Foley BC, Owen KB, Evans JR, Bauman AE, Reece LJ. Physical activity and sport participation characteristics of Indigenous children registered in the Active Kids voucher program in New South Wales. *Journal of Science and Medicine in Sport*. 2020;23(12):1178-84.
71. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
72. Fisher KLM, Amin; von Tigerstrom, Barbara; Larre, Tamara; Cameron, Christine; Chad, Karen E.; Reeder, Bruce; Tremblay, Mark S. Awareness and Use of Canada's Children's Fitness Tax Credit. *Canadian Tax Journal*. 2013;61(3):599-632.

73. James M, Todd C, Scott S, Stratton G, McCoubrey S, Christian D, et al. Teenage recommendations to improve physical activity for their age group: a qualitative study. *BMC Public Health*. 2018;18(1):372.
74. Clark AF, Campbell J, Tucker P, Wilk P, Gilliland JA. If You Make it Free, Will They Come? Using a Physical Activity Accessibility Model to Understand the Use of a Free Children's Recreation Pass. *J Phys Act Health*. 2019;16(7):493-503.
75. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *Journal of physical activity & health*. 2015;12(6):840-53.
76. Finkelstein EA, Tan Y-T, Malhotra R, Lee C-F, Goh S-S, Saw S-M. A cluster randomized controlled trial of an incentive-based outdoor physical activity program. *The Journal of pediatrics*. 2013;163(1):167-72.e1.
77. World Health Organization. Fair Play: Building a strong physical activity system for more active people. In: team PA, editor. 2021.
78. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls, and prospects. *The Lancet*. 2012;380(9838):247-57.
79. Sylvia LG, Bernstein EE, Hubbard JL, Keating L, Anderson EJ. Practical guide to measuring physical activity. *Journal of the Academy of Nutrition and Dietetics*. 2014;114(2):199-208.
80. Hidding LM, Chinapaw MJM, van Poppel MNM, Mokkink LB, Altenburg TM. An Updated Systematic Review of Childhood Physical Activity Questionnaires. *Sports Medicine*. 2018;48(12):2797-842.
81. Allender S, Occhipinti J-A, Bauman A, Bellew B, Cavill N, Chau J, et al. Getting Australia Active III: A systems approach to physical activity for policy makers 2020.
82. Ogilvie D, Adams J, Bauman A, Gregg EW, Panter J, Siegel KR, et al. Using natural experimental studies to guide public health action: turning the evidence-based medicine paradigm on its head. *Journal of epidemiology and community health*. 2020;74(2):203-8.
83. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health*. 1999;89(9):1322-7.
84. Sallis J, Bauman A, Pratt M. Environmental and policy interventions to promote physical activity. *American Journal of Preventive Medicine*. 1998;15(4):379-97.
85. Ding D, Ramirez Varela A, Bauman AE, Ekelund U, Lee IM, Heath G, et al. Towards better evidence-informed global action: lessons learnt from the Lancet series and recent developments in physical activity and public health. *British Journal of Sports Medicine*. 2020;54(8):462.
86. Gelius P, Messing S, Goodwin L, Schow D, Abu-Omar K. What are effective policies for promoting physical activity? A systematic review of reviews. *Preventive Medicine Reports*. 2020;18:101095.

87. Active Healthy Kids Australia. Reboot! Reimagining Physically Active Lives: 2022 Australian Report Card on Physical Activity for Children and Young People. Melbourne, Victoria: Active Healthy Kids Australia; 2022.
88. Reece LJ, Foley BC, Bellew B, Owen K, Cushway D, Srinivasan N, et al. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. Public Health Research and Practice. 2021;31(2):e30122006.
89. NSW Government Office of Sport. Active Kids: NSW Government; 2018 [Available from: <https://sport.nsw.gov.au/sectordevelopment/activekids>].
90. SA Government. Sports Vouchers 2015 [Available from: <https://www.sportsvouchers.sa.gov.au/>].
91. WA Government. Regional Athlete Travel Subsidy 1995 [Available from: <https://www.dlgsc.wa.gov.au/funding/sport-and-recreation-funding/regional-athlete-travel-subsidy-scheme>].
92. Department of Sport and Recreation. Sport 4 All Evaluation. Perth: WA Government; 2017.
93. Victorian Government. Get Active Kids Voucher Program 2020 [Available from: <https://www.getactive.vic.gov.au/vouchers/>].
94. ACT Government. Tenant Participation Grants 2020 [Available from: <https://www.communityservices.act.gov.au/hcs/tenant-participation-grants>].
95. QLD Government. Get Started Vouchers 2013 [Available from: www.qld.gov.au/recreation/sports/funding/getinthegame/].
96. QLD Government. Young Athletes Travel Subsidy 2015 [Available from: [https://aocra.com.au/new/uploads/file/YATS%20Fact%20Sheet%20\(3\).pdf](https://aocra.com.au/new/uploads/file/YATS%20Fact%20Sheet%20(3).pdf)].
97. QLD Government. Fair Play vouchers 2019 [Available from: <https://www.qld.gov.au/recreation/sports/funding/fairplay/apply>].
98. WA Government. KidSport Program Policy. 2011.
99. WA Government. KidSport 2011 [Available from: <https://www.wa.gov.au/service/sport-and-recreation/sport-and-fitness-development/kidsport>].
100. NT Government. Sport Voucher Scheme 2012 [Available from: <https://sportvoucher.nt.gov.au/>].
101. NT Government. Sport Voucher Scheme Policy. 2012.
102. Tasmanian Government. Ticket to Play 2019 [Available from: <https://www.tickettoplay.tas.gov.au/>].
103. Participation grants expanded to support wellbeing through COVID-19 [press release]. 22/4/2021 2021.
104. NSW Government Office of Sport. First Lap 2021 [Available from: <https://www.sport.nsw.gov.au/firstlap>].
105. Providing young Tasmanians with a Ticket to Play [press release]. Minister for Sport and Recreation, 6/7/2021 2021.

106. KidSport turns 10 and changes lives [press release]. 16/12/2021 2021.
107. WA Government. Regional Athlete Travel Subsidy Public Guidelines. 1995.
108. Fynn JF, Hardeman W, Milton K, Jones A. Exploring influences on evaluation practice: a case study of a national physical activity programme. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):31.

3 METHODS

3.1 CHAPTER OUTLINE

This chapter describes the financial incentive intervention studied throughout the remaining chapters of the thesis, entitled the Active Kids program, and the methods adopted for the evaluation of the program.

Chapter 1 introduced the need to enable more children and adolescents to be more active, more often. Structured physical activity programs delivered outside-of-school were identified as an underutilised opportunity to increase physical activity participation. However, multiple barriers to participation in structured physical activity exist, including the cost of registrations and memberships. It has been shown that cost is a barrier, but there is limited understanding of how the cost barrier might be addressed to create more opportunities for school-aged children to be active.

Chapter 2 included two scoping reviews that identified evidence for financial incentive interventions that address the cost barrier to structured physical activity for school-aged children. Part A of the scoping review identified eleven interventions in the peer reviewed literature that used financial incentives to influence children's physical activity levels outside school. Most of these interventions used randomised-controlled trial (RCT) designs involving small to medium participant numbers (29–1,489 children) and had mixed results. Few RCT studies reported on the implementation process, and none of these researcher-led interventions progressed to large-scale delivery of financial incentive interventions for school-aged children. Interventions that were delivered to large populations (n=2) had low-quality evaluations. The peer-reviewed evidence was insufficient to determine the effectiveness of financial incentives in reducing the cost barrier to structured physical activity participation. Part B of the scoping review in Chapter 2 interrogated publicly available information regarding government-led financial incentives in Australia. Each State and Territory had at least one financial incentive program to reduce the costs associated with structured physical activity participation. Government-led financial incentives in Australia have not transparently reported evaluation protocols, detailed their implementation processes, or reported robust evaluations. The scoping review found a gap between peer-reviewed evidence and practice regarding the effect of financial incentive interventions on increasing school-aged children's physical activity. In 2018, the NSW Government launched the Active Kids program. This financial incentive (voucher) program aimed to reduce the cost barrier to participation in structured physical activity programs for all school-enrolled children in NSW. Studies regarding the Active Kids program were excluded from Part A of the scoping review. Chapters 4–8 present five studies evaluating dimensions of the Active Kids program, to fill the gaps between research and practice identified in Chapter 2. In addition, other papers that describe this evaluation are provided in Appendix 2.

This chapter describes the independent and rigorous evaluation approach that was integrated into the design and development of the NSW Government's Active Kids program (2018–2020). The theoretical underpinnings, evaluation framework, study design, data collection protocols and measures, and research questions addressed in Chapters 4–8 are described in this chapter. *Before the evaluation methods are described, an overview of the Active Kids program is presented, which is relevant for all subsequent chapters.*

3.2 ACTIVE KIDS PROGRAM OVERVIEW

3.2.1 NSW context

The NSW government has a track record for investing in active living and healthy eating interventions to prevent chronic diseases(1). Long-term investment in the Healthy Children's Initiative, led by the NSW Government Ministry of Health, has seen multiple state-wide programs implemented to reduce childhood obesity and establish positive eating and physical activity behaviours in children aged 5–15 years old(2). The Healthy Children's Initiative programs have been delivered in early-childhood centres, schools, and community settings. The component of the Health Children's initiative that is delivered in a community setting is a nutrition-focused program aims to improve the availability of health food and drink in community sports club canteens (finish with the right stuff)(2). The Healthy Children's initiative is a comprehensive, multi-component initiative that aimed to reduce childhood obesity rates and has received substantial government investment since 2010 however the prevalence of overweight and obesity has remained stable(2, 3); population surveillance shows that 23% of children in NSW are living with overweight or obesity(3). Furthermore, the prevalence of children who meet physical activity guidelines has remained low in NSW, with 19% of 5–16-year-olds accumulating at least 60 minutes of physical activity outside-of-school each day(4). Additional effective interventions were needed to accelerate improvements in children's and adolescents' healthy eating and physical activity behaviours. Increasing participation in structured physical activity outside-of-school was not addressed by the NSW Government's Healthy Children's Initiative(2). In 2017, the NSW Government recognised an opportunity for their sport and recreation agency, the Office of Sport, to contribute to improving children's physical activity by reducing the cost barrier to participation for children and adolescents.

The Office of Sport asked the University of Sydney-based Sport and Recreation Intervention and Epidemiology Research (SPRINTER) group to synthesise evidence on voucher schemes that reduce the costs of sports registration costs. SPRINTER conducted a rapid review that explored evidence of effective voucher schemes to increase community participation in physical activity, sport and active recreation and identified optimal voucher scheme design features(5). The best available evidence was provided to the NSW Government with recommendations and guidance for strategic investment in a voucher program.

In June 2017, the NSW Premier Gladys Berejiklian's budget announcements included a record \$401 million in funding to invest in major and community sporting facilities and encourage healthier lifestyles in children; of this, \$207 million was allocated towards the Active Kids program (2018–2021), which was later extended to \$650 million over five years (2019–2023)(6). The Active Kids program was described as a whole-of-government initiative, although it was predominantly led by the NSW Government Office of Sport and was not formally part of the Healthy Children's initiative which focused on addressing childhood obesity(6, 7). Other agencies of the NSW Government were involved in an Active Kids program steering committee however did not have any formal objectives related to the program's implementation.

3.2.2 Active Kids program description

On January 31, 2018, the NSW State Government launched the Active Kids program; a universally available program to support parents and caregivers to subsidise the cost of children's participation in structured physical activity programs outside-of-school time(7).

The NSW Active Kids program objectives were to:

1. Increase participation of school-enrolled children in sport and active recreation

2. Support the delivery of the then Premier's Priority to reduce childhood overweight and obesity by increasing physical activity levels in children aged 4.5 to 18 years living in NSW
3. Help change the physical activity behaviours of children and young people in NSW.

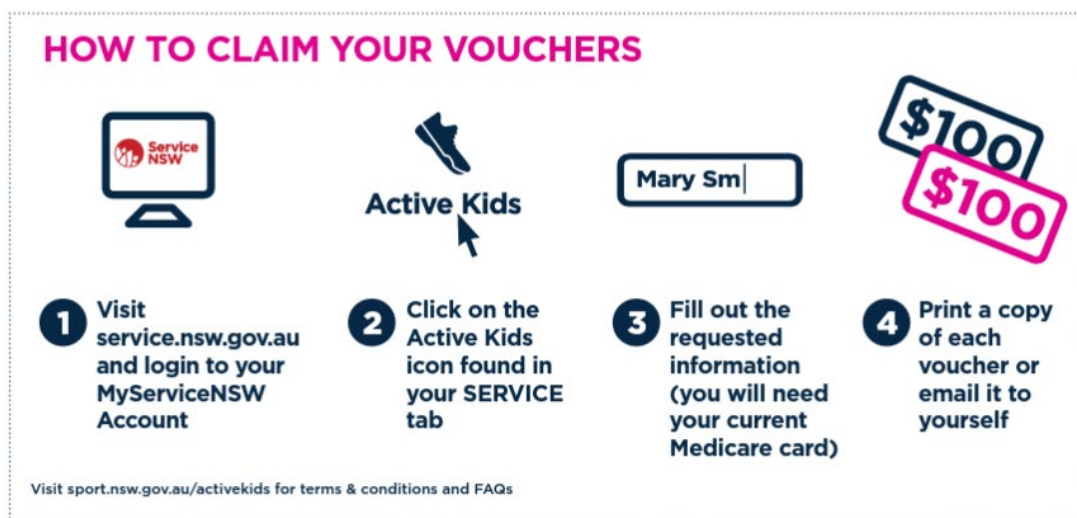
3.2.2.1 Eligible children

The NSW government adopted a universal approach to the Active Kids program. All school-enrolled children aged 4.5–18 years old that lived in NSW with a valid Medicare card were eligible for an Active Kids voucher(7). This included students who were home-schooled or enrolled in secondary school education with an educational institution such as TAFE NSW.

3.2.2.2 The Active Kids voucher

Parents and caregivers could apply for an Active Kids voucher through a bespoke online government platform. Applications could be submitted throughout the year for the child's voucher which was then automatically available for redemption with an approved Active Kids provider. In 2018, one Active Kids voucher valued at \$100 was available for eligible children between 31 January – 31 December 2018(7). From 2019, two vouchers valued at \$100 each were available for eligible children to promote participation throughout the year(7). Parents and caregivers could access the first voucher between 1 January – 31 December; the second voucher could be accessed between 1 July and 31 December each year (2019–2023)(7). The process for parents to claim Active Kids vouchers is shown in Figure 7, extracted from the Active Kids website.

Figure 7 Information for parents and caregivers on how to claim and use a voucher, created by the NSW Government(7)



HOW TO USE YOUR VOUCHERS

- 1** Find a provider by visiting our website: sport.nsw.gov.au/activekids
- 2** Once you have chosen an activity give the voucher number to your activity provider, or log onto your provider's website and enter the voucher number



*Vouchers can always be found in your MyServiceNSW account by looking in the My Applications tab

3.2.2.3 Eligible activities

Eligible activities were required to provide opportunities for physical activity participation in NSW that:

- Provided as part of a structured program of **at least eight weeks' duration**, and
- involve regular **moderate-to-vigorous physical activity** (MVPA).

This includes “sporting pursuits, swimming lessons, structured fitness programs, outdoor recreation programs, indoor recreation programs (e.g., dance), and other structured activity programs of moderate to vigorous intensity that are approved by the Office of Sport”(7).

Ineligible activities include: “a gym membership that was not part of a structured program; activities or programs that were part of the school curriculum, held during school hours or run by schools (including on weekends); after-school care services and tutors; physiotherapy; School holiday or short intensive programs; online programs or apps; travel to and from competitions; individual items that would normally be bought from a retailer (for example, jerseys, socks and boots)”(7).

3.2.2.4 Active Kids providers

To become a registered provider with the Active Kids program, organisations needed to deliver an eligible structured physical activity program and be:

- a sporting club/association affiliated with a recognised State Sporting Organisation located in NSW, or
- a for-profit or not-for-profit activity provider located in NSW, and
- an organisation providing participants with opportunities to engage in moderate to vigorous level physical activity
- Approved by and registered with the Active Kids program before participating in the program and accepting vouchers from participants.

To be eligible for registration, a provider must: “hold a current Australian Business Number, Australian Company Number, or Certificate of Incorporation and must not have any outstanding actions or enforcement orders recorded by the Office of Fair Trading; hold appropriate skills, experience, or qualifications for low risk activities they provide, and/or appropriate accreditation for high risk activities, specifically swimming and fitness activities; obtain Working with Children Check clearance for all staff and/or volunteers, as required; hold current Certificates of Currency for indemnity and insurance policies appropriate to the type and level of activities being delivered”(7).

3.3 Methods for the evaluation of the Active Kids program

3.3.1 Natural experiment approach

Natural experiments are a type of evaluation design that investigate the effect of an intervention without the researcher manipulating the exposure, i.e., observing naturally occurring events and their effects in 'real-world' conditions(8-11). Natural experiments have been used to establish population-level evidence for financial incentive interventions including sugar sweetened beverage taxes and tobacco reform; however, this type of research has been underutilised for financial incentives to promote physical activity participation(9)(see Chapter 2). Most experimental research into financial incentives to promote physical activity have focused on adult populations, have been restricted to randomised controlled trial designs, and have not been delivered to large populations in real-world conditions(12-16)(see Chapter 2). Large-scale financial incentive interventions that aim to promote physical activity participation among school-aged children lack evaluation evidence(9)(Chapter 2). Craig et al. recommend that natural experiments are conducted to provide convincing evidence of effective population-level interventions to promote physical activity participation(11). Natural experiments can adopt various research designs, including quasi-experimental cohort studies with or without comparison groups, observational studies with comparison groups, and interrupted time-series designs(9).

The Active Kids program, launched in 2018, was the first universal government-led financial incentive for children's participation in structured physical activity in Australia(7). This approach to promoting school-aged children's participation in structured physical activities outside-of-school time provided an opportunity for evidence generation. Whilst there was a reasonable expectation that providing a financial incentive (voucher) to reduce the cost of participation would influence school-aged children's behaviours, the effect of a large-scale program on enabling equitable sport and recreation participation was not known(17). A commissioned evidence review was used to inform some aspects of the Active Kids program design, including evidence from a voucher program evaluation that was described in Chapter 2 – the ACTIVE program(5). Through an existing research partnership between the University of Sydney SPRINTER group and the NSW Government Office of Sport, the SPRINTER group was engaged to independently evaluate the Active Kids program(18). The research group conducting the evaluation did not have control over the design or implementation of the Active Kids program, making this study fit the criteria of a natural experiment.

3.3.2 Identification of an evaluation framework

An evaluation is an activity conducted as systematically and impartially as possible to determine why, and to what extent, an intervention achieved both expected and unexpected results(19). Activities that intend to influence complex behaviours, such as physical activity participation at the population level, require comprehensive and sustained multi-component interventions, that may have a myriad of intended and unintended impacts(20, 21). The complexity of evaluating population-level interventions is well recognised(19-21). Although complex, interventions aiming to increase physical activity participation must be evaluated to enable evidence-based decision-making processes of governments, organisations, and stakeholders(19-21).

Evaluation frameworks provide a manageable structure to design, conduct, and report good quality evaluation studies. Evaluation frameworks can help researchers, practitioners and policy makers identify what should be measured and how to understand an intervention comprehensively. Interventions that use evaluation frameworks are more likely to produce evaluation findings comparable to other studies and transferable to other contexts(22). Many

evaluation frameworks recommend that qualitative and quantitative data are both utilised to supplement the strengths and weaknesses of each data type in isolation(21-23).

Within the public health field, over 71 evaluation frameworks can be used, of which 68 frameworks are appropriate for physical activity interventions(21, 22). Even with the many options available, Fynn et al. (2020) 's systematic review found that less than one-quarter of physical activity intervention evaluation studies used evaluation frameworks(22). The evaluation framework most frequently reported in public health and physical activity evaluations is Glasgow's RE-AIM framework(22, 24).

The RE-AIM framework was first introduced in this thesis during Chapter 2, where it was used to summarise evidence in the scoping review and report the findings(24). Within Chapter 2 the scoping review identified that most financial incentives studies aiming to promote physical activity in school-aged children did not use an evaluation framework. The limited use of evaluation frameworks in studies of financial incentives resulted in under-investigation of implementation processes and low ability to generalise study findings to new contexts (Chapter 2). The only evaluation framework used in interventions identified in Chapter 2 was the RE-AIM framework(24-26). The ACTIVE program that used the RE-AIM framework was the most rigorous evaluation identified in the scoping review. The RE-AIM framework was adopted to guide the rigorous and comprehensive evaluation of the Active Kids program.

3.3.2.1 The RE-AIM framework

The RE-AIM framework was created to guide researchers and policymakers in implementing behaviour change interventions to generate good-quality evidence(24). The RE-AIM framework is a five-stage framework denoted by the Reach, Effect, Adoption, Implementation, and Maintenance(24). Some stages focus on the individual level (Reach and Effect), and others focus on settings and organisations (Adoption and Implementation), or both (Maintenance)(23). These important dimensions of evaluation are addressed throughout this thesis (See Figure 1).

Glasgow et al. have documented adaptations to the RE-AIM Framework over the past 20 years and recently revised and enhanced the framework, acknowledging some overarching issues(23). One recent enhancement to RE-AIM was the addition of the pragmatic, robust implementation and sustainability model to the framework(23). This recognises the significance of contextual factors on RE-AIM findings. RE-AIM now recognises how broader policies, guidelines, resources, environmental, and cultural factors may influence interventions, in addition to the settings and organisations previously considered(23, 24). The pragmatic, robust implementation and sustainability model calls for better measurement and reporting of implementation processes and their relationship to intervention outcomes using mixed methods(23). Although quantitative evidence provided clear insights for some RE-AIM dimensions, detailed understanding requires a mixture of qualitative and quantitative data. Mixed methods evaluations are recommended in applying the RE-AIM framework, to provide a better understanding of what occurs and how and why the various findings are achieved. Although mixed methods are increasingly used, evaluation studies using the RE-AIM framework often do not include in-depth reports of implementation strategies and adaptations to intervention components on RE-AIM findings(23, 27). The potential for research translation is greatly increased in studies that consider the influence of internal and external contexts on an intervention and report intervention processes(19, 22, 23, 27). The recognition of the framework amongst researchers and policy makers, the focus on both individual and setting levels of an intervention, the pragmatic perspective, and the shift to promote the use of both quantitative and qualitative evidence were key factors in the selection of the RE-AIM framework for the evaluation of the Active Kids program(23, 24).

3.3.2.1.1 Definitions of RE-AIM framework dimensions

Each dimension of the RE-AIM framework can be interpreted differently. In this study, the definitions for each dimension of the framework are:

RE-AIM dimension	Definition of the dimension used in this thesis	Chapter
Reach	The number and proportion of the eligible population that engage in the financial incentive intervention, and how representative the participants are compared to the eligible population.	4
Effect	The effectiveness of the intervention on primary and secondary outcomes including children's physical activity levels or participation in structured physical activity programs, wellbeing outcomes, and negative effects.	5
Adoption	Use of the financial incentive and other intervention components to providers to address the cost barrier.	6
Implementation (process)	The uptake of the financial incentive across the implementation setting/s by stakeholders/partners and the degree to which stakeholders/partners facilitate delivery of the intervention.	7
Maintenance	The long-term effectiveness (>12 months) of the intervention on the primary outcome.	8

3.3.3 Establishing program theory: a logic model approach

Interventions which have clear theoretical underpinnings are more likely to be effective in changing physical activity behaviours, because they consider the complex socio-ecological influences on an individual(20, 28, 29). Skivington et al. have described program theory as “how an intervention is expected to lead to its effects and under what conditions. Program theory articulates the key components of the intervention and how they interact, the mechanisms of the intervention, the features of the context that are expected to influence those mechanisms, and how those mechanisms might influence the context.”(29). One way to establish a program theory for a new intervention is to develop a logic model which summarises complex interventions into simple visual representations. Logic models have been shown to highlight practical and theoretical gaps during the planning phase of intervention design so that these might be tested and overcome during implementation(29).

When a logic model is co-designed with multiple stakeholders, there are multiple benefits to the design, implementation, and evaluation of an intervention(20, 29). Creating a logic model allows stakeholders to understand the intervention's essential components and identify and agree on the relationship between the program inputs, activities and outcomes(20). Logic models allow the establishment of theoretical underpinnings for interventions involving stakeholders from various disciplines that may use different terminology and theories to describe similar relationships(20). Once stakeholders reach agreement on the theory of change shown in the logic model, researchers can assess the evaluability of the intervention and design an appropriate evaluation methodology. An established logic model can be utilised as a resource for all stakeholders to reflect on throughout the implementation of a program and can provide a structure for evaluation reporting.

3.3.3.1 Development of the Active Kids program logic model

A logic model was developed to underpin the Active Kids program and to aid the design of the program evaluation (Figure 8). It is best practice to develop a logic model or program theory

at the beginning of an intervention with stakeholder involvement(29). The SPRINTER group³ created a draft logic model for the program drawing on a combination of theories, concepts, observational studies, and the political context. The RE-AIM framework components were integrated within the draft logic model. Concurrently, a cross-government steering group was established to support the Office of Sport throughout the development, implementation, and evaluation of the Active Kids program. The Office of Sport chaired the steering group, which included representatives from various government agencies - health, education, transport, services, community development, and youth government departments/agencies, including the SPRINTER group. The draft logic model was presented to all stakeholders in this steering group. SPRINTER guided stakeholders through a process of refining and agreeing on the short-and medium-term impacts required for the long-term outcomes to be achieved. The co-designed logic model helped focus stakeholders on the mutually agreed key resources, core activities, and outputs required to achieve the intended outcomes of the Active Kids program (Figure 8).

The Active Kids program logic model was a useful tool to enable evaluation measures to be embedded within the program from the outset. The evaluability of each component in the logic model for the Active Kids program was assessed and colour coded into process (green) and outcome (blue) components, with responsible stakeholders defined (Figure 8). Process evaluation data was collected by the NSW Government Office of Sport whilst outcome evaluation data were collected by the SPRINTER group. Both process and outcome evaluation data were used by the SPRINTER group to create comprehensive evaluation reports and research articles during the implementation of the Active Kids program, including the studies in this thesis.

3.3.3.2 Components of the Active Kids program logic model

The core activities and outputs in the logic model are divided by the two participant groups engaged in the Active Kids program 1) Children and parents/caregivers and 2) Structured physical activity providers. These activities were led by the NSW Government Office of Sport and centred on program promotion and engagement of participants. Awareness of the Active Kids program and access to Active Kids vouchers and structured physical activity programs were key outputs for children and their parents/caregivers. To achieve these outputs, structured physical activity and sport providers had to be registered and engaged with the Active Kids program. The structured physical activity providers were key stakeholders who delivered voucher activities and were also expected to use marketing and promotional resources to increase awareness of the program amongst children and their parents/caregivers.

The short-term impacts focused on process measures which would indicate if the core activities and outputs were delivered to influence participants. Short-term impacts included the number of children registered in the program, the number and range of structured physical activity programs where the vouchers could be used, and number of vouchers used. The logic model highlighted the importance of engaging children who were inactive or had not previously been involved in sport (Figure 8).

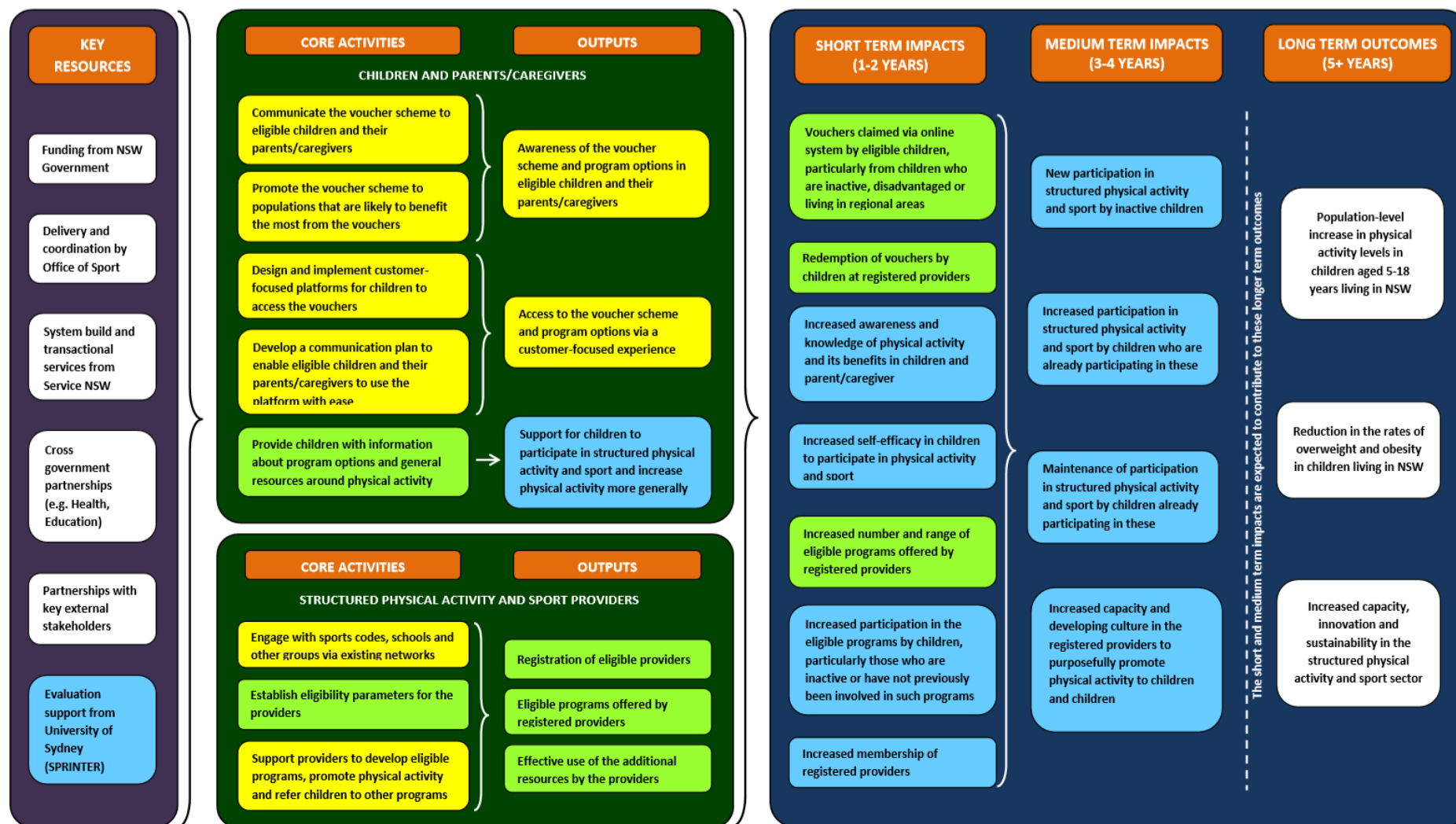
The medium-term impacts highlight the importance of engaging inactive children in structured physical activity, as well as increasing the participation levels and maintaining physical activity behaviours in participating active children (Figure 8). This reflects different types of children who may engage in the program, recognising that the voucher is likely to have a different

³ The candidate was employed as a Research Officer with the SPRINTER group during the development of the Active Kids program logic and worked closely with the group's Director and Advisors on the logic model and evaluation design before commencing her PhD candidature.

impact on children based on their baseline physical activity before engaging in the Active Kids program. The voucher program was also expected to increase the capacity of structured physical activity providers to promote physical activity to school-aged children.

The long-term outcomes aligned with the aims of the Active Kids program. Indicators of the long-term outcomes were integrated within routine data collection to monitor change over time (Figure 8).

Figure 8 Logic model for the evaluation of the NSW Active Kids program



 - Marketing & Comms OoS

 - Process evaluation OoS

 - Outcome evaluation USYD

3.3.4 Study design

This natural experiment adopted a quasi-experimental study design with no comparison group to evaluate the NSW Government Office of Sport's Active Kids program. A research protocol for the evaluation was developed before the program launched, and has been published in a peer-review journal(18). The RE-AIM framework was adopted to structure the evaluation, and a program theory was co-designed with various stakeholders using a logic model approach. A prospective cohort study was nested as a sub-study within the quasi-experimental study to evaluate the effect of the intervention on individual school-aged (4.5–18 years old) children's physical activity levels (primary outcome) and participation in structured physical activity programs (secondary outcome).

3.3.5 Research questions

The research questions addressed by each chapter of the thesis are:

Chapter 2: To what extent have financial incentives promoting physical activity participation outside-of-school hours among school-aged children been implemented globally? Are financial incentives effective in promoting physical activity participation for school-aged children?

Chapter 4: What is the absolute number and proportion of individuals willing to participate in the NSW Active Kids program, and how representative are participants compared to the eligible population?

Chapter 5: What is the impact of using an Active Kids voucher in NSW on the number of days per week children participate in physical activity for at least 60 minutes six months after using a voucher? How does the voucher contribute to the child's weekly time and annual expenditure on structured physical activity? Are changes in physical activity participation after voucher use associated with personal and social factors in children's lives?

Chapter 6: What are the number and absolute proportion of registered children who did not use an Active Kids voucher and their reported reasons for not redeeming it before it expired?

Chapter 7: To what extent did structured physical activity providers engage with the Active Kids program?

Chapter 8: What is the sustained effectiveness of using an Active Kids voucher on children's physical activity levels and participation in structured physical activity programs?

3.3.6 Ethical considerations

This study received ethics approval from the Human Research Ethics Committee at the University of Sydney (project number: 2017/947) and was registered with Australian New Zealand Clinical Trials Registry (ACTRN12618000897268).

3.3.7 Declaration of interest

The candidate was employed by as part of a research partnership between the University of Sydney SPRINTER group and the NSW Government Office of Sport. The SPRINTER group received funding from the Office of Sport to complete an annual workplan of agreed academic and policy relevant deliverables, including the evaluation of the Active Kids program. The SPRINTER group were independent from the Office of Sport and no restrictions were imposed on reporting of the evaluation findings.

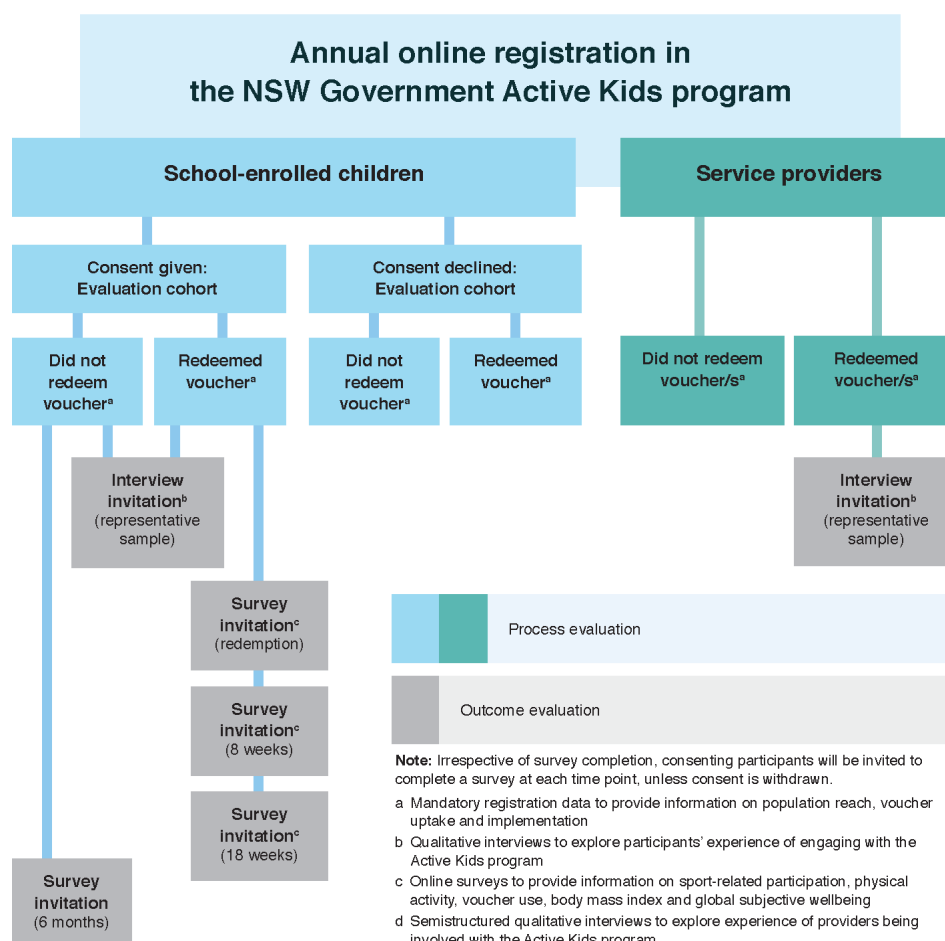
3.3.8 Study populations and participant recruitment

Three groups of participants are studied in this evaluation:

1. All children who meet program eligibility criteria and register in the Active Kids program;
2. Research participants among all registered children and their parents/caregivers that provided consent for additional follow-up research; and
3. Registered Active Kids providers that deliver structured physical activity programs to children that redeem a voucher.

The flow of participant recruitment for the three study population groups in the thesis is shown in Figure 9. School-enrolled children that registered for an Active Kids voucher all provided data for the process evaluation. The terms and conditions of the program stated that data from all participants that register for an Active Kids voucher would be included in the evaluation, including their responses to the compulsory data fields in the online government administration platform, and data on the use of their voucher, the date the child's voucher was redeemed with an approved provider and the type of activity supported by the voucher (e.g., soccer). More than 1.2 million school-enrolled children were eligible to claim a voucher on 31 January 2018. Everyone who registered for a voucher was invited to participate in research to determine the effectiveness of the Active Kids program. Participants that provided consent were invited to complete online surveys by the email used to register for a voucher. A representative sample of registered Active Kids providers were invited to participate in qualitative interviews by email. Figure 9 summarises the annual flow of participants through the study.

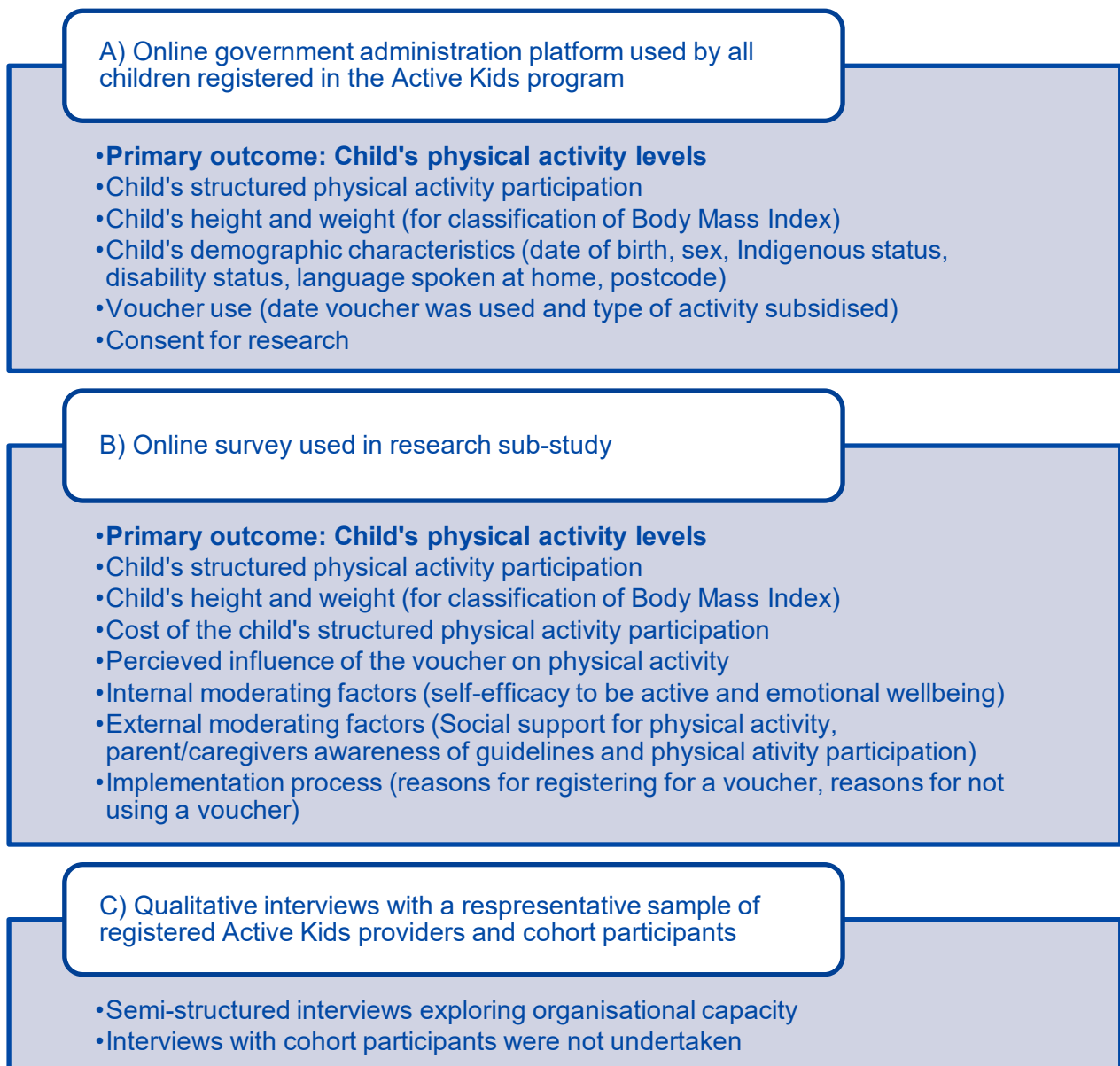
Figure 9 Flow diagram of the Active Kids evaluation protocol from Reece, Foley et. al. 2021



3.4 DATA COLLECTION TOOLS

Data were collected using three methods A) the online government administration platform used by all children who registered in the Active Kids program, B) online surveys sent to cohort participants who consented at voucher registration and C) qualitative interviews with a representative sample of registered Active Kids providers and cohort participants. Data collected through the online government administration platform were linked to the survey responses using a unique identifier. Figure 10 presents a summary of the data collection tools and the primary and secondary data collected through each method.

Figure 10 Summary of outcomes measured using each data collection method



3.4.1 Online Government Administration platform

To apply for an Active Kids voucher, all parents and caregivers completed a registration form on a bespoke online government administration platform. Information collected through the online government administration platform contributed to multiple dimensions of the RE-AIM framework. Data collected from all children was used in Chapters 4, 5, 6, and 8. The compulsory data provided by all registered children included:

3.4.1.1 *Child's physical activity levels (Primary outcome)*

- **Instrument:** Prochaska's validated 60-minutes/day single item screening measure of moderate-to-vigorous physical activity in adolescents and children(30).
- **Item:** "In a typical week, on how many days is the child physically active for at least 60 minutes? This could be made up of different activities accumulated throughout the day including walking quickly, cycling to school, organised sport and physical activities at school or an exercise class." there were 9 response options including 0–7 days, or 'not sure'.
- **Rationale:** The national physical activity recommendation for children is: 'For health benefits, children aged 5–18 years should accumulate at least 60 minutes in moderate-to-vigorous physical activity every day'; therefore, collecting the number of days children achieve 60 minutes of physical activity was determined as appropriate to assess children's physical activity levels. Prochaska's single-item measure is recommended for use in population measurement of Australian children's physical activity participation by Active Healthy Kids Australia(31). This single-item measure is regularly used in NSW research and surveillance, such as the NSW Population Health Survey and the NSW Schools Physical Activity and Nutrition Survey(4, 32). Using a consistent item with other studies provides ease of comparison.
- **Validity/Reliability information:** Prochaska, Sallis and Long developed the single item physical activity measure with adolescents in 2001(30). Scott et al. confirmed the reliability and validity with Australian adolescents(33). Our surveys were completed by-proxy, regarding children in a wider age-group (5–18 years old). A systematic review has recommended proxy measures (parent or caregiver) as appropriate for use in large population samples provided the instruments have acceptable measurement properties, particularly with younger children who may not have the cognitive ability to report their physical activity participation(34).

3.4.1.2 *Child's structured physical activity participation*

- **Instrument:** Annual sport participation item used in the AusPlay survey(35).
- **Item:** "Approximately, how many organised sessions of sport or physical activities has the child participated in, outside-of-school hours, during the last 12 months?" The parents/caregiver had the option to respond by entering the number of times in the last 12 months, number of times per month, or number of times per week.
- **Rationale:** Consistency with National Surveillance.
- **Validity/Reliability:** There are currently no recommended or consistent items used for measuring sport or structured physical activity participation in children or adolescents(36, 37). The AusPlay item has not been tested for validity or reliability but is used as the National surveillance tool by AusPlay.

3.4.1.3 *Child's Body Mass Index (BMI)*

- **Instrument:** Height and weight fields were included in the registration form however the fields were not compulsory in 2018. From 2019 onwards, entry of height and weight was a compulsory part of the registration process.
- **Classification:** BMI was calculated as weight divided by height squared (i.e., kg/m²). Each child was categorised as thin, healthy weight, overweight or obese using the International Obesity Task Force definitions(38). The International Obesity Task Force definitions provide age and sex-specific BMI cut-offs for overweight, and obesity based on representative data from six countries, and thus provide a standard international definition for categorising childhood overweight and obesity.
- **Rationale:** Assess program reach to children living with overweight or obesity in NSW.
- **Validity/Reliability:** Parent/caregiver report (proxy) of the child's height and weight is appropriate for use in large population samples. Australian parents have been found to be reasonably accurate in reporting children's height and weight(39).

3.4.1.4 *Child's demographic characteristics*

- The child's name, date of birth, sex, Indigenous status, disability status, language spoken at home, postcode. The child's school and Medicare details were also collected to confirm children's eligibility but were not shared with the research team, as it was not essential for the evaluation.

3.4.1.5 *Voucher use*

- The administration platform systematically recorded voucher use details i.e., the date the child's voucher was redeemed with an approved provider, and the type of activity it was used for. Voucher redemption data was linked with the child's registration data using a unique identifier to assess program adoption.

3.4.1.6 *Consent for research*

- Instrument: Tick box, as shown in Figure 11.

Figure 11 Screen shot of consent question on the Online Administration platform

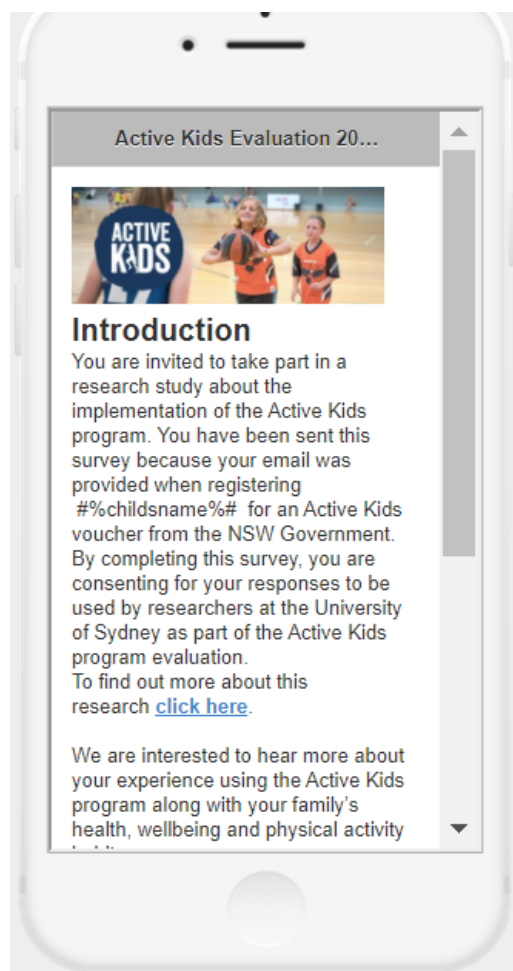
I agree to being contacted by the Office of Sport to participate in further research to determine the effectiveness of the program. I understand that I am free to withdraw my consent at any time.

3.4.2 Online survey used in research sub-study

All children who provided consent to participate in research during the registration process (Figure 11) were eligible to be invited to participate in the research sub-study. The research participants in the sub-study contributed to the outcome evaluation of the Active Kids program. Data from the online survey are reported in Chapters 5, 6 and 8.

The online survey was designed to monitor the program logic and evaluate the effect of the Active Kids voucher on children's physical activity behaviours over time, in relation to program exposure. The survey was developed specifically for the evaluation of the Active Kids program using validated self-report or proxy-report items for measurement where possible. Figure 12 displays a screen shot of what the survey looked like to participants in the research sub-study.

Figure 12 Screen shot of online survey on mobile device



The outcomes assessed and the instruments used to collect data about the child are detailed under the following subheadings. A copy of the survey questions is included in the supplementary material. In summary, measures of physical activity included the child's physical activity levels (primary outcome), structured physical activity participation, voucher activity participation, perceived influence of the voucher on physical activity and annual cost of structured physical activity participation. Measures of potential individual-level moderating factors included the child's self-efficacy to be active, and emotional wellbeing. Measures of external moderating factors included social support for physical activity, parent/caregivers' awareness of physical activity guidelines, as well as parent/caregiver physical activity levels and sport participation. Measures of the implementation process assessed the reasons for registration and reasons for not using a voucher. The child's BMI was collected in the online survey to measure changes in weight status. The primary outcome and BMI are the only measures repeated in the online survey and the administration platform.

3.4.2.1 Child's physical activity levels (primary outcome)

The identical item as collected in the administration platform(30).

3.4.2.2 Child's structured physical activity participation

- **Instrument:** Modified 3-item measure from Australia's National sport surveillance survey, AusPlay. This item was repeated if the child had participated in the voucher activity in the past week to assess their participation in the voucher activity.
- **Item:** Time in the past 7 days spent participating in structured physical activity reported in days per week (response options 0–7 days), sessions per week (response options 0–8+ sessions per week) and duration of an average session (response entered in a number entry field).

- **Rationale:** The recall of physical activity behaviours is most reliable when considered within the past 7 days(40). The item used in AusPlay would not allow differentiation between the voucher activity and all other structured participation. Therefore, the item was modified from annual recall in the source (AusPlay) to a 7-day recall of the child's participation for this study.
- **Validity/Reliability information:** There are currently no recommended or consistent items used for measuring sport or structured physical activity participation in children or adolescents. The AusPlay item has not been tested for validity or reliability but is used in the National surveillance tool by AusPlay, by the Australian Government. In AusPlay reporting, the annual sport figure is often divided into weekly session for reporting. The weekly recall modification better suited the prospective cohort study design with multiple yearly surveys.

3.4.2.3 *Child's Body Mass Index*

The identical height and weight fields as were included in the registration platform were asked in the online survey; however, responses were optional.

3.4.2.4 *Cost of the child's structured physical activity participation*

- **Instrument:** Single item from Australia's National sport surveillance survey, AusPlay.
- **Item:** "In the past 12 months, how much did you pay in total for the child's structured physical activity and sport? This includes all paid activities in the last 12 months." and a currency response field was available for numeric entry.
- **Rationale:** It was anticipated that the financial incentive (Active Kids voucher) would influence the annual amount families spent to support children's participation in structured physical activity.
- **Validity/Reliability information:** No recommended or consistent items are used to measure financial expenditure on children or adolescents' sport or structured physical activity. The AusPlay item has not been tested for validity or reliability but is used in the National surveillance tool by AusPlay, by the Australian Government however provides internal validity for Australian research. External validity of this item is questionable as it does not clearly instruct participants to exclude/include equipment, clothing and travel related costs.

3.4.2.5 *Perceived influence of the voucher on physical activity*

- **Instrument:** Developed specifically for this study.
- **Item:** "In your opinion how has the Active Kids program influenced the child's total time being physically active?" with a 5-point Likert response scale from 'Increased a lot' to 'Decreased a lot'.
- **Rationale:** Understand parent/caregivers' perception of the voucher's influence on the child's physical activity.
- **Validity/Reliability:** Not assessed.

3.4.2.6 *Internal (individual-level) potential moderating factors*

3.4.2.6.1 *Self-efficacy to be physically active*

- **Instrument:** Four items modified from questionnaires measuring social-cognitive determinants of physical activity among adolescent girls(41)

- **Item:** “Indicate the child’s degree of agreement to the following statements. The child finds being physically active fun; the child feels they can be physically active during their free time on most days; the child feels they can ask an adult (parent, carer, teacher) to be physically active with them; the child feels they can ask a friend to be physically active with them during their free time. Responses were indicated using a 5-point Likert scale from ‘Disagree a lot’ to ‘Agree a lot’.
- **Rationale:** Enhanced self-efficacy was identified in the logic model as a potential outcome of the Active Kids program. These questions only appeared to participants who indicated the child was present when the survey was being completed, so that their responses could be collected directly, not by proxy.
- **Validity/Reliability:** The original questionnaire items demonstrated factorial validity and invariance as a unidimensional measure of self-efficacy to be physically active among adolescent girls(41). Additional testing to assess validity in school aged boys and girls was not undertaken. The reliability of the questionnaire has not been assessed.

3.4.2.6.2 *Child’s emotional wellbeing*

- **Instrument:** Three items extracted from the WHO’s Health Behaviour in School-aged Children survey -KIDSCREEN 10(42), and a single item happiness measure developed specifically for this study.
- **Item:** “Thinking about the last week, how often has the child felt: Full of energy; Lonely; Unable to concentrate” response options were a 5-point Likert scale from ‘Never’ to ‘Always’.
- **Item:** “Thinking about the last week, how often has the child felt: Happy” response options were a 5-point Likert scale using smiley face slider from ‘Extremely happy’ to ‘Extremely unhappy’.
- **Rationale:** It was predicted that participation in structured physical activity would influence the children’s emotional wellbeing, therefore these items were included to measure wellbeing and happiness in participants. These questions only appeared to participants who indicated the child was present when the survey was being completed, so that their responses could be collected directly, not by proxy.
- **Validity/Reliability:** The WHO’s Health Behaviour in School-aged Children survey is widely used, and the KIDSCREEN-10 has proven reliability and criterion validity(42). Including all ten items was not feasible in this short online survey, therefore three items were used; the validity of this approach was not tested. The single item happiness question has not been tested for validity or reliability in proxy or self-report surveys.

3.4.2.7 *External moderating factors*

3.4.2.7.1 *Social support for the child’s physical activity*

- **Instrument:** Items modified from a self-report questionnaire to examine children’s perceptions of the physical activity environment at home and in the neighbourhood(43).
- **Item:** “In the last week, which of the following best represents the child’s activity, outside-of-school hours? Please select all that apply Active with:” Responses included the whole family together; male adult carer; female adult carer; grandparent/s;

sibling/s; friend/s; relatives (e.g., cousins); teammates; by them-self /alone; the child was not active.

- **Rationale:** Social support for physical activity is known to facilitate participation and may moderate the effect of the Active Kids voucher. Therefore, we included a measure of the child's social environment.
- **Validity/Reliability:** The full questionnaire is reliable and acceptable to children for assessing environmental perceptions relevant to physical activity among 11-year-old children(43). The reliability and validity of the social environment section extracted for use in the evaluation of the Active Kids program was not tested.

3.4.2.7.2 Awareness of children's physical activity guidelines

- **Instrument:** Awareness of Physical activity guidelines item from the NSW Population Health Survey.
- **Item:** "How many minutes of physical activity is it recommended that children do each day?"
- **Rationale:** Compare awareness in the Active Kids cohort to other population studies in NSW.
- **Validity/Reliability:** The instrument aligns with the NSW Population Health Survey and NSW Student Physical Activity and Nutrition Survey(4, 32).

3.4.2.7.3 Parent/caregivers achievement of physical activity guidelines

- **Instruments:** A single-item physical activity measure for adults(44).
- **Item:** "In the past week on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate? This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places but should not include housework or physical activity that may be part of your job." There were 8 response options comprising responses from 0–7 days.
- **Rationale:** To understand the relationship between adult and child physical activity levels.
- **Validity/Reliability:** The single item measure was found to be valid, reliable, and responsive to change, making it appropriate for use in program evaluation(44-47).

3.4.2.7.4 Structured physical activity participation of the parent/caregiver

- **Instrument:** modified from AusPlay.
- **Item:** "During the last 7 days, on how many days did you take part in a structured activity or sport?" There were 8 response options including 0–7 days.
- **Rationale:** To understand the relationship between adult and child physical activity levels.
- **Validity/Reliability:** The AusPlay item has not been tested for validity or reliability but is used in the Australian Government's National surveillance tool, AusPlay.

3.4.2.8 Implementation process

3.4.2.8.1 Reasons for registering for the Active Kids voucher

- **Instrument:** Developed specifically for this study.

- **Item:** “Tell us your main reasons for registering with the Active Kids program? Tick all that apply” with 12 response options and an additional ‘other field’ for participant to provide a reason that was not listed.
- **Rationale:** Understand participants reason for registering.
- **Validity/Reliability:** Not assessed.

3.4.2.8.2 Reason for not using an Active Kids voucher

- **Instrument:** Developed specifically for this study.
- **Item:** “What are the main reasons you have not redeemed the child’s Active Kids voucher? Please select all that apply” with 14 response options and an additional ‘other field’ for participant to provide a reason that was not listed.
- **Rationale:** Understand participants reason for not using a voucher.
- **Validity/Reliability:** Not assessed.

The online survey was designed to be completed by the child’s parent/caregiver, with the child present or by a child able to provide informed consent (16–18 years old). At the beginning of the survey, a question identified the relationship of the person completing the survey to the child and text was presented differently whether the child was responding or a parents/caregiver (proxy). To minimise bias, it was recommended the child was present and specific instructions were to ensure the child was asked for their response.

3.4.3 Qualitative interviews

The qualitative interviews with a representative sample of research participants and Active Kids providers were included within the research protocol to contribute to the process evaluation of the Active Kids program(18). These qualitative evaluation components were included in the evaluation design to provide an in-depth understanding of the Active Kids program on the population groups involved in the program. Qualitative interview data are reported in Chapter 7.

3.4.3.1 Research sub-study participants

Qualitative interviews with a sample of research participants were planned however were not possible during the implementation of Active Kids program(18). Therefore, no data is presented on these within this thesis. The rationale for this decision was beyond the control of the research team.

3.4.3.2 Active Kids provider's experiences

Active Kids providers represent organisations that deliver a structured physical activity program and adhere to the Active Kids Provider Guidelines. The total number of Active Kids providers registered in the Active Kids program was recorded by the online government administration platform. During the logic model development, it was unclear whether stakeholders in the sport and recreation sector would have the capacity to engage with the Active Kids program. This new program would change how school-aged children register to participate in their programs, which is a major source of revenue. The effect of these changes on the already stretched capacity of organisations to provide enjoyable, accessible, inclusive, and affordable structured physical activity programs for all was unknown. Qualitative monitoring of the expected, and unexpected impacts of the Active Kids program on Active Kids providers was essential to gain in-depth understanding of the implementation process. Registered Active Kids providers could also be invited to participate in semi-structured interviews.

The semi-structured interview guide was based on Doherty, Misener and Cuskelly's multidimensional framework of capacity in grass-roots sports clubs and co-designed by the SPRINTER group and the NSW Government Office of Sport(48). The topic guide asked stakeholders about the impacts of the Active Kids program on each dimension of the framework, namely human resources (staff, volunteers, members), finance (memberships, revenue), infrastructure (information technology, facilities), planning and development (tailored initiatives, marketing, and promotion), and external relationships (partnerships, relationship with government)(48). The topic guide also asked stakeholders about their reasons for becoming an Active Kids provider, their understanding of the program and their opinions on what worked and what didn't in the implementation process (supplementary material 2).

The semi-structured interviews were planned to be conducted annually with a representative sample of registered Active Kids using telephones or zoom and audio-recorded for analysis. During the study period (2018–2020), Active Kids providers were only invited to participate in qualitative interviews once (see Chapter 7).

3.5 SUMMARY OF THE EVALUATION METHODS

A series of studies reported in this thesis using the data collected throughout the evaluation (2018–2020). Based on the RE-AIM evaluation framework, discrete studies were conducted to address each framework dimension, with a corresponding research question. Table 5 provides an overview of how the RE-AIM framework and associated research questions have utilised the data sources described throughout the methods chapter. The study design and data analysis methods are briefly described and will be extended in the relevant chapters (Table 5).

Table 5 Summary of thesis chapters, research questions, study design, data, and analysis

RE-AIM dimension	Research question/s	Study design	Data source	Data analysis methods
Reach Chapter 4	What is the absolute number and proportion of individuals willing to participate in the NSW Active Kids program, and how representative are participants compared to the eligible population?	Cross-sectional study	Online Government Administration platform Census data(49)	Multinomial regression models to examine which demographic characteristics were associated with physical activity and participation in sessions of structured physical activity. Analysis was conducted in SAS.
Effect Chapter 5	What is the impact of using an Active Kids voucher in NSW on the number of days per week children participate in physical activity for at least 60 minutes six months after using a voucher? How does the voucher contribute to the child's weekly time and annual expenditure on structured physical activity? Are changes in physical activity participation after voucher use associated with personal and social factors in children's lives?	Prospective cohort study	Online Government Administration platform Online surveys - primary outcome and secondary outcomes.	A multivariable generalised linear mixed model (GLMM) was used to examine changes in the number of days the child participated in physical activity for at least 60 min over time (from registration to ≤8 weeks, 9–26 weeks and 6 months+ after voucher use), adjusting for all sociodemographic characteristics (sex, age, Indigenous status, disability status, language spoken at home, socio-economic status, geographic location, and BMI). A multivariable GLMM was used to determine the Active Kids voucher's contribution on children's sport participation and annual expenditure, again controlling for all sociodemographic characteristics. Bonferroni corrections for multiple comparisons were applied to GLMM analysis. Analyses were conducted in SPSS.
Adoption Chapter 6	What are the number and absolute proportion of registered children who did not use an Active Kids voucher and their reported reasons	Repeat cross-sectional study	Administration platform Online survey item - Reason for not using a voucher	The descriptive characteristics of all children registered for a voucher in 2018, 2019 and 2020 were analysed by their annual voucher redemption status (Redeemed at least one voucher, did not redeem). Odds ratios were calculated to compare the demographic

RE-AIM dimension	Research question/s	Study design	Data source	Data analysis methods
	for not redeeming it before it expired?			characteristics of children who did not redeem a voucher against children who did in each year. Survey responses from participants that provided a reason for not using a voucher were pooled and analysed by socio-demographic subgroups found to be less likely to redeem a voucher. Analyses were conducted in SPSS.
Implementation Chapter 7	To what extent did structured physical activity providers engage with the Active Kids program?	Qualitative study	Semi-structured qualitative interviews	Interviews were conducted via Zoom, audio-recorded and transcribed for analysis. The analysis was conducted using the seven stages of the Framework analysis approach. Analysis was conducted in NVivo.
Maintenance Chapter 8	What is the sustained effectiveness of using an Active Kids voucher on children's physical activity levels and participation in structured physical activity programs?	Prospective cohort study	Administration platform Online surveys - primary outcome only.	The effect of the Active Kids program on children's physical activity levels could be assessed multiple ways using the data collected in the evaluation. Multivariable generalised linear mixed models are used to assess individual-level changes in children's physical activity participation in two different cohorts of participants. Analyses were conducted in SAS.

3.5.1 Practical considerations within the Active Kids program

Ultimately, the NSW Minister for Sport, the Hon. Stuart Ayres finalised all aspects of the Active Kids program design; the researchers did not have control over the design or delivery of the intervention. The evaluation design and protocol evolved as the intervention was being designed during 2017, requiring the research team to adapt the protocol as the NSW Government Office of Sport made policy decisions. A critical decision influencing the evaluation design was the definition of which children and adolescents would be eligible to participate in the Active Kids program. The NSW government decided the Active Kids program would be a universal voucher program available to all school-enrolled children in NSW. This decision influenced the evaluation design, with comparison regions or phased (step-wedge) evaluation designs directly less feasible. The possibility of delaying the availability of the intervention to any children or adolescents to add rigour to the research design was not acceptable. Pragmatism was critical to capture evaluation data.

The centralised administration platform also influenced the evaluation design. The voucher registration and redemption processes were conducted through a bespoke online government administration platform hosted by a government agency separate from the NSW Office of Sport, known as Service NSW. Policymakers conducted consultations and pilot tests with State Sporting Organisations to refine the government platform and ensure that it could integrate with stakeholders' registration and membership systems. Pilot tests of the registration platform's functionality were also conducted with parents/caregivers of school-aged children. Modifications to refine the administration platform occurred regularly before the launch of the Active Kids program; the SPRINTER group regularly assessed how changes to the administration platform might influence the evaluability of the Active Kids program against the logic model. The functionality of the platform to record process and outcome metrics was paramount, yet the researchers were not directly involved in building the platform. Through regular engagement with policymakers, both process and outcome evaluation metrics were embedded within the NSW Government's bespoke administration platform for the Active Kids program.

The political and economic context also influenced how the evaluation was conducted. In 2018, a conservative government launched the Active Kids program with the Hon. Stuart Ayres as the Minister for Sport. In 2019, a state election was held, and the conservative government was re-elected. Protocols around the election however limited the time available for data collection as the government was in a care-taker period where communication to voters is restricted. After the election, the Premier revised the Cabinet structure and appointed a different Minister for Sport, the Hon. John Sidoti, who served for 168 days before being replaced by the Hon. Geoff Lee who was an acting Minister for Sport during the remainder of 2019 and 2020. This change in Minister and lack of an appointed Minister for Sport during 2019 and 2020 created challenges for the qualitative data collection projects which had not been scheduled into the SPRINTER workplan beyond June 2019.

3.5.2 Influence of the COVID-19 pandemic on the evaluation

In March 2020, COVID-19 was declared a global public health pandemic by the WHO. Governments responded in various ways; locking down cities, imposing stay at home restrictions, implementing school closures, cancelling face-to-face structured physical activity programs, all to prevent the spread of infection and reduce COVID-19 mortalities(50). The COVID-19 pandemic had substantial influences on children's physical activity, health, and wellbeing which may have influenced the results observed in 2020(50, 51). The COVID-19 pandemic may have influenced the findings presented in Chapters 6 and 8.

3.5.3 Limitations

The candidate did not have control over the design or implementation of the Active Kids program. The natural experiment approach allowed the evaluation to be conducted in a flexible and pragmatic way in partnership with the NSW Government and key stakeholders. Consistent with other natural experiments at the scale of the Active Kids program, we were unable to establish a comparison group. The absence of a comparison group means these studies will not prove whether financial incentives provide evidence that is consistent with a direct causal influence on school-aged children's physical activity levels.

Regarding the use of self-report surveys in the cohort study, the use of self-report data (often reported by-proxy through parent/caregiver) is prone to social desirability bias and recall bias(52). Pre-test sensitisation could inflate the effects of the intervention through repeated use of the measurement tool, but this cannot be avoided. Future studies should strive to use device-based measurements to monitor changes in physical activity. Furthermore, validated survey items for all ages (4.5–18 years) included in our study and tested with proxy-report were not available. Further research should continue strengthening the tools available for evaluating scaled-up interventions for children of all ages.

The online government administration platform also included a question collecting active consent from parents/caregivers registering their child in the Active Kids program asking consent for participation in additional research. The published protocol for the evaluation was designed using a rolling recruitment method with the expectation that the bespoke Government platform would integrate with the survey administration platform to allow automated, time-sensitive data collection after participants used an Active Kids voucher, or if they had not redeemed a voucher within six months of registering(18). Unfortunately, due to technical issues connecting the database and survey platform the rolling recruitment strategy was not established. A decision was made to adjust the research protocol and invite all participants to complete a survey (by-proxy through parent/caregiver) at specific time points throughout the year.

The qualitative data collection was not feasible to conduct to the intended level (annual and with Active Kids providers and Cohort participants). The influence of conducting evaluations within a political context, with ongoing changes in leadership and government priorities, should be considered and resourced sufficiently in future studies with a defined timeline. The pragmatic approach in evaluating this natural experiment was central to understanding the long-term influences of the Active Kids program for children and adolescents.

3.6 DISCUSSION

The Active Kids evaluation is comprehensive compared to the only other known government-led financial incentives programs that aimed to increase school age children's physical activity participation described in peer-reviewed literature — the evaluation approach taken by these financial incentives are summarised below.

- I. The research report described the “KOMM! In den Sportverein” intervention that was implemented in Saxony, Germany(53). All Grade 3 students were given a voucher by their teacher to reduce the cost of registration in a sports club outside-of-school; the voucher was valued to meet the average cost of registration in sports clubs in Saxony. This intervention was not studied at the time of implementation, and information regarding the implementation process was not well recorded (e.g., vouchers were on paper slips which could not be linked to individual children). Ten years after the intervention had ceased, local researchers designed a study to investigate post-hoc if the financial incentive program affected children who received a voucher. They

undertook a cross-sectional survey and medical records to compare physical activity and sports club involvement in children that received the financial incentive compared to those in a comparable town(53).

- II. The Canadian Fitness Tax Credit (CFTC) was implemented in Canada for a decade(54-59). Parents and caregivers of children aged 2–16 years old were eligible to claim the CFTC at tax-time if they kept the receipts from payment for the child to participate in structured physical activity programs and associated equipment or uniforms. Multiple studies were undertaken during the implementation period, which found similar results — the CFTC “helped make the rich richer” and did not reduce the cost barrier to participation in sports for low-income families(54-60). One study investigating the effects of the CFTC conducted secondary analysis of device-measured physical activity at three cross sectional time-points in school aged children in Alberta Canada; they found no significant impact of the CFTC on the children’s physical activity(60).

Neither the German voucher program nor the CFTC used an a priori evaluation framework to guide their studies. The evaluation of these interventions were conducted without involving the government agencies leading the implementation. These studies only collected quantitative data and provide insufficient evidence to determine the effectiveness of large-scale financial incentive programs in overcoming the cost barrier to school-aged children’s participation in structured physical activity. There is a clear need to conduct good quality, comprehensive evaluations of large-scale financial incentives on school-aged children’s physical activity levels. The RE-AIM evaluation framework and a logic model were used to guide the evaluation of the Active Kids program. These tools enabled stakeholders to agree on the key aspects of the intervention that required monitoring in order to understand if the program achieved its objectives (see section 3.2). The SPRINTER group published a research protocol which recorded the intended evaluation approach for this natural experiment(61).

3.7 CONCLUSIONS

The Active Kids program is a government-led financial incentive (voucher) intervention which aimed to reduce the cost barrier to participation in structured physical activity programs for school-aged children in NSW. This large-scale financial incentive program provided a unique opportunity to understand the influence of government activities on physical activity participation using a natural experiment. This chapter described the rigorous, yet pragmatic evaluation approach integrated into the Active Kids program. By adopting an evaluation framework, a comprehensive understanding of the implementation process and program outcomes will be gained through this evaluation study. The nested prospective cohort study will enable the long-term effects of the intervention to be explored. This natural experiment will also generate timely evidence to inform modifications to the Active Kids program during implementation to increase school-aged children’s physical activity levels.

The Active Kids evaluation approach will help increase current knowledge on designing and implementing complex, yet pragmatic evaluations with policymakers, while maintaining independence. It is important to note that the cross-government steering committee has undertaken additional evaluation studies on the program, to which the research in this thesis made a large contribution. The government evaluations are not publicly available but include the exploration of the Active Kids uptake in specific schools using confidential Government data in partnership with the NSW Department of Education and an economic evaluation.

This chapter has described the Active Kids program and the methods adopted to evaluate the program. The value of conducting natural experiments, the importance of using evaluation

frameworks and adopting theory-driven approaches were described along with how the Active Kids program evaluation adopted these strategies to design a rigorous evaluation. The RE-AIM framework and its five dimensions were defined, which provide the structure to report the evaluation findings in this thesis. This chapter also presented the research questions, data collection tools, analytical methods for Chapters 4-8. The following chapters present studies on specific dimensions of the RE-AIM framework as part of the Active Kids program evaluation.

3.8 REFERENCES

1. Wutzke S, Morrice E, Benton M, Milat A, Russell L, Wilson A. Australia's National Partnership Agreement on Preventive Health: Critical reflections from States and Territories. *Health Promotion Journal of Australia*. 2018;29(3):228-35.
2. Innes-Hughes C, Rissel C, Thomas M, Wolfenden L. Reflections on the NSW Healthy Children Initiative: a comprehensive state-delivered childhood obesity prevention initiative. *Public Health Research & Practice*. 2019.
3. Health Stats. Overweight and obesity in children. Sydney: Centre for Epidemiology and Evidence, NSW Ministry of Health; 2021 [Available from: <https://www.healthstats.nsw.gov.au/#/indicator?name=-beh-bmi-cat-oo-kid-phs&location=NSW&view=Trend&measure=prevalence&groups=Sex&compare=Sex&filter=Sex,Boys,Girls,Boys%20and%20girls>].
4. Hardy LL MS, Drayton BA, Bauman, A. . NSW Schools Physical Activity and Nutrition Survey (SPANS) 2015: Full Report. Sydney: NSW Department of Health; 2016.
5. Bellew B, Young, S. Voucher schemes to promote increased participation in sport and active recreation: rapid evidence review for the NSW Office of Sport.: SPRINTER Group, The University of Sydney; 2017.
6. NSW Government. NSW Budget Statement 2017-2018. In: Treasury N, editor. 2017.
7. NSW Government Office of Sport. Active Kids: NSW Government; 2018 [Available from: <https://sport.nsw.gov.au/sectordevelopment/activekids>].
8. Ogilvie D, Adams J, Bauman A, Gregg EW, Panter J, Siegel KR, et al. Using natural experimental studies to guide public health action: turning the evidence-based medicine paradigm on its head. *Journal of epidemiology and community health*. 2020;74(2):203-8.
9. Crane M, Bohn-Goldbaum E, Grunseit A, Bauman A. Using natural experiments to improve public health evidence: a review of context and utility for obesity prevention. *Health Research Policy and Systems*. 2020;18(1):48.
10. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ*. 2008;337:a1655.
11. Craig P, Cooper C, Gunnell D, Haw S, Lawson K, Macintyre S, et al. Using natural experiments to evaluate population health interventions: new Medical Research Council guidance. *J Epidemiol Community Health*. 2012;66(12):1182-6.
12. Barte JCM, Wendel-Vos GCW. A Systematic Review of Financial Incentives for Physical Activity: The Effects on Physical Activity and Related Outcomes. *Behavioral Medicine*. 2017;43(2):79-90.
13. Luong M-LN, Hall M, Bennell KL, Kasza J, Harris A, Hinman RS. The Impact of Financial Incentives on Physical Activity: A Systematic Review and Meta-Analysis. *American Journal of Health Promotion*. 2020:0890117120940133.
14. Mitchell MS, Goodman JM, Alter DA, John LK, Oh PI, Pakosh MT, et al. Financial Incentives for Exercise Adherence in Adults: Systematic Review and Meta-Analysis. *American Journal of Preventive Medicine*. 2013;45(5):658-67.

15. Mitchell MS, Orstad SL, Biswas A, Oh PI, Jay M, Pakosh MT, et al. Financial incentives for physical activity in adults: systematic review and meta-analysis. *British Journal of Sports Medicine*. 2020;54(21):1259-68.
16. Vlaev I, King D, Darzi A, Dolan P. Changing health behaviors using financial incentives: a review from behavioral economics. *BMC Public Health*. 2019;19(1):1059.
17. Owen KB, Nau T, Reece LJ, Bellew W, Rose C, Bauman A, et al. Fair play? Participation equity in organised sport and physical activity among children and adolescents in high income countries: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*. 2022;19(1):27.
18. Reece LJ, Foley BC, Bellew B, Owen K, Cushway D, Srinivasan N, et al. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.
19. United Nations Evaluation Group. Norms and Standards for Evaluation. New York: UNEG; 2016.
20. Bauman A, Nutbeam D. Planning and evaluating population interventions to reduce noncommunicable disease risk - reconciling complexity and scientific rigour? *Public Health Res Pract*. 2014;25(1).
21. Fynn JF, Hardeman W, Milton K, Jones AP. A scoping review of evaluation frameworks and their applicability to real-world physical activity and dietary change programme evaluation. *BMC Public Health*. 2020;20(1):1000.
22. Fynn JF, Hardeman W, Milton K, Murphy J, Jones A. A systematic review of the use and reporting of evaluation frameworks within evaluations of physical activity interventions. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):107.
23. Glasgow RE, Harden SM, Gaglio B, Rabin B, Smith ML, Porter GC, et al. RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*. 2019;7.
24. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322-7.
25. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
26. Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC public health*. 2016;16:890.
27. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ : British Medical Journal*. 2015;350:h1258.
28. Bronfenbrenner U. *The Ecology of Human Development*: Harvard University Press; 1979.

29. Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*. 2021;374:n2061.
30. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155(5):554-9.
31. Active Healthy Kids Australia. Active Healthy Kids Australia. Is Sport Enough? The 2014 Active Healthy Kids Australia Report Card on Physical Activity for Children and Young People. 2014.
32. NSW Ministry of Health. New South Wales Population Health Survey. Child Population Health Survey. Sydney: New South Wales Government; 2005.
33. Scott JJ, Morgan PJ, Plotnikoff RC, Lubans DR. Reliability and validity of a single-item physical activity measure for adolescents. *J Paediatr Child Health*. 2015;51(8):787-93.
34. Lubans DR, Hesketh K, Cliff DP, Barnett LM, Salmon J, Dollman J, et al. A systematic review of the validity and reliability of sedentary behaviour measures used with children and adolescents. *Obesity Reviews*. 2011;12(10):781-99.
35. Australian Sports Commission. AusPlay: Survey Questions. Canberra: Australian Sports Commission; 2016.
36. Aubert S, Brazo-Sayavera J, González SA, Janssen I, Manyanga T, Oyeyemi AL, et al. Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: a narrative review. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):81.
37. Željko Pedišić AZ, Louise L. Hardy, Jo Salmon, Anthony D. Okely, Josephine Chau, Hidde P. van der Ploeg, Adrian Bauman. Physical activity prevalence in Australian children and adolescents: Why do different surveys provide so different estimates, and what can we do about it? *Kinesiology*. 2017;49(2):135-45.
38. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity*. 2012;7(4):284-94.
39. Chai LK, Collins CE, May C, Holder C, Burrows TL. Accuracy of Parent-Reported Child Height and Weight and Calculated Body Mass Index Compared With Objectively Measured Anthropometrics: Secondary Analysis of a Randomized Controlled Trial. *J Med Internet Res*. 2019;21(9):e12532.
40. Kohl HW, Fulton JE, Caspersen CJ. Assessment of Physical Activity among Children and Adolescents: A Review and Synthesis. *Preventive Medicine*. 2000;31(2):S54-S76.
41. Motl RW, Dishman RK, Trost SG, Saunders RP, Dowda M, Felton G, et al. Factorial validity and invariance of questionnaires measuring social-cognitive determinants of physical activity among adolescent girls. *Preventive medicine*. 2000;31(5):584-94.
42. Ravens-Sieberer U, Erhart M, Rajmil L, Herdman M, Auquier P, Bruil J, et al. Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. *Qual Life Res*. 2010;19(10):1487-500.
43. Hume C, Ball K, Salmon J. Development and reliability of a self-report questionnaire to examine children's perceptions of the physical activity environment at home and in the

neighbourhood. *The international journal of behavioral nutrition and physical activity*. 2006;3:16.

44. Milton K, Bull FC, Bauman A. Reliability and validity testing of a single-item physical activity measure. *British journal of sports medicine*. 2011;45(3):203-8.

45. Milton K, Clemes S, Bull F. Can a single question provide an accurate measure of physical activity? *British Journal of Sports Medicine*. 2013;47(1):44.

46. O'Halloran P, Kingsley M, Nicholson M, Staley K, Randle E, Wright A, et al. Responsiveness of the single item measure to detect change in physical activity. *PLOS ONE*. 2020;15(6):e0234420.

47. Wanner M, Probst-Hensch N, Kriemler S, Meier F, Bauman A, Martin BW. What physical activity surveillance needs: validity of a single-item questionnaire. *Br J Sports Med*. 2014;48(21):1570-6.

48. Doherty A, Misener K, Cuskelly G. Toward a Multidimensional Framework of Capacity in Community Sport Clubs. *Nonprofit and Voluntary Sector Quarterly*. 2013;43(2_suppl):124S-42S.

49. Australian Bureau of Statistics. Australian Census 2016 [Available from: <https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Census?OpenDocument&ref=topBar>].

50. Reece LJ, Owen KB, Foley BC, Rose C, Bellew W, Bauman AE. Understanding the impact of COVID19 on children's physical activity levels in NSW, Australia. *Health Promotion Journal of Australia*. 2020.

51. Neville RD, Lakes KD, Hopkins WG, Tarantino G, Draper CE, Beck R, et al. Global Changes in Child and Adolescent Physical Activity During the COVID-19 Pandemic: A Systematic Review and Meta-analysis. *JAMA Pediatrics*. 2022;176(9):886-94.

52. Hidding LM, Chinapaw MJM, van Poppel MNM, Mokkink LB, Altenburg TM. An Updated Systematic Review of Childhood Physical Activity Questionnaires. *Sports Medicine*. 2018;48(12):2797-842.

53. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. *ZA Institute of Labor Economics*. 2021(14246).

54. von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *American journal of public health*. 2011;101(8):e10-6.

55. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC public health*. 2010;10:356.

56. Fisher K, Von Tigerstrom B, Larre T, Mawani A, Cameron C, Chad K, et al. The children's fitness tax credit (CFTC): Awareness and use in the first three years (2007-2009). *Canadian Journal of Diabetes*. 2013;37(SUPPL. 2):S224.

57. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of physical activity & health*. 2021;18(9):1067-73.

58. Lott DMDFR. Report on Federal Tax Expenditures - Concepts, Estimates and Evaluations 2017. Department of Finance Canada; 2017.

59. Spence JC, Holt NL, Sprysak CJ, Spencer-Cavaliere N, Caulfield T. Non-refundable tax credits are an inequitable policy instrument for promoting physical activity among Canadian children. *Can J Public Health*. 2012;103(3):175-7.
60. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.
61. Reece LJ, Foley, B.C ., Bellew, B ., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.

4 POPULATION REACH OF THE ACTIVE KIDS PROGRAM

4.1 CHAPTER OUTLINE

This chapter addressed the first dimension of Glasgow's RE-AIM framework — Reach. Understanding the number and proportion of eligible school-aged children that engaged with the Active Kids voucher program, and how representative the participants are compared to the eligible population is important. This chapter compares the information collected from all children that registered for an Active Kids voucher in 2018 to census data on all eligible children in NSW (n = 1,263,454). In addition to reach, correlates of physical activity and structured physical activity participation are explored among this large sample of school-aged children. This study has been published in the International Journal of Environmental Research and Public Health's special issue on Promoting Health: Physical Activity and Well-Being in Children and Adolescents and can be [accessed online here](#).

The citation for this publication is: **Bridget C. Foley**, Katherine B. Owen, William Bellew, Luke Wolfenden, Kathryn Reilly, Adrian E. Bauman, and Lindsey J. Reece. 2020. "Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach?" International Journal of Environmental Research and Public Health 17, no. 16: 5691.

The peer-reviewed publication is included herein.



Article

Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach?

Bridget C. Foley ^{1,*} , Katherine B. Owen ¹, William Bellew ¹ , Luke Wolfenden ², Kathryn Reilly ², Adrian E. Bauman ¹ and Lindsey J. Reece ¹

¹ SPRINTER, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney, D17 Charles Perkins Centre, Level 6, the Hub, Camperdown, NSW 2006, Australia; katherine.owen@sydney.edu.au (K.B.O.); william.bellew@sydney.edu.au (W.B.); adrian.bauman@sydney.edu.au (A.E.B.); lindsey.reece@sydney.edu.au (L.J.R.)

² The School of Medicine and Public Health, The University of Newcastle, Callaghan, NSW 2308, Australia; luke.wolfenden@health.nsw.gov.au (L.W.); kathryn.reilly@health.nsw.gov.au (K.R.)

* Correspondence: bridget.foley@sydney.edu.au

Received: 15 July 2020; Accepted: 5 August 2020; Published: 6 August 2020



Abstract: Active Kids is a government-led, universal voucher program that aims to reduce the cost of participation in structured physical activity for all school-enrolled children in New South Wales (NSW), Australia. As part of the Active Kids program evaluation, this cross-sectional study examined the Active Kids' program's reach to children in NSW and their physical activity behaviors, before voucher use. Demographic registration data from all children (4.5–18 years old) who registered for an Active Kids voucher in 2018 ($n = 671,375$) were compared with Census data. Binary and multinomial regression models assessed which correlates were associated with meeting physical activity guidelines and participation in the sessions of structured physical activity. The Active Kids program attracted more than half (53%) of all eligible children in NSW. Children who spoke a primary language other than English at home, were aged 15–18 years old, lived in the most disadvantaged areas, and girls, were less likely to register. Of the registered children, 70% had attended structured physical activity sessions at least once a week during the previous 12 months, whilst 19% achieved physical activity guidelines. Active Kids achieved substantial population reach and has the potential to improve children's physical activity behaviors.

Keywords: financial incentive; policy; organized sport

1. Introduction

Physical activity is associated with many health and wellbeing benefits [1,2]. For those aged 5–17 years, 60 min of moderate to vigorous intensity each day is recommended [3,4]. Guthold et al. estimated that most (81%) Australian children failed to meet physical activity guidelines [5]. Children may accumulate physical activity in various ways through activities of daily living, including school, active travel, and recreational physical activities, including play and structured sessions (e.g., sport, active recreation) [6]. Structured physical activities involve moderate to vigorous intensity activity and develop a range of physical, psychological, social, and cognitive skills required to lead a healthy life [1,2]. It is estimated that 47% of Australian children participate in less than one session of structured physical activity outside of school each week [7]. As age increases, participation in structured physical activity decreases, often remaining low throughout adulthood. A variety of people, communities, organizations, policies, and the wider environmental factors create barriers to structured physical

activity participation in Australia. There is a need to increase structured physical activity participation during childhood and facilitate lifelong participation behaviors [8].

Effective government policies and interventions that aim to overcome systemic barriers to positive health behaviors are vital but, take time to implement and scale-up [9]. Although government-led actions have the potential to alter environments or social norms, these approaches are often met with resistance from the private sector or community organizations. For example, government taxation on tobacco products is proven to change purchasing behaviors and reduce smoking rates, yet some nations are taking a long time to implement this effective approach. Resistance to public policy interventions occurs when a profitable organization or group is likely to be negatively impacted by the positive public health intervention, or when there is limited community support. Such resistance can slow implementation, reduce the potential reach and mediate the expected effects [9]. Where health promoting government-led interventions are passed and implemented, comprehensive evaluations are important to continue advancing public health [10]. It is widely accepted that understanding reach is a critical part of evaluation, among other factors described by Glasgow et al. [11]. Reach should measure the number and characteristics of people who engage and whether they are representative of the target population faced by the barriers which the policy or the intervention aims to overcome [11].

In the context of children's structured physical activity participation, financial incentive interventions that aim to reduce the cost of structured physical activity participation have gained political interest [12]. Cost is a major barrier that is stopping children from starting or continuing to participate in structured physical activities [13]. A previous example of a financial incentive for children's structured physical activity implemented and evaluated, at scale, is the Canadian Fitness Tax Credit. Findings showed limited reach to children residing in disadvantaged areas [14]. The tax credit reached 12.3% of the eligible population in the first year, unfortunately limiting reach to those who would benefit most in disadvantaged areas [14].

In Australia, the New South Wales (NSW) Government, invested in a universal financial incentive voucher program entitled 'Active Kids' [15,16]. The Active Kids voucher was offered to all school-enrolled children in NSW (4.5–18 years old), commencing 31 January 2018 [17]. Each voucher provides AUD\$100 towards the cost of an ≥ 8 -week membership or registration fee, with approved structured activity providers. Structured physical activities include opportunities delivered through an organization, which involve physical exertion, skill and/or hand-eye coordination as the primary focus of the activity [8]; but elements of competition are not essential. These might be undertaken as team or individual pursuits, such as sport participation (e.g., Football, Swimming, Athletics, Tennis) or active recreation (e.g., Dance, Martial Arts, bush survival skills, etc.). A complex pragmatic evaluation was integrated within the design of the Active Kids program from the outset [16]. This study examined the Active Kids registration data to understand the program reach. Physical activity behaviors of registered children in NSW were examined, with consideration also given to the correlates of physical activity. The subsequent implementation and efficacy of the Active Kids voucher program are reported separately.

2. Materials and Methods

This study adopted a cross-sectional study design. All school-enrolled children (4.5–18 years old, $N = 1,263,454$) who lived in NSW and held a valid Australian universal healthcare number [18], were eligible for an Active Kids voucher between 31 January and 31 December 2018. Parents or carers registered children in the Active Kids program through a bespoke online government platform, which included standardized demographic data, physical activity, and health indicators. All registration data were extracted from the NSW Office of Sport registration database. The University of Sydney Human Research Ethics committee approved all ethical aspects of this study (Reference number: 2017/946).

Standardized demographic questions in the Active Kids registration form were sourced from government surveillance tools to ensure comparability and validity [19,20]. Demographic characteristics collected included child age, sex, primary language spoken at home, Aboriginal identity, disability

status, socioeconomic status (SES), and remoteness. Disability status included physical, sensory, intellectual, psychiatric, or other health-related disabilities. SES was determined using postcode of residence and categorized using the Socio-Economic Index for Area, specifically the Index of Relative Socio-Economic Disadvantage [21], which ranks areas in Australia according to relative socioeconomic disadvantage. Remoteness was assessed using postcode of residence and categorized using the Accessibility and Remoteness Index of Australia (ARIA+). ARIA+ groups areas on the basis of relative access to services, into major city, inner regional, outer regional, or remote [22].

Achievement of physical activity guidelines was assessed using a single item question reported by the parent or the carer [23]. The item asked, “In a typical week, how many days was the child physically active for at least 60 min?” Response options were days between ‘0–7’ days or ‘not sure’. There is evidence that this is a valid and reliable self-report measure of physical activity in adolescents [23]. Children were classified as meeting physical activity guidelines if ‘7 days’ was selected [3,4,23].

Participation in sessions of structured physical activity was measured using a single item reported by the parent or carer [20]. The item asked, “Approximately, how many organized sessions of sport or physical activities has the child participated in, outside of school hours, during the last 12 months?” The parent or carer had the option to respond by entering the number of times in the last 12 months, number of times per month, or number of times per week. Children were classified into the following five categories by dividing the number of annual session by 52 for a weekly average number of sessions—‘no participation’ (0 sessions/year), ‘at least once a month’ (<52 session/year), ‘at least once a week’ (52–103 session/year), ‘at least twice a week’ (104–207 sessions/year), ‘at least four times a week’ (≥ 208 sessions/year).

Parent/carer reported that the child height and weight were non-mandatory fields in the registration form. Height and weight were used to calculate Body Mass Index (BMI) for each child, which was categorized as thin, healthy weight, overweight, or obese, using the International Obesity Taskforce definitions [24].

Frequencies and proportions for demographic characteristics were calculated for all children in NSW and those who registered in the Active Kids program. Characteristics of eligible children were compared against the National 2016 census conducted by the Australian Bureau of Statistics [25]. Due to the large sample size, all associations between covariates and physical activity were significant. Therefore, proportional reporting ratios (PRR) were then calculated to better characterize the magnitude of differences between all eligible children and those registered in the program [26].

Binary logistic regression models were conducted to determine the demographic characteristics that were associated with meeting the physical activity guidelines, and the multinomial regression models to examine which demographic characteristics were associated with participation in sessions of structured physical activity. Analyses were performed in SAS Enterprise Guide 9.4 (SAS Institute, Cary, NC, USA).

3. Results

Between 31 January and 31 December 2018, 671,705 (53%) of all eligible school-enrolled children in NSW registered for an Active Kids voucher (Table 1). Active Kids achieved greater reach amongst young children (4–11 years old), children who identify as Aboriginal/Torres Strait Islander, who speak English at home, and who identified as having a disability. Boys registered in similar proportions to the total population while fewer eligible girls registered for a voucher. Children who spoke a primary language other than English at home, were aged 15–18 years old, lived in socio-economically disadvantaged areas, and girls, were less likely to be registered for an Active Kids voucher. Similar proportions of children from major cities, inner regional, and outer regional/remote areas registered in the Active Kids program. Census data for BMI was not available, however, 306,450 (46%) participants voluntarily chose to provide height and weight data.

Table 1. Reach of the Active Kids program in New South Wales.

Demographic Characteristics	All Eligible Children in New South Wales N = 1,263,454		Children who Registered in the Active Kids in 2018 N = 671,375 (53.2%)		Difference Between Groups
	N	%	N	%	PRR
Age category					
4–8 years	378,787	30.0	269,457	71.1	1.3
9–11 years	274,038	21.7	185,931	67.8	1.3
12–14 years	258,828	20.5	138,063	53.3	1.0
15–18 years	351,801	27.8	77,924	22.2	0.4
Sex *					
Boys	648,759	51.3	361,852	55.8	1.0
Girls	614,695	48.7	308,543	50.2	0.9
Primary language spoken at home					
English	953,924	75.5	621,535	65.2	1.2
Other	309,530	24.5	50,140	16.2	0.3
Aboriginal identity					
Aboriginal/Torres Strait Islander	59,554	4.7	36,129	60.7	1.1
Non-Aboriginal/Torres Strait Islander	1,203,900	95.3	626,688	52.1	1.0
Prefer not to say			8558		
Disability					
Yes	31,705	2.5	17,715	55.9	1.1
No	1,169,846	92.6	644,658	55.1	1.0
Prefer not to say			9002		
Socio-economic status ^					
1st quartile (Most disadvantaged)	263,911	20.9	99,583	37.7	0.7
2nd quartile	290,625	23.0	140,302	48.3	0.9
3rd quartile	334,919	26.5	158,783	47.4	0.9
4th quartile (Most advantaged)	373,455	29.6	200,566	53.7	1.0
Missing			72,141		
Location ^					
Major City	935,525	74.0	440,793	47.1	0.9
Inner Regional	257,961	20.4	126,594	49.1	0.9
Outer Regional and remote	69,943	5.5	32,622	46.6	0.9
Missing			71,366		
Body Mass Index Category					
Thin	NA		35,357		
Healthy weight	NA		195,166		
Overweight	NA		52,675		
Obesity	NA		23,252		
Missing	1,263,454	100.0	365,255	28.9	0.5

* Some Active Kids participants did not report sex (<0.2%). ^ Some postcodes were missing or invalid (11% for socioeconomic status) (11% for geographic location). NA: Data not available from the national Census [25].

Correlates of Physical Activity and Structured Physical Activity Participation

Of the children who registered for an Active Kids voucher, 19.3% ($n = 129,292$) achieved health enhancing physical activity guidelines (Table 2). Most children (92%, $n = 618,733$) reported having participated in structured physical activity sessions outside-of-school during the past 12 months; 15.1% participated in structured physical activity sessions at least four times a week, 22.0% participated at least twice a week, 32.5% participated at least once a week, and 22.6% at least once a month (Table 2). Children who participated in more structured physical activity sessions had greater odds of meeting physical activity guidelines (Table 2).

Table 2. Odds ratios of children at registration meeting physical activity guidelines and participating in structured physical activities.

Characteristic	Physical Activity		Structured Physical Activity Participation		
	Met Guidelines Odds Ratio (95% CIs)	At least Once a Month Odds Ratio (95% CIs)	At least Once a Week Odds Ratio (95% CIs)	At least Twice a Week Odds Ratio (95% CIs)	At least Four Times a Week Odds Ratio (95% CIs)
Total N (%)	129,292 (19.3%)	151,758 (22.6%)	217,963 (32.5%)	147,696 (22.0%)	101,316 (15.1%)
Physical Activity Guidelines					
Met guidelines	**	1.05 (0.99, 1.11)	1.26 (1.20, 1.34)	1.76 (1.67, 1.86)	3.88 (3.67, 4.10)
Age category					
4–8	Ref	Ref	Ref	Ref	Ref
9–11	0.69 (0.68, 0.71)	1.21 (1.16, 1.27)	1.42 (1.36, 1.49)	1.88 (1.79, 1.97)	3.15 (3.00, 3.30)
12–14	0.47 (0.47, 0.48)	1.24 (1.17, 1.31)	1.44 (1.37, 1.52)	2.01 (1.90, 2.12)	4.02 (3.81, 4.25)
15–18	0.39 (0.38, 0.40)	1.19 (1.11, 1.28)	1.38 (1.29, 1.47)	1.89 (1.77, 2.03)	4.01 (3.74, 4.30)
Sex					
Boys	Ref	Ref	Ref	Ref	Ref
Girls	0.61 (0.60, 0.61)	0.88 (0.85, 0.92)	0.83 (0.80, 0.86)	0.82 (0.79, 0.85)	0.79 (0.77, 0.83)
Primary language spoken at home					
English	Ref	Ref	Ref	Ref	Ref
Other	0.68 (0.67, 0.7)	0.60 (0.57, 0.63)	0.47 (0.44, 0.49)	0.35 (0.33, 0.37)	0.23 (0.22, 0.25)
Aboriginal identity					
Aboriginal/Torres Strait Islander	1.31 (1.28, 1.35)	1.03 (0.95, 1.10)	0.69 (0.64, 0.74)	0.66 (0.61, 0.71)	0.76 (0.70, 0.82)
Non-Aboriginal/Torres Strait Islander	Ref	Ref	Ref	Ref	Ref
Disability					
Yes	0.88 (0.84, 0.91)	0.59 (0.54, 0.64)	0.38 (0.35, 0.41)	0.28 (0.26, 0.3)	0.21 (0.19, 0.22)
No	Ref	Ref	Ref	Ref	Ref
Socio-economic status					
1st quartile (Most disadvantaged)	Ref	Ref	Ref	Ref	Ref
2nd quartile	1.09 (1.07, 1.11)	1.31 (1.24, 1.38)	1.63 (1.54, 1.71)	1.70 (1.61, 1.80)	1.70 (1.61, 1.80)
3rd quartile	1.08 (1.06, 1.10)	1.54 (1.47, 1.63)	2.17 (2.06, 2.28)	2.31 (2.19, 2.43)	2.22 (2.10, 2.34)
4th quartile (Most advantaged)	1.16 (1.13, 1.18)	2.14 (2.02, 2.27)	3.69 (3.49, 3.91)	4.27 (4.02, 4.52)	4.11 (3.87, 4.36)

Table 2. Cont.

Characteristic	Physical Activity	Structured Physical Activity Participation			
	Met Guidelines Odds Ratio (95% CIs)	At least Once a Month Odds Ratio (95% CIs)	At least Once a Week Odds Ratio (95% CIs)	At least Twice a Week Odds Ratio (95% CIs)	At least Four Times a Week Odds Ratio (95% CIs)
Location					
Major Cities	Ref	Ref	Ref	Ref	Ref
Inner Regional	1.37 (1.34, 1.39)	1.32 (1.25, 1.39)	1.32 (1.26, 1.39)	1.30 (1.23, 1.36)	1.24 (1.18, 1.31)
Outer Regional and remote	1.55 (1.50, 1.59)	1.86 (1.69, 2.04)	1.80 (1.64, 1.97)	1.81 (1.65, 1.99)	1.70 (1.54, 1.87)
Body Mass Index category					
Thin	1.08 (1.05, 1.11)	0.87 (0.79, 0.96)	0.74 (0.68, 0.82)	0.70 (0.63, 0.77)	0.68 (0.62, 0.75)
Healthy weight	Ref	Ref	Ref	Ref	Ref
Overweight	0.78 (0.76, 0.80)	1.01 (0.93, 1.11)	0.89 (0.81, 0.97)	0.80 (0.73, 0.88)	0.70 (0.64, 0.77)
Obesity	0.67 (0.65, 0.70)	0.84 (0.76, 0.93)	0.58 (0.52, 0.64)	0.45 (0.4, 0.49)	0.36 (0.33, 0.41)

** The reference group for physical activity guidelines is 'Did not achieve guidelines', i.e., achieved less than 60 min of physical activity per day in the past 7 days. The reference group for structured physical activity participation is 'zero sessions in past 12 months'.

Children who live in regional and remote areas and children who live in high socio-economic areas had higher odds of meeting physical activity guidelines and higher odds of participating in structured physical activity sessions, compared to children who live in a major city or low socio-economic areas. Higher odds of meeting physical activity guidelines but lower odds of participating in structured physical activities outside of school were observed among Aboriginal/Torres Strait Islander children, children categorized as 'Thin', and younger children compared to non-Aboriginal/Torres Strait Islander children, children categorized as 'Healthy weight', and children over nine years old. As the child's age increased, their odds of participating in structured physical activities increased, whilst the odds of meeting physical activity guidelines reduced in older children. Lower odds of meeting physical activity guidelines and lower odds of participating in structured physical activities were observed among girls, children who speak a language other than English at home, children with a disability, and children categorized as 'obese' compared to boys, children who only speak English at home, children free from disability, and those who are not obese (Table 2).

4. Discussion

This is the first study to demonstrate the population reach of a government-led, universal children's structured physical activity voucher intervention, delivered at scale. The Active Kids voucher program reached more than half of the eligible NSW state population, over 600,000 children in 2018. An important component of the complex pragmatic evaluation of the Active Kids program [16], this substantial reach in the program's first year indicated the intervention's ability to engage significant numbers of children and families. Furthermore, the characteristics of the population registered was largely representative of the NSW population. The significant reach was one indicator of success for this program and had the potential to change societal norms for school-aged children around physical activity and lifestyle behaviors.

Although the Active Kids voucher was universally available, children living in socioeconomically disadvantaged areas, who speak a language other than English at home, who are over the age of 15 years old, and girls, were underrepresented. In Australia, these underrepresented groups are also known to have lower structured physical activity participation rates [7]. These findings of the program reach were improved compared to the population-wide Children's Fitness Tax Credit (CFTC), which reported reaching 20% of children in their highest income category, whilst reach in their low-income categories were less than 1% [14]. To ensure that existing inequities in physical activity behaviors were not widened, complementary actions that reduce barriers to structured participation should be addressed for underrepresented groups, such as increasing opportunities for culturally appropriate activities, targeted mass media campaigns to promote the voucher to these groups, and improved transport infrastructure to increase access to structured physical activity opportunities [8].

A large proportion of children who registered for a voucher had participated in a structured physical activity session in the previous 12 months, before the Active Kids voucher was available. Children who were most committed to sport and lived in high socioeconomic areas were most effectively reached by the Active Kids program. Their previous engagement in the sector might indicate that the voucher encouraged participants to return to structured sessions, or that the voucher availability did not change their behavior. Owen et al. (2020), found that children living in low socioeconomic areas were less likely to have heard of the Active Kids program and to have registered for an Active Kids voucher [27]. Again, in Canada, the CFTC has limited awareness and uptake among families in disadvantaged areas [14]. Both the CFTC and Active Kids interventions took an equality-based approach in their program design. In Canada, the financial incentive value was an 'equal proportion of the amount spent on registration for all', which meant that "the rich got richer" and the tax credit had little value for low-income families [14]. The Active Kids program provided an 'equal value to all participants, independent of amount spent on the child's registration' [15]. The Active Kids program demonstrated much higher initial population reach to disadvantaged children (38%) than CFTC, likely due to a greater proportion of disadvantaged children's expenses being supported by the \$100 Active

Kids voucher [12]. Differences in program design, stakeholder involvement, and implementation, also contribute to the different reach between programs.

A financial incentive is, however, only one part of a multi-component approach that is required to address population inactivity [8]. A recent systematic review highlights that cost, lack of time, peer relationships, and access to local opportunities to participate in structured physical activities are barriers that need to be addressed [13]. Additional components are required to achieve equitable program reach in socioeconomically disadvantaged areas, families who speak a language other than English at home and older children. These sub-groups are known to be less active than their counterparts and have the greatest potential to benefit from using a voucher [28,29]. Small-scale financial incentive studies propose co-design of eligible activities with children in low socioeconomic circumstances might increase their use of the voucher [30,31]. Intervention components that are delivered in partnership with stakeholders beyond the physical activity and sport sectors, such as mass media and communications campaigns targeted towards culturally and linguistically diverse families or adolescents, might further increase the intervention reach in the subsequent years of delivery of Active Kids [32].

Evaluation of large-scale policies and interventions should always be undertaken and used to monitor inequalities, informing delivery in real time [14,16]. The Active Kids registration dataset enabled daily monitoring of program reach during 2018. The government then used this data to create infographics to share with local stakeholders, including in areas with proportionately low registrations for the population. Locally relevant data on children's registrations in the Active Kids program engaged stakeholders, enabling local strategies to promote Active Kids, which likely contributed to the high population reach at the end of the program's first year. When interventions were scaled up, ongoing modifications and additional components were recommended to strengthen the intervention within a particular context [33]. The approach taken by the NSW Government for the Active Kids program, to integrate an independent evaluation within the program protocol, is an exemplar of a best practice evaluation approach, enabling evidence-based modifications and additional components during implementation

This study showed that children who participate regularly in structured activities have greater odds of achieving the recommended levels of physical activity. This result aligns with public opinion of Australia being a sporting nation [34], demonstrating the important role that structured physical activities can play in assisting some children to achieve the recommended physical activity guidelines, especially if they participate regularly. Longitudinal research provides further evidence that participation in structured sports programs, increases the odds of physical activity participation later in life [6]. The community sport and recreation sector should be encouraged by these findings to broaden their membership reach and encourage new children to participate in structured activities. Children who participate regularly in structured physical activities might still exhibit poor physical literacy [35,36]. In addition to increasing participation in their sessions, structured physical activity programs should focus on retaining participants and progressing them along the physical literacy continuum, encouraging lifelong participation.

Self-report physical activity participation is frequently monitored in relation to physical activity guidelines for moderate to vigorous physical activity. Our study found that 19% of all children registering for an Active Kids voucher met the physical activity guidelines, which is similar to 11 National and State data sources across Australia that estimated 15–41% of 5–17-year old children in Australia achieve physical activity guidelines [35]. The correlates observed in this study were similar to previous research, identifying greater inactivity among older adolescents, girls, children who speak a language other than English at home, children with a disability, living in metropolitan areas, or socioeconomically disadvantaged areas [36]. This low proportion of the population meeting physical activity guidelines was concerning and further justified the need for Active Kids, as well as additional public health interventions to increase children's physical activity levels. The integration of both physical activity and sport participation measurement was a strength of this study.

Another strength of this study was the representative population sample that would provide policy makers, academics, and practitioners, with robust data to make judgments on the implementation and effectiveness of Active Kids, as well as understanding more about physical activity behaviors of the children engaged in the program. Recognizing that the Active Kids data set cannot be used as a surveillance tool, considering the program bias, it did provide rich data on the physical activity behaviors of children in NSW complementing other population data sets in Australia such as AusPlay [7]. The limitations of this study were the self-report nature of the data collected and the volunteer bias in children and parents who expressed interest in the Active Kids program. The proportion of children who reported participating in structured physical activity sessions in this study was higher than population estimates from AusPlay [7]. All outcomes reported for children and adolescents were completed by a parent or carer by proxy and were based on self-report data, making the data prone to social desirability bias and recall bias [37].

Population data available within Australia used significantly smaller samples; the National and State population health surveys included data from 21,300 people (4273 in NSW) and 12,000 people, respectively [19,38]; National sport sector survey, AusPlay, had an annual target sample size of 20,000 adults, and 3600 children (5922 adults and 1175 children in NSW) [20]. These ongoing population measures are important but might have insufficient sample-sizes for subgroup analysis. Subgroups that often lack statistical power in population surveillance of physical activity behaviors include Aboriginal/Torres Strait Islander children, culturally and linguistically diverse communities, children with a disability, and children in regional and remote areas [39,40]. This Active Kids dataset enabled some of these gaps to be filled with the methodological limitations and for bias to be acknowledged. This dataset provided relevant information on the initial reach of the Active Kids program and will help assess participation and maintenance of physical activity in subsequent years [16].

Contrary to known reductions in structured physical activity participation with increasing age [41], in our sample participation was high among other age groups, with highest odds of participation at age 12–14 years and participation remained high among 15–18-year-olds. Declining rates of sport participation during adolescence are well established in the literature, therefore, the interpretation of this finding should consider the smaller proportion of 15–18-year-olds represented in the study sample, those likely to be sport-focused, reinforcing the bias acknowledged above. Older children, therefore, who did not register for a voucher, were a priority population, based on previous research highlighting the risk of drop-out [5]. Another contradictory finding to the existing literature was from the 36,129 Aboriginal Australian and Torres Strait islander children in this sample. This dataset provides the largest sample of Aboriginal and Torres Strait Islander children's physical activity behaviors and suggests that most Aboriginal and Torres Strait Islander children in NSW do not regularly participate in structured physical activities. This requires further investigation, as previous research described the cultural significance of sport and physical activity among Aboriginal and Torres Strait Islander communities [42]. The size and scale of Active Kids with its myriad of delivery partners also presented a unique opportunity to drive towards a consistent measurement system for physical activity [43].

5. Conclusions

The universal nature of the Active Kids voucher has the potential to overcome systemic barriers to structured physical activity participation for children. The first year of the Active Kids program achieved substantial reach to over 53% of the NSW population of school-enrolled children. To enhance reach to under-represented groups, the state government should strengthen collaborations and strategic partnerships with organizations in sport and other sectors, including education, justice, multicultural, and community services. The integration of standardized questions within the Active Kids registration platform provides unique insights into physical activity behaviors of more than half the NSW child population. Inequities in physical activity participation identified at registration have practical implications for how the wider-community and Active Kids providers engage disadvantaged children in structured physical activity programs. Additional efforts should be made to ensure less

active children, who register for a voucher, actually use their Active Kids voucher to participate in eligible programs. Further evaluation throughout the duration of the program implementation should examine the effect of the Active Kids voucher on children's physical activity participation and additional understanding of the mediating factors that influence children's participation in structured physical activity.

Author Contributions: All authors made a significant contribution to the final manuscript. B.C.F., K.B.O., W.B., A.E.B., and L.J.R., conceptualized the research questions, designed the study methodologies, and contributed to data curation. B.C.F. performed the formal statistical analysis and prepared the original draft. B.C.F., K.B.O., W.B., L.W., K.R., A.E.B., and L.J.R., contributed to the interpretation of the results, and reviewed and provided feedback on the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: We would like to acknowledge the Office of Sport NSW Government as the lead government agency for this cross-agency policy, and specifically thank those involved in the implementation of the Active Kids program.

Conflicts of Interest: The SPRINTER (SPort & Recreation INTervention & Epidemiology Research) group is a research partnership between the University of Sydney and Office of Sport NSW Government and receives funding from the Office of Sport to complete an annual workplan of agreed academic and policy relevant deliverables. It is through this research group that this piece of research was conducted. The Office of Sport had no role in the design of the study; analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

- Powell, K.E.; King, A.C.; Buchner, D.M.; Campbell, W.W.; DiPietro, L.; Erickson, K.I.; Hillman, C.H.; Jakicic, J.M.; Janz, K.F.; Katzmarzyk, P.T.; et al. The Scientific Foundation for the Physical Activity Guidelines for Americans, 2nd Edition. *J. Phys. Act. Health* **2018**, *16*, 1–11. [[CrossRef](#)] [[PubMed](#)]
- Eime, R.M.; Young, J.A.; Harvey, J.T.; Charity, M.J.; Payne, W.R. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *Int. J. Behav. Nutr. Phys. Act.* **2013**, *10*, 98. [[CrossRef](#)] [[PubMed](#)]
- Australian Government Department of Health and Ageing. *Australian 24-Hour Movement Guidelines for Children and Young People (5 to 17 Years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep*; Australian Government: Canberra, Australia, 2019.
- World Health Organization. *Global Recommendations on Physical Activity for Health*; World Health Organization: Geneva, Switzerland, 2010.
- Guthold, R.; Stevens, G.A.; Riley, L.M.; Bull, F.C. Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc. Health* **2020**, *4*, 23–35. [[CrossRef](#)]
- Palomäki, S.; Hirvensalo, M.; Smith, K.; Raitakari, O.; Männistö, S.; Hutri-Kähönen, N.; Tammelin, T. Does organized sport participation during youth predict healthy habits in adulthood? A 28-year longitudinal study. *Scand. J. Med. Sci. Sports* **2018**, *28*, 1908–1915. [[CrossRef](#)]
- Sport Australia. AusPlay Results: Clearinghouse for Sport. 2020. Available online: <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/results> (accessed on 12 September 2017).
- World Health Organization. *Global Action Plan on Physical Activity 2018–2030: More Active People for a Healthier World*; World Health Organization: Geneva, Switzerland, 2018.
- Huang, T.T.K.; Grimm, B.; Hammond, R.A. A Systems-Based Typological Framework for Understanding the Sustainability, Scalability, and Reach of Childhood Obesity Interventions. *Child. Health Care* **2011**, *40*, 253–266. [[CrossRef](#)]
- Ogilvie, D.; Adams, J.; Bauman, A.; Gregg, E.W.; Panter, J.; Siegel, K.R.; Wareham, N.J.; White, M. Using natural experimental studies to guide public health action: Turning the evidence-based medicine paradigm on its head. *J. Epidemiol. Community Health* **2020**, *74*, 203–208. [[CrossRef](#)]
- Glasgow, R.E.; Vogt, T.M.; Boles, S.M. Evaluating the public health impact of health promotion interventions: The RE-AIM framework. *Am. J. Public Health* **1999**, *89*, 1322–1327. [[CrossRef](#)]

12. Reece, L.J.; McInerney, C.; Blazek, K.; Foley, B.C.; Schmutz, L.; Bellew, B.; Bauman, A.E. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC Public Health* **2020**, *20*, 19. [CrossRef]
13. Somerset, S.; Hoare, D.J. Barriers to voluntary participation in sport for children: A systematic review. *BMC Pediatrics* **2018**, *18*, 47. [CrossRef]
14. Spence, J.C.; Holt, N.L.; Dutove, J.K.; Carson, V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: The rich get richer. *BMC Public Health* **2010**, *10*, 356. [CrossRef]
15. Office of Sport. Active Kids: NSW Government. 2018. Available online: <https://sport.nsw.gov.au/sectordevelopment/activekids> (accessed on 20 January 2019).
16. Reece, L.J.; Foley, B.C.; Bellew, B.; Owen, K.; Cushway, D.; Srinivasan, N.; Hamdorf, P.; Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Res. Pract.* **2020**. [CrossRef]
17. Sport Budget 2017–18: New South Wales Government, Office of Sport. Available online: <https://sport.nsw.gov.au/sectordevelopment/sport-budget-2017-18> (accessed on 20 January 2019).
18. Services Australia. Medicare: Australian Government. Available online: <https://www.servicesaustralia.gov.au/individuals/medicare> (accessed on 12 September 2017).
19. Australian Bureau of Statistics. *National Health Survey: First Results, 2017–2018*; Australian Bureau of Statistics: Canberra, Australia, 2018.
20. Australian Sports Commission. *AusPlay: Survey Questions*; Australian Sports Commission: Canberra, Australia, 2016.
21. Australian Bureau of Statistics. *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA)—Technical Paper, 2006 (No.2039.0.55.001)*; Australian Bureau of Statistics: Canberra, Australia, 2008.
22. Department of Health and Aged Care. *Measuring Remoteness: Accessibility/Remoteness Index of Australia (ARIA)*, Occasional Papers: New Series Number 14. October 2001 ed.; Department of Health and Aged Care: Adelaide, Australia, 2001.
23. Prochaska, J.J.; Sallis, J.F.; Long, B. A physical activity screening measure for use with adolescents in primary care. *Arch. Pediatrics Adolesc. Med.* **2001**, *155*, 554–559. [CrossRef] [PubMed]
24. Cole, T.J.; Lobstein, T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity* **2012**, *7*, 284–294. [CrossRef] [PubMed]
25. Australian Bureau of Statistics. Australian Census 2016. Available online: <https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Census?OpenDocument&ref=topBar> (accessed on 20 January 2019).
26. Cummings, P.; Rivara, F.P. Reporting Statistical Information in Medical Journal Articles. *Arch. Pediatrics Adolesc. Med.* **2003**, *157*, 321–324. [CrossRef]
27. Owen, K.B.; Foley, B.C.; Bauman, A.; Bellew, B.; Reece, L.J. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *J. Sci. Med. Sport* **2020**, *23*, 753–757. [CrossRef]
28. Willis, C.; Girdler, S.; Thompson, M.; Rosenberg, M.; Reid, S.; Elliott, C. Elements contributing to meaningful participation for children and youth with disabilities: A scoping review. *Disabil. Rehabil.* **2017**, *39*, 1771–1784. [CrossRef]
29. Shields, N.; Synnot, A. Perceived barriers and facilitators to participation in physical activity for children with disability: A qualitative study. *BMC Pediatrics* **2016**, *16*, 9. [CrossRef]
30. Dunton, G.; Ebin, V.J.; Efrat, M.W.; Efrat, R.; Lane, C.J.; Plunkett, S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J. Phys. Act. Health* **2015**, *12*, 840–853. [CrossRef]
31. James, M.L.; Christian, D.; Scott, S.C.; Todd, C.E.; Stratton, G.; Demmler, J.; McCoubrey, S.; Halcox, J.P.; Audrey, S.; Ellins, E.A.; et al. Active Children through Individual Vouchers Evaluation: A Mixed-Method RCT. *Am. J. Prev. Med.* **2020**, *58*, 232–243. [CrossRef]
32. Wakefield, M.A.; Loken, B.; Hornik, R.C. Use of mass media campaigns to change health behaviour. *Lancet* **2010**, *376*, 1261–1271. [CrossRef]
33. Chambers, D.A.; Glasgow, R.E.; Stange, K.C. The dynamic sustainability framework: Addressing the paradox of sustainment amid ongoing change. *Implement. Sci.* **2013**, *8*, 117. [CrossRef] [PubMed]
34. Commonwealth Government. *Sport 2030*; Sport Australia: Canberra, Australia, 2018.
35. Schranz, N.; Glennon, V.; Evans, J.; Gomersall, S.; Hardy, L.; Hesketh, K.D.; Lubans, D.; Ridgers, N.D.; Straker, L.; Stylianou, M.; et al. Results from Australia's 2018 Report Card on Physical Activity for Children and Youth. *J. Phys. Activity Health* **2018**, *15*, S315. [CrossRef] [PubMed]

36. Hardy, L.L.; Mhrshahi, S.; Drayton, B.A.; Bauman, A.E. *NSW Schools Physical Activity and Nutrition Survey (SPANS) 2015: Full Report*; NSW Department of Health: Sydney, Australia, 2016.
37. Hidding, L.M.; Chinapaw, M.J.M.; Van Poppel, M.N.M.; Mokkink, L.B.; Altenburg, T.M. An Updated Systematic Review of Childhood Physical Activity Questionnaires. *Sports Med.* **2018**, *48*, 2797–2842. [[CrossRef](#)] [[PubMed](#)]
38. NSW Ministry of Health. New South Wales Population Health Survey. In *Child Population Health Survey*; New South Wales Government: Sydney, Australia, 2005.
39. Macniven, R.R.J.; Turner, N.; Blunden, S.; Bauman, A.; Wiggers, J.; Gwynn, J. Understanding physical activity patterns among rural Aboriginal and non-Aboriginal young people. *Rural Remote Health* **2019**, *19*, 4876. [[CrossRef](#)] [[PubMed](#)]
40. May, T.; Dudley, A.; Charles, J.; Kennedy, K.; Mantilla, A.; McGillivray, J.; Wheeler, K.; Elston, H.; Rinehart, N.J. Barriers and facilitators of sport and physical activity for Aboriginal and Torres Strait Islander children and adolescents: A mixed studies systematic review. *BMC Public Health* **2020**, *20*, 601. [[CrossRef](#)]
41. Vella, S.A.; Cliff, D.P.; Okely, A.D. Socio-ecological predictors of participation and dropout in organised sports during childhood. *Int. J. Behav. Nutr. Phys. Act.* **2014**, *11*, 62. [[CrossRef](#)]
42. Evans, J.R.; Wilson, R.; Coleman, C.; Man, W.Y.N.; Olds, T. Physical activity among indigenous Australian children and youth in remote and non-remote areas. *Soc. Sci. Med.* **2018**, *206*, 93–99. [[CrossRef](#)]
43. Bauman, A.; Chau, J. Monitoring population trends through physical activity surveillance—A chequered history in Australia. *Australas. Epidemiol.* **2015**, *22*, 5.



© 2020 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

4.2 CHAPTER CONCLUSIONS

This chapter presented original research on the Active Kids program in NSW, addressing the reach dimension of the RE-AIM framework. In summary, the Active Kids voucher program reached more than half of the eligible NSW population in 2018. Among all registered children, 70% had attended structured physical activity sessions at least once a week during the previous 12 months, whilst just 19% were achieving physical activity guidelines. The substantial program reach, particularly to school-aged children who are not achieving physical activity guidelines, demonstrates the potential of the Active Kids program to improve population levels of physical activity. Compared to similar programs identified in the scoping review of peer-reviewed evidence and Australian financial incentive programs, the Active Kids program reached to highest number of school aged children, in part due to the universal program design. This chapter also demonstrates the Active Kids program reached the highest number, and greatest proportion of disadvantaged group among the eligible population. The next chapter will follow a research sub-group of children who used an Active Kids voucher to understand the effects of the program on children's physical activity levels.

5 EFFECTS OF THE ACTIVE KIDS PROGRAM

5.1 CHAPTER OUTLINE

This chapter presents the effects of the Active Kids program on school-aged children's physical activity behaviours. Chapter 4 demonstrated the substantial reach of the Active Kids program among school-aged children in NSW, however registering for a voucher is only the first step and is unlikely to change physical activity levels. The action of using an Active Kids voucher and participating in a structured physical activity program for at least 8-weeks has the potential to enhance children's physical activity behaviours.

This chapter presents a nested research sub-study which followed a group of research participants during 2018. Online surveys were used to understand the effect of using an Active Kids voucher on children's physical activity participation during participation in the subsidised program immediately and up to at least six months after using the voucher. This publication presents the contribution of the voucher activity to the child's total structured physical activity participation, and the financial contribution of the \$100 Active Kids voucher to supporting the annual expenses associated with structured physical activity participation. This study has been published in BMC Public Health and can be [accessed online here](#).

The citation for this publication is: **Bridget C. Foley**, Katherine B. Owen, Adrian E. Bauman, William Bellew, and Lindsey J. Reece. 2021. "Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention" BMC Public Health 21, 22.

A copy of the peer-reviewed publication is included herein.

RESEARCH ARTICLE

Open Access



Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention

Bridget C. Foley^{*} , Katherine B. Owen, Adrian E. Bauman, William Bellew and Lindsey J. Reece

Abstract

Background: There is an urgent need for scaled-up effective interventions which overcome barriers to health-enhancing physical activity for children and adolescents. In New South Wales (NSW), Australia, the state government implemented a universal voucher program, 'Active Kids' to support the cost of structured physical activity registration for school-enrolled children aged 4.5–18 years old. The objective of this study was to understand the effects a financial incentive intervention delivered in a real-world setting has on children and adolescent's physical activity participation.

Method: In 2018, all children and adolescents registered for an Active Kids voucher provided sociodemographic characteristics, physical activity and research consent. This prospective cohort study used an online survey with validated items to measure physical activity and other personal and social factors in children and adolescents who used an Active Kids voucher. Generalized linear mixed models were used to examine changes from registration to after voucher use at ≤ 8 weeks, 9–26 weeks and ≥ 6 months.

Results: Study participants reported increasing their days achieving physical activity guidelines from 4.0 days per week (95%CI 3.8, 4.2) at registration ($n = 37,626$ children) to 4.9 days per week (95%CI 4.7, 5.1) after 6 months ($n = 14,118$ children). Increased physical activity was observed for all sociodemographic population groups. The voucher-specific activity contributed 42.4% (95%CI 39.3, 45.5) to the total time children participated in structured physical activities outside of school. Children and adolescents who increased to, or maintained, high levels of activity were socially supported to be active, had active parent/caregivers, had better concentration and were overall happier than their low-active counterparts.

Conclusion: The Active Kids program significantly increased children's physical activity levels and these increases continued over a six-month period. The Active Kids voucher program shows promise as a scaled-up intervention to increase children and adolescents' physical activity participation.

Trial registration: Australian New Zealand Clinical Trial Registry [ACTRN12618000897268](https://www.anzctr.org.au/Trial/Registration/Trial.jsp?ACTRN12618000897268), approved May 29th, 2018 - Retrospectively registered.

Keywords: Children, Adolescents, Financial incentive, Voucher, Organized sport, Physical activity, Leisure-time, Evaluation, Policy, Behavior change

* Correspondence: bridget.foley@sydney.edu.au

SPRINTER (Sport and Active Recreation Intervention & Epidemiology Research Group), Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, D17 Charles Perkins Centre, The University of Sydney, Level 6, the Hub, Camperdown, NSW 2006, Australia



© The Author(s). 2021 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Background

Increasing the amount of physical activity children and adolescents achieve each day is a global priority [1]. It is recommended that all children aged 5–17 years accumulate at least 60 min of moderate to vigorous physical activity each day [2, 3]. Adhering to these guidelines is associated with enhanced cardiorespiratory and musculoskeletal health and fitness, improved body composition, academic achievement and cognition, quality of life, mental health, social and emotional behaviours in children [2, 4]. At the societal level, increased physical activity produces co-benefits across many Sustainable Development Goals, as noted by the World Health Organisation, including reduction of premature mortality from non-communicable disease prevention, contribution to job creation for young people and reduction in social inequalities through promoting fairness and inclusion [1, 5]. Worldwide, more than 80% of adolescents (11–17 years old) are not meeting physical activity recommendations, while Australian adolescents are among the least active with just 11% achieving recommended levels of physical activity for health [2, 6]. There is an urgent need to implement scaled-up effective interventions to improve children and adolescent's health-enhancing physical activity behaviours.

Participation in structured physical activity is one-way to increase achievement of the recommended physical activity guidelines [7, 8]. Structured physical activities include opportunities delivered through an organisation, which involve physical exertion, skill and/or hand-eye coordination as the primary focus of the activity [1]; but elements of competition are not essential. These may be undertaken as team or individual pursuits such as sport participation (e.g. Football, Swimming, Athletics, Tennis) and/or active recreation (e.g. Dance, Martial Arts, bush survival skills etc). Participation in structured physical activity programs throughout childhood and adolescence is influenced by multiple barriers and facilitators across individual, interpersonal, community and societal levels [9–11]. Modifiable barriers limiting children and adolescent's participation in structured physical activity include the cost of registration, equipment and uniforms; access to appropriate and safe opportunities; lack of time and having friends involved [12, 13]. Knowing this, real-world interventions which aim to overcome barriers to structured physical activity participation are urgently required [1].

Financial incentive policies and programs that aim to reduce the cost barrier for children and adolescents may increase participation and retention in structured physical activity [14]. There has been a marked increase in public sector investment for financial incentive programs that directly reduce the cost barrier to structured physical activity participation [15, 16]. To date, heterogeneous interventions tested in randomised controlled trials

suggest that financial incentives hold promise to get more children active [17–20]. The ACTIVE trial adopted a co-design approach with teenagers, providing them free choice of unstructured activities the vouchers could be used for, which had a positive impact on cardiovascular fitness, cardiovascular health, and perspectives of activity [17, 18]; Dunton tested after-school physical activity programs for primary school children in low-income families which has limited effectiveness [20]; Financial incentives have also been used to promote physical activity in overweight/obese American Indian youth (11–20 years old) resulting in longer session duration but minimal effect on the number of sessions youth participated in [19]. A cross-sectional study of the Government of Canada's Canadian Fitness Tax Credit, which provided a non-refundable tax credit for structured physical activity programs (including sport and dance) for all children up to 16 years old found the tax credit benefited the wealthier families most [21]. In Australia, it is estimated that families spend AUD \$447 annually on structured physical activity, per child [15]. Sport voucher programs have also been implemented by governments in different Australian jurisdictions, each adopting a unique approach, with limited process or outcome evaluation on the effectiveness of this type of intervention [15]. Pragmatic evaluations of large-scale interventions should be undertaken to inform policy and practice [22, 23].

In 2018, the NSW Government allocated \$207 million across four years for a universal voucher program, entitled Active Kids [24]. More than 1.2 million school-enrolled children aged between 4.5 and 18 years old were potentially eligible to register for one AUD \$100 voucher per calendar year. The voucher aimed to increase structured physical activity participation outside of school by reducing the cost barrier. A complex yet pragmatic quasi-experimental, mixed-methods evaluation was integrated into the design of Active Kids and involves a series of studies [25]. We have previously reported the population awareness and reach of the Active Kids program [26, 27]. The objective of this study was to fill the gap in understanding of the impact of a universal, state-wide financial incentive intervention (Active Kids voucher) on children's physical activity participation, and the contribution of the voucher to support structured physical activity participation. Personal and social associations with being active were explored to understand whether the voucher influenced underlying contextual factors.

Method

Study design

This study is a natural experiment using a prospective cohort study design, nested within the Active Kids state-

wide program evaluation [25]. Natural experiments are appropriate when exposure to the intervention of interest has not been manipulated by the researcher and events that occur during the experiment are outside the control of the researcher [23, 28]. Using data collected during the first year of the Active Kids program, we aimed to address the following research questions:

1. Does using an Active Kids voucher increase the number of days per week children participate in physical activity for at least 60 min, and are any increases maintained six months after using the voucher?
2. What proportion of the child's reported weekly time and annual expenditure on structured physical activities does the Active Kids voucher contribute towards?
3. Are changes in physical activity participation after voucher use associated with personal and social factors in children's lives?

Active Kids program description

The Active Kids program is a state-wide, whole-of-government initiative led by the NSW Government Office of Sport [29]. It provides all school-enrolled children aged between 4.5 and 18 years old access to a financial voucher (valued up to AUD \$100) to reduce the cost of registration or membership in an approved structured program of at least 8 weeks' duration which involves moderate or vigorous levels of physical activity. Eligible voucher programs include team sports, individual sports, swimming lessons, structured fitness programs, active recreation programs and dance, which were not held during school time or delivered by schools.

The Active Kids program is administered through a bespoke government platform. Upon registration, each child receives a unique voucher code which can be redeemed with an Active Kids provider to reduce the cost of registration or membership. Activity providers must also register with the NSW Government Office of Sport for Active Kids accreditation to enable them to redeem and Active Kids voucher. Once the accredited provider redeems the voucher through this platform, the child's voucher status changes from available to redeemed within the platform. Further programmatic details of Active Kids can be accessed here: <https://www.sport.nsw.gov.au/sectordevelopment/activekids>

Inclusion criteria

All children registered in the Active Kids program who provided written active consent (often by-proxy through parent/guardian) during the online Active Kids registration were eligible to be included in the study. Consent was indicated through selection of a tick box within the

online Active Kids registration on the bespoke government webpage. Data regarding children were included if a response to the online survey was received after the child's Active Kids voucher had been redeemed. Participant flow for this study is shown in Fig. 1.

Measurement

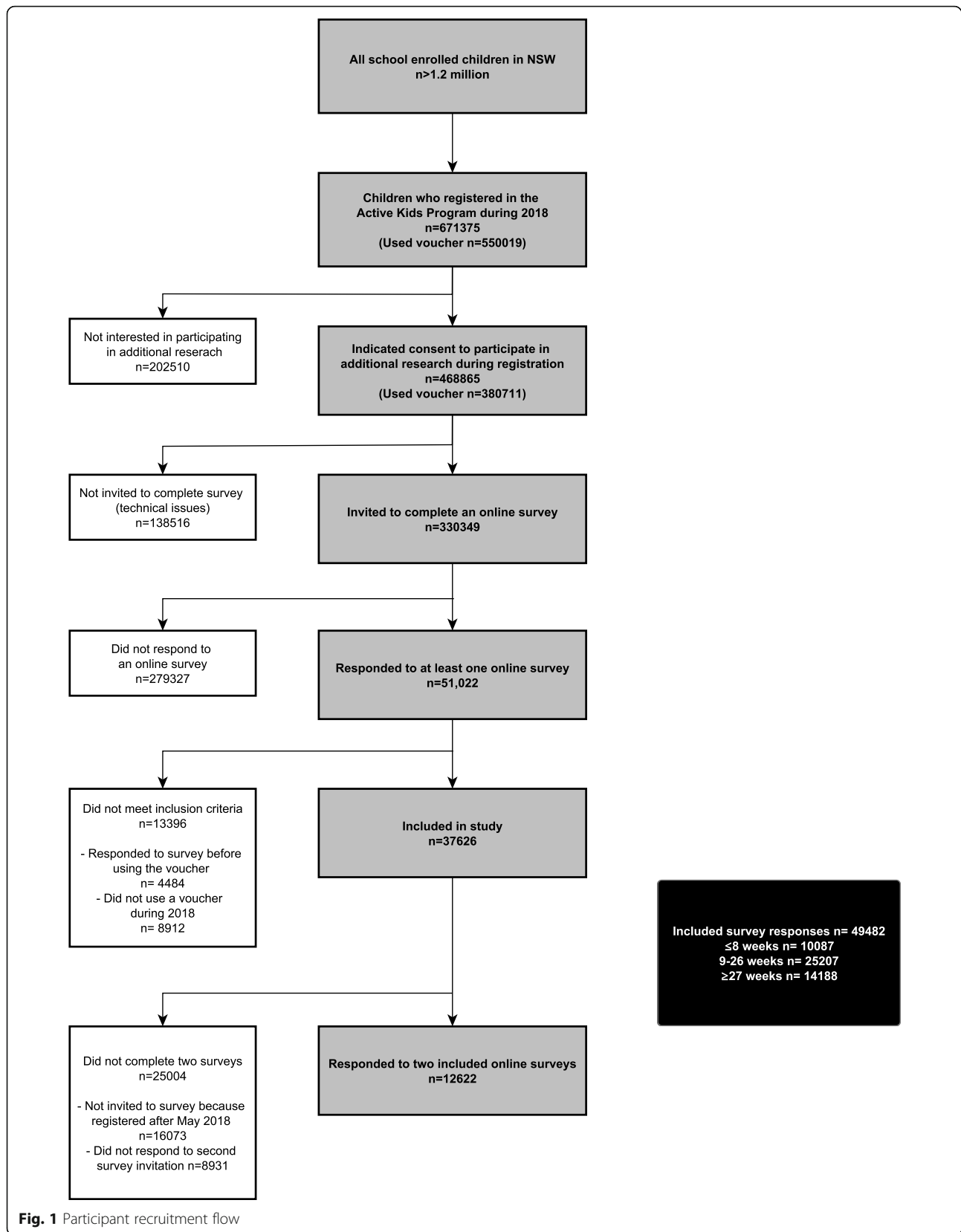
The research protocol outlined that everyone who agreed to participate in research during the voucher registration process would be sent an invitation to an online survey eight and eighteen weeks after they had redeemed the Active Kids voucher using a rolling recruitment method. A decision was made, due to technical issues connecting the database and survey platform, to adjust the protocol and invite all participants (often by-proxy through parent/guardian) to complete a survey at two time points to assess their physical activity participation (May 2018 and November 2018) (see Fig. 1). The STROBE checklist and the Checklist for Reporting Results of Internet E-Surveys were used to ensure quality reporting of our methods [30, 31].

Invitations to the online survey were emailed from a NSW government domain on behalf of the researchers. After the participant information statement was read and understood, participants (often by-proxy through parent/guardian) indicated consent through completion of the online survey. The survey was hosted on Form Assembly in May and by Australian Survey Research platform (Survey Manager) in November. Surveys remained open to those invited for 3 weeks with a reminder sent to those who had not completed the survey after 2 weeks. Partially completed surveys were included in the analysis with missing data excluded from analysis. No incentives or rewards were offered to people who participated in the survey.

Instruments

Registration platform

Provision of sociodemographic information and primary outcome (physical activity) data were mandatory during registration for an Active Kids voucher. Sociodemographic data fields in the registration platform included the child's name, date of birth, sex, Indigenous status, disability status, language spoken at home, postcode. Date of birth was used to categorize children into four age groups (4–8 years; 9–11 years; 12–14 years; 15–18 years) which are consistent with the developmental stages for children and adolescents, defined by the Sport sector in Australia [32]. Socio-economic status of children was derived from their reported postcode using the Australian Bureau of Statistics's Socio-Economic Index For Areas Index of Relative Disadvantage [33]. National percentiles were then categorized into quartiles. Geographic location was classified using the reported postcode and determined using Accessibility/Remoteness Index of Australia Plus [34]; Outer



regional and remote were combined in the analysis. Height and weight fields were included in the registration platform however the fields were not mandatory during 2018. Body Mass Index z-scores (BMI) were calculated using the height and weight of the child reported during the registration process. Children were classified as thin, healthy weight, overweight or obese using the International Obesity Task Force cut points [35].

The primary outcome for this study was the number of days the child participated in at least 60 min of physical activity. This was assessed using a proxy self-report single-item 7-day recall validated question [36, 37]:

“In a typical week, how many days was the child physically active for at least 60 minutes? This could be made up of different activities including walking, cycling to school, and sport at lunchtime or an exercise class.”

Annual sport participation was collected in the registration form using an AusPlay survey item [38].

Online survey

The online survey was designed to be completed by the child’s parent/caregiver, with the child present or by a child able to provide informed consent (16–18 years old). To minimise bias, it was recommended the child was present and specific instructions were to ensure the child was asked for their response. The survey was developed specifically for the evaluation of the Active Kids program using validated self-report or proxy-report items for measurement where possible [39]. See Additional File 1 for the survey items included in the May 2018 and November 2018 surveys.

The 7-day recall of the child’s physical activity used in the registration platform was repeated within the survey [36, 37]. Time in the past 7 days spent participating in structured physical activity, and in the activity where the child used the Active Kids voucher, were collected using modified items from the National sport surveillance survey AusPlay; these included days per week, sessions per week and duration of each session, as well as the AusPlay item for annual cost of sport participation [38].

Personal and social factors which may moderate the effect of the voucher were also measured through the online survey. Children’s self-efficacy and enjoyment of being physically active [40, 41], ease of locating places to be physically active [42] and social influences on child’s physical activity [43] were measured using validated items. Adults were asked to identify the recommended minutes of physical activity children should accumulate each day [44], their own physical activity participation [45] and their own organized sport participation in the previous seven days [38] using validated survey items.

Data analysis

All analyses were conducted using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, N.Y., USA). The descriptive characteristics of all children registered for a voucher, along with subsamples who used an Active Kids voucher, and the cohort study participants were analysed. Due to the large sample size, significant differences were observed between all groups, therefore, proportional reporting ratios (PRR) were calculated to determine the magnitude of differences between all children registered in the program and study participants.

Timepoints

After registering for a voucher, the participant and their context determined where and when they redeemed the voucher. All participants (often by-proxy through parent/guardian) provided primary outcome data at registration, and at least once after using their voucher through responding to the online survey. Each participant’s voucher redemption date was recorded as the date the provider redeemed the voucher in the bespoke government administration platform. Three post-voucher categories were generated using the difference in weeks between the voucher redemption date and the median date in the data collection period for each survey. Voucher activities were required to last at least eight weeks; therefore, the first category was defined by surveys completed within ‘8 weeks or less’ after voucher redemption. An interim time point of 9–26 weeks was generated and the final timepoint was responses ≥ 27 weeks (≥ 6 months) after voucher redemption. This categorisation enabled within person analysis to be undertaken for the primary outcome.

Physical activity outcomes

Bivariate generalized linear mixed models were used to assess the associations between sociodemographic characteristics and the number of days the child participated in at least 60 min of physical activity at registration. A multivariable generalized linear mixed model was used to examine changes in the number of days the child participated in physical activity for at least 60 min over time (from registration to ≤ 8 weeks, 9–26 weeks and 6 months+ after voucher use), adjusting for all sociodemographic characteristics. Sociodemographic characteristics included sex, age, Indigenous status, disability status, language spoken at home, socio-economic status, geographic location and BMI. Interactions between physical activity and sociodemographic characteristics over time were also tested. For the interaction results, the Bonferroni correction for multiple comparisons was applied.

A multivariable generalized linear mixed model was used to determine what contribution using the Active kids voucher had on children’s sport participation and annual expenditure. This model adjusted for all sociodemographic

characteristics and the Bonferroni correction for multiple comparisons was applied.

Personal and social associations with increased activity after voucher use

Generalized linear mixed models were conducted to assess associations between increased physical activity and personal and social influences on the child. We categorised children who increased physical activity in two different ways to do this. Model 1 used observations from children who were active on ≥ 5 days per week at any survey time point, with the reference group being children who were active < 5 days per week, in order to strengthen our understanding of high activity levels and associated personal and social contextual factors. The ≥ 5 day cut-point was selected rather than a 7-day cut-point to compare the most active to the least active children. Model 2 compared those who increased the number of days they achieved 60 min of physical activity from the number of days reported at registration, against those who maintained the same number of days (0–7 days) or decreased days achieving guidelines. Children who achieved the physical activity guideline and maintained this over time were considered in the reference group to strengthen our understanding of those who increased their physical activity after using an Active Kids voucher in Model 2.

Results

During the first year of implementation of the Active Kids program (2018) in NSW, 671,375 children registered for an Active Kids voucher. Of these, 550,019 children (81.9%) used an Active Kids voucher, from whom 380,711 (69.2%) indicated consent (by-proxy) to participate in research (Fig. 1). Table 1 presents the demographic characteristics of children registered in the Active Kids program and those included in this cohort study ($n = 37,626$). Consent through survey participation was indicated by-proxy for most participants, with less than 1% of children aged over 16 completed their own survey.

Study participants were similar to all children who registered for a voucher (Table 1). Proportional reporting ratios showed children who responded to at least one survey were less likely to be older, identified as Aboriginal/Torres Strait Islander, lived in the most disadvantaged areas, lived in outer regional and remote areas, were obese and participated in sport less than once a week. Children who responded to two surveys were less likely to speak a primary language other than English at home or lived in the most disadvantaged socio-economic quartile. Study participants were slightly more physically active than all children who registered in the Active Kids program, with 21.3% of study participants meeting physical activity guidelines compared to 19.8%

of all children (Table 1); unadjusted mean days achieving physical activity guidelines at registration were 4.5 days (SD 1.8) compared to 4.4 days (SD 1.8) respectively.

At registration, all sociodemographic correlates, except Indigenous status, were significantly associated with physical activity days in the last week. Significantly lower physical activity levels were observed for children who were female, older (12+ years), spoke a language other than English at home, identified as having a disability, lived in socio-economically disadvantaged areas, lived in major cities or were above a healthy weight, compared to their counterparts before engaging in the Active Kids program (Table 2).

Influence of the Active Kids voucher on achievement of recommended physical activity guidelines

Participation in the Active Kids program increased the mean days children participated in at least 60 min of physical activity from 4.00 days (95% CI 3.80, 4.21) at registration to 4.94 days (95%CI 4.73, 5.15) after 6 months ($P < 0.0001$). Within eight weeks, there was a 0.25 mean increase ($P < 0.0001$) in the number of days the child participated in 60 min of physical activity, and a 0.30 day increase from registration to after 9–26 weeks (Fig. 2). The multivariable coefficient results are provided in Additional File 2.

Significant interactions with time were found for children by sex ($F = 16.647$, $P < 0.0001$), age ($F = 9.316$, $P < 0.0001$), language spoken at home ($F = 9.316$, $P < 0.0001$), socio-economic status ($F = 6.879$, $P < 0.0001$), location ($F = 8.123$, $P < 0.0001$) and BMI ($F = 7.013$, $P < 0.0001$) (Fig. 3). There were no significant interactions with time for children by disability status ($F = 1.404$, $P = 0.155$). The disparity in days achieving physical activity guidelines between females and males at registration (0.4 days) reduced after 6 months to 0.2 days, with more significant impacts among female participants. Disparities increased for older children (15–18-year old) compared to younger children from 0.3 days at registration to 0.5 days after six months. Similarly, children who spoke a language other than English at home were 0.6 days less active at registration, and this increased to 0.8 days less active than their English-speaking counterparts. Differences between the most and least disadvantaged groups were greatest in the ≤ 8 -week period (0.4 days), with the least disadvantaged group increasing more, however disparities returned previous levels after 6 months. Children living in the city and obese children, responded positively when the voucher was in use (≤ 8 -week period) then disparities returned to previous levels over time (Fig. 3).

Contribution of the voucher to weekly time and annual expenditure on structured physical activities

The top 10 structured physical activities study participants used their voucher for were Football (Soccer)

Table 1 Participant sociodemographic characteristics at registration compared to the research cohort

	All children N%	Children who used a voucher N%	Used a voucher / All	Participants who completed one survey N%	Survey one / All	Participants who completed two surveys N%	Survey two / All
	<i>N</i> = 671, 375 (100%)	<i>N</i> = 550,019 (81.9%)	<i>PRR</i> (95%CI)	<i>N</i> = 37,626	<i>PRR</i> (95%CI)	<i>N</i> = 12,622	<i>PRR</i> (95%CI)
Sex*							
Male	361,852 (54.0)	300,103 (54.6)	1.01 (1.01– 1.02)	19,607 (52.2)	0.97 (0.96, 0.98)	7140(56.6)	1.05 (1.03, 1.06)
Female	308,543 (46.0)	249,133 (45.4)	0.99 (0.98– 0.99)	17,973 (47.8)	1.04 (1.03, 1.05)	5472(43.4)	0.94 (0.93, 0.96)
Age							
4–8 years	269,457 (40.1)	226,386 (41.2)	1.03 (1.02– 1.03)	16,388 (43.6)	1.09 (1.08, 1.09)	5005(39.7)	0.99 (0.97, 1.00)
9–11 years	185,931 (27.7)	156,364 (28.4)	1.03 (1.02– 1.03)	9945 (26.4)	0.95 (0.94, 0.97)	3476(27.5)	0.99 (0.98, 1.01)
12–14 years	138,063 (20.6)	110,621 (20.1)	0.98 (0.97– 0.98)	7376(19.6)	0.95 (0.94, 0.97)	2742(21.7)	1.06 (1.04, 1.08)
15–18 years	77,924 (11.6)	56,648 (10.3)	0.89 (0.88– 0.89)	3917(10.4)	0.90 (0.88, 0.91)	1399(11.1)	0.95 (0.93, 0.98)
Aboriginal/Torres Strait Islander							
No	626,688 (93.3)	514,483(93.5)	1.00 (1.00– 1.00)	35,644(94.7)	1.01 (1.01, 1.02)	11,961(94.8)	1.02 (1.01, 1.03)
Yes	36,129 (5.4)	28,618 (5.2)	0.97 (0.96– 0.97)	1533(4.1)	0.76 (0.73, 0.78)	512 (4.1)	0.76 (0.72, 0.80)
Prefer not to say	8558 (1.3)	6918(1.3)	0.99 (0.97– 1.00)	449(1.2)	0.94 (0.88, 0.91)	149(1.2)	0.92 (0.84, 1.00)
Primary language spoken at home							
English	621,235 (92.5)	513,793(93.4)	1.01 (1.01– 1.01)	34,651 (92.1)	1.00 (0.99, 1.00)	11,999(95.1)	1.03 (1.02, 1.04)
Language other than English	50,140 (7.5)	36,226(6.6)	0.88(0.87– 0.89)	2975(7.9)	1.06 (0.98, 1.08)	623(4.9)	0.65 (0.61, 0.69)
Identified disability							
No	644,658 (96.1)	530,202(96.5)	1.00(1.00– 1.01)	36,085(96.0)	1.00 (0.99, 1.01)	12,177(96.7)	1.01 (1.00, 1.02)
Yes	17,715 (2.6)	12,772 (2.3)	0.88(0.87– 0.89)	1077(2.9)	1.08 (0.97, 1.12)	305(2.4)	0.92 (0.86, 0.98)
Prefer not to say	8277 (1.2)	6420(1.2)	0.95(0.93– 0.96)	426(1.1)	0.92 (0.95, 0.97)	113(0.9)	0.75 (0.66, 0.84)
Socio-economic status[^]							
1st Quartile (Most Disadvantaged)	99,583 (16.6)	76,900(15.7)	0.94 (0.94– 0.95)	4523 (13.2)	0.81 (0.83, 0.98)	1257(11.6)	0.70 (0.67, 0.73)
2nd Quartile	140, 302(23.4)	116,191(23.7)	1.01(0.01– 0.02)	7979(23.3)	1.01 (1.03, 0.99)	2617(24.2)	1.03 (1.01, 1.05)
3rd Quartile	158,783 (26.5)	130,315(26.5)	1.00(1.00– 1.01)	9502(27.7)	1.07 (1.08, 0.99)	2925(27.0)	1.02 (1.00, 1.04)
4th Quartile (Least Disadvantaged)	200,566 (33.5)	167,753(34.2)	1.02(1.02– 1.02)	12,289(35.8)	1.09 (1.10, 0.99)	4016(37.1)	1.11 (1.09, 1.13)
Geographic location[^]							
Major city	440,793 (73.5)	359,235 (73.1)	0.99 (0.99– 1.00)	25,593(74.5)	1.04 (0.99, 1.04)	7898(72.9)	0.99 (0.98, 1.00)
Inner regional	126,594 (21.1)	105,485(21.5)	1.02(1.01– 1.02)	7062(20.6)	1.00 (0.99, 1.01)	2401(22.2)	1.05 (1.03, 1.07)
Outer regional and remote	32,622 (5.4)	27,035(5.5)	1.01(1.00– 1.02)	1681(4.9)	0.92 (0.97, 0.94)	530(4.9)	0.91 (0.87, 0.95)

Table 1 Participant sociodemographic characteristics at registration compared to the research cohort (*Continued*)

	All children N%	Children who used a voucher N%	Used a voucher / All	Participants who completed one survey N%	Survey one / All	Participants who completed two surveys N%	Survey two / All
Body Mass Index (BMI) classification, reported at baseline **							
Thin	35,357 (11.5)	29,815(11.6)	1.03 (1.02– 1.04)	2557(12.3)	1.29 (0.98, 1.31)	971(11.8)	1.03 (1.00, 1.06)
Healthy weight	195,166 (63.7)	165,065(64.1)	1.03(1.03– 1.04)	13,490(64.8)	1.23 (0.99, 1.24)	5427(65.9)	1.03 (1.01, 1.05)
Overweight	52,675 (17.2)	43,724(17.0)	1.01(1.01– 1.02)	3395(16.3)	1.15 (0.98, 1.17)	1342(16.3)	0.95 (0.92, 0.98)
Obese	23, 252(7.6)	18,786(7.3)	0.99(1.98– 1.00)	1383(6.6)	1.06 (0.97, 1.09)	491(6.0)	0.79 (0.74, 0.84)
Physical activity, reported at baseline#							
Insufficiently active	524, 334(80.2)	427,349 (79.6)	0.99(0.99– 1.00)	29,119(78.7)	0.99 (0.99, 1.00)	9505(76.2)	0.96 (0.95, 0.98)
Met physical activity guidelines	129,228 (19.8)	109,710(20.4)	1.04(1.03– 1.04)	7859(21.3)	1.09 (0.99, 1.10)	2965(23.8)	1.20 (1.18, 1.22)
Childs annual organised sport and physical activity participation, reported at baseline#							
Non-participant	12,238 (1.9)	7193 (1.4)	0.72(0.70– 0.73)	594 (1.6)	0.87 (0.95, 0.91)	23(0.2)	0.11 (–0.09, 0.31)
Casual participant (<less than once per week)	151,675 (24.0)	114,237(22.1)	0.92(0.92– 0.92)	7348(20.4)	0.86(0.99, 0.88)	1988(16.4)	0.68 (0.66, 0.70)
Regular participant (1– 1.9 sessions per week)	217,878 (34.5)	182,579(35.2)	1.02(1.02– 1.03)	12,730(35.3)	1.04 (0.99, 1.05)	4237(34.9)	1.01 (0.99, 1.03)
Regular participant (2– 3.9 session per week)	147,616 (23.4)	126,284(24.4)	1.04(1.04– 1.05)	9012(25.0)	1.09 (0.99, 1.10)	3328(27.4)	1.17 (1.15, 1.19)
Committed participant (> 4 session per week)	101,290 (16.1)	87,677(16.9)	1.06(1.05– 1.06)	6354(17.6)	1.12 (0.99, 1.13)	2567(21.1)	1.31 (1.29, 1.33)

*Participants did not report sex of the child at birth ($n = 980$, < 0.2%) ^Some postcodes were missing or invalid ($n = 72,141$, 11% for socioeconomic status) ($n = 71,366$, 11% for geographic location); **Reporting height and weight was provided voluntarily ($n = 364,925$, 54% missing); #Participant reported being 'unsure' at registration($n = 17,813$, 2.7% for physical activity) ($n = 40,678$, 6% for annual organised sport and physical activity)

(28.4%), Netball (10.6%), Swimming (10.2%), Multisport (7.9%), Dance (7.3%), Rugby league (6.0%), Gymnastics (3.7%), Basketball (3.6%), Australian Football League (AFL) (3.1%) and Rugby Union (2.9%). After using an Active Kids voucher, the mean weekly duration children participated in structured physical activity outside of school was 5.97 h (SD 6.62), with a mean contribution of 2.40 h (SD 3.28) to the total from the voucher activity. The selected Active Kids voucher activity contributed 42.37% [95%CI 39.28, 45.49] of the total time children reported participating in structured physical activities (Table 3). The voucher made a greater contribution to participation for Active Kids who were 15–18 years old, Aboriginal/Torres Strait Islander, spoke a language other than English, had a disability, lived in socio-economically disadvantaged areas, or were obese (not overweight) (Table 3).

The unadjusted annual mean cost of structured physical activity participation was AUD\$1250 p.a. The Active Kids voucher, valued at \$100 p.a., supported on average 19.82% [95%CI 17.71, 21.95] of annual expenditure for all study participants. The contribution of the voucher to total expenditure was greater for children who were

male (20.54% [95%CI 19.04, 22.05]) compared to female (17.71% [95%CI 16.20, 19.23]); Aboriginal and/or Torres Strait Islander (23.70% [95%CI 21.50, 25.91]) compared to non-Indigenous (18.67% [95%CI 16.60, 20.73]); Children with a disability (21.68% [95%CI 19.76, 23.60]) compared to no disability (19.85% [95%CI 18.15, 21.55]); Children living in the most disadvantaged areas (23.44% [95%CI 21.02, 25.84]) compared to least disadvantaged areas (17.67% [95%CI 15.27, 20.06]); Children living in regional (18.79% [95%CI 13.61, 24.00]) or remote areas (22.27% [95%CI 16.92, 27.64]) compared to children living in cities (16.04% [95%CI 10.88, 21.18]); and obese children (21.37% [95%CI 19.13, 23.62]) compared to children in the healthy weight range (18.88% [95%CI 16.78, 20.97]).

Personal and social associations of children with high activity levels

Results comparing children who reported achieving ≥ 5 days with 60 min of physical activity ($n = 24,268$) with low active children (< 5 days, $n = 17,394$) are displayed in Table 4. More active children had greater odds of their parents correctly recalling children's physical activity guidelines and their parents being physically active

Table 2 Bivariate analysis of mean days of 60-min physical activity at registration in the cohort (n = 37,375)

		Mean days (95% Confidence Interval)	Contrast	Significance
All		4.46 (4.44, 4.48)	–	–
Sex	Male	4.65 (4.62, 4.67)	Ref	Ref
	Female	4.26 (4.23, 4.28)	–0.39	< 0.0001
Age	4–8 years	4.50 (4.48, 4.53)	Ref	Ref
	9–11 years	4.50 (4.47, 4.54)	0.00	0.875
	12–14 years	4.39 (4.35, 4.43)	–0.12	< 0.0001
	15–18 years	4.29 (4.23, 4.35)	–0.22	< 0.0001
Aboriginal/Torres Strat Islander	No	4.46 (4.43, 4.47)	Ref	Ref
	Yes	4.55 (4.45, 4.64)	0.09	0.061
Language spoken at home	English	4.51 (4.49, 4.53)	Ref	Ref
	Other	3.85 (3.78, 3.92)	–0.66	< 0.0001
Disability	No disability	4.48 (4.46, 4.50)	Ref	Ref
	Disability	3.97 (3.86, 4.09)	–0.50	< 0.0001
Socio-economic status	1st Quartile Most disadvantaged	4.24 (4.19, 4.30)	Ref	Ref
	2nd Quartile	4.53 (4.49, 4.57)	0.29	< 0.0001
	3rd Quartile	4.40 (4.37, 4.44)	0.16	< 0.0001
	4th Quartile Least Disadvantaged	4.52 (4.49, 4.56)	0.28	< 0.0001
Geographic location	Major City	4.40 (4.37, 4.42)	Ref	Ref
	Regional	4.61 (4.57, 4.65)	0.21	< 0.0001
	Outer regional and remote	4.69 (4.60, 4.77)	0.29	< 0.0001
Body Mass index	Thin	4.48 (4.57, 4.71)	–0.01	0.799
	Healthy weight	4.65 (4.62, 4.68)	Ref	Ref
	Overweight	4.40 (4.34, 4.46)	–0.25	< 0.0001
	Obese	4.13 (4.03, 4.22)	–0.52	< 0.0001

* Some participants reported being unsure of their child’s physical activity at registration

themselves compared with less active children. High active children had supportive home environments and had been active with their parents/carers (especially female parents/carers), siblings, relatives and friends. Active children reported higher self-efficacy than their inactive counterparts, to specifically choose to be active in their

free time and reported finding it easy to find and participate in physical activity if they wanted to. Children who were active on ≥5 days per week reported finding physical activity fun; being happy and full of energy significantly more and were less likely to report feelings of loneliness or be unable to concentrate than less active participants.

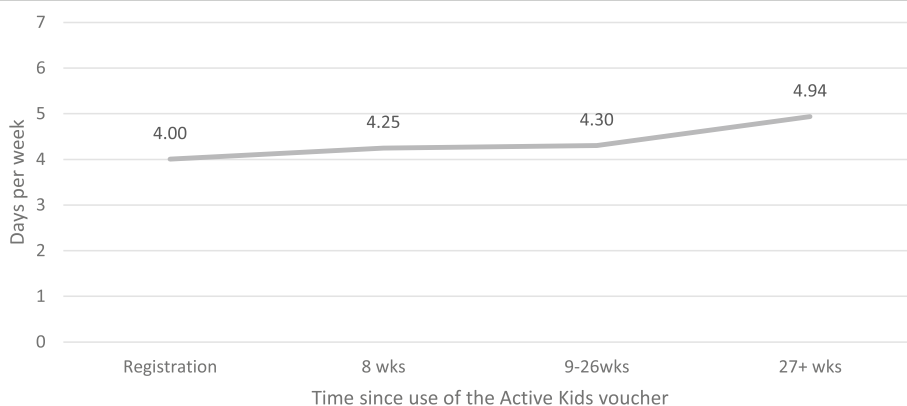
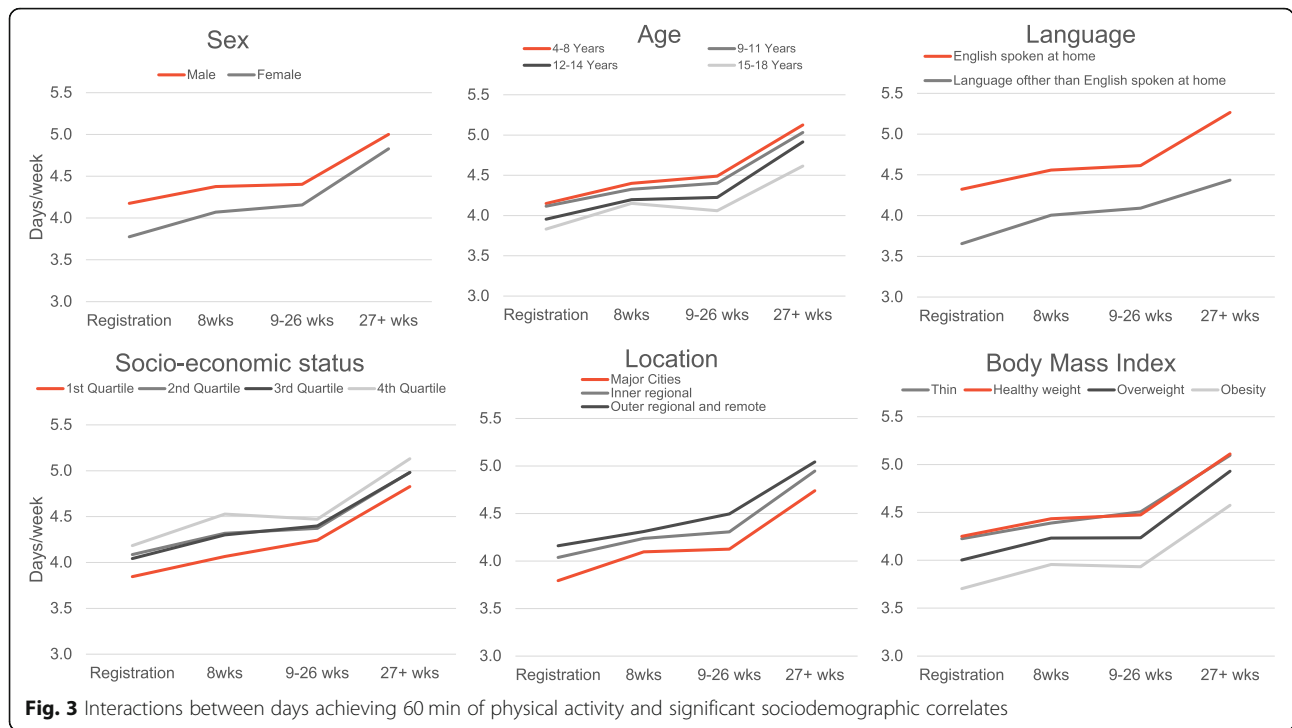


Fig. 2 Changes in mean days doing 60 min of physical activity (N = 37,375, with 79,038 observations)



Personal and social associations of children who increased active days after voucher use

Children who increased the number of days doing 60 min of physical activity after voucher use ($n = 12,853$) were compared to children who maintained ($n = 24,711$) or decreased ($n = 4098$) the number of days doing 60 min of physical activity from registration (Table 4). Children who increased their active days reported finding physical activity fun, but reported lower self-efficacy to be active in their free time and were more likely to find it difficult to participate in physical activity if they wanted to. Children who increased their physical activity after using an Active Kids voucher reported feeling significantly happier and full of energy and were less likely to report feelings of loneliness or be unable to concentrate, than those who maintained or decreased their activity (Table 4).

Discussion

Large-scale interventions which reduce barriers to participation in structured physical activity faced by children and adolescents are essential to addressing the global physical inactivity crisis. To overcome cost barriers, implementation of financial incentives for structured physical activities by the public sector appear to be increasing yet, process and outcome evaluations are rarely undertaken [14, 15]. This natural experiment used a prospective cohort study to understand impacts of the state-wide implementation of the universal Active Kids voucher program, a financial incentive intervention, on

children’s physical activity participation. At registration for the Active Kids program, less than one in five children met physical activity guidelines. Our results indicate that weekly physical activity increased following the use of an Active Kids voucher and these increases continued over a six-month period. Physical activity guidelines recommend children achieve at least 60 min of moderate to vigorous physical activity seven days per week. The increase from four to five days per week in this population-wide sample demonstrates a significant improvement in physical activity levels through implementation of the Active Kids program. The economic burden of preventable, non-communicable disease associated with physical inactivity is substantial [46, 47]. The implementation of the scaled up state-wide universal Active Kids program shows promise to increase physical activity participation in children and adolescents.

During the first year of implementation, changes in Active Kids participants physical activity levels from registration were positive across all sociodemographic characteristics. In the short term, inequities in physical activity participation fluctuated among sociodemographic groups and after six months, gender inequities had reduced. Female children and adolescents’ physical activity levels increased towards their male counterparts’ levels. It is unclear why females responded substantially better to the Active Kids voucher universal intervention. Though this positive change was observed within sex, disparities remained consistent for other characteristics and grew within language and age characteristic groups.

Table 3 Contribution of the Active Kids voucher to weekly time doing structured physical activity

		Hours per week doing structured physical activity (voucher and non-voucher activity) $n = 35,297 \bar{x}$ Hours (95%CI)	Voucher activity contribution to total weekly minutes $n = 27,737 \bar{x}$ Contribution (95%CI)
Sex	Male	6.33 (5.71, 6.95)	43.80% (41.64, 45.97)
	Female	6.43 (5.81, 7.06)	43.15% (40.98, 45.33)
Age group	4–8 years	3.39 (2.51, 4.28)	42.65% (39.59, 45.69)
	9–11 years	5.48 (4.59, 6.37)	42.51% (39.45, 45.57)
	12–14 years	7.29 (6.40, 8.18)	43.37% (40.31, 46.44)
	15–18 years	7.90 (6.99, 8.81)	44.93% (41.82, 48.03)
Aboriginal/Torres Strait Islander	No	5.42 (4.55, 6.30)	42.85% (39.85, 45.85)
	Yes	6.03 (5.11, 6.96)	45.53% (42.35, 48.71)
Primary language spoken at home	English	6.52 (5.64, 7.39)	42.47% (39.47, 45.49)
	Language other than English	5.51 (4.60, 6.42)	44.24% (41.10, 47.39)
Identified disability	No	6.55 (5.82, 7.28)	42.02% (39.47, 44.56)
	Yes	5.75 (4.93, 6.57)	43.44% (40.59, 46.32)
Socio-economic status	1st Quartile <i>Most Disadvantaged</i>	6.55 (5.54, 7.57)	45.63% (42.11, 49.16)
	2nd Quartile	6.15 (5.14, 7.16)	44.62% (41.10, 48.11)
	3rd Quartile	6.16 (5.15, 7.17)	44.20% (40.69, 47.69)
	4th Quartile <i>Least Disadvantaged</i>	5.95 (4.94, 6.96)	40.88% (37.35, 44.40)
	Location	Major city	6.12 (5.18, 7.07)	42.73% (39.53, 45.93)
	Inner regional	5.67 (4.72, 6.63)	42.71% (39.47, 45.97)
	Outer regional and remote	5.57 (4.58, 6.57)	41.58% (38.20, 44.97)
Body Mass Index	Thin	5.90 (4.98, 6.81)	43.31% (40.15, 46.46)
	Healthy weight	6.05 (5.16, 6.94)	42.17% (39.14, 41.26)
	Overweight	6.02 (5.11, 6.92)	42.69% (39.57, 45.81)
	Obese	6.33 (5.39, 7.28)	44.70% (41.46, 47.93)
Achieving Physical Activity guidelines	No	5.40 (4.52, 6.28)	43.52% (40.43, 46.62)
	Yes	6.63 (5.73, 7.52)	41.24% (38.10, 44.38)

Holm's Sequential Bonferroni adjustment to estimated means and 95% Confidence Intervals (CI) were made

Previous research in Canada using financial incentives for sport found offering the same tax-credit to the whole population disproportionately helped high socioeconomic groups [21]. The Active Kids program has demonstrated high reach and engagement [27]; however socio-economically disadvantaged children, children who speak a primary language other than English at home, obese children and 15–18 year old groups and children in major cities appear to demand additional interventions. Targeted or proportionate universalist approaches that reduce inequities in children and adolescents' physical activity levels and ensure equitable benefits from Active Kids voucher use require attention [1, 48].

Modifiable barriers to structured physical activity for children and young people are complex and difficult to

overcome [9–11]. Cost, access, time and social support affect children and adolescent's physical activity to different degrees depending on their context. This intervention explicitly targeted cost of structured physical activity participation by providing one Active Kids voucher during the calendar year. Participants reported higher annual expenditure on structured physical activity than population estimates [32], with the Active Kids voucher universally supporting 20% of the structured activity costs. This reflects the underrepresentation of children from low socio-economic areas registered in the Active Kids program [26]. The contribution of the Active Kids voucher to annual expenditure achieved was similar to previous estimates [15]. Significantly greater contributions were observed among children living in

Table 4 High and increased physical activity after voucher use and associated personal/social factors

		Prevalence among all children (n = 32,250)	Binomial comparisons from 32,250 children using 41,662 observations	
			Model 1 - Observations of children active ≥ 5 days per week (n = 24,268), compared to those active on < 5 days per week (n = 17,394) after voucher use	Model 2 - Observations from children who increased the number of days they achieve 60 min of physical activity (n = 12,853), compared to those who maintained same level (n = 24,711) or decreased (n = 4098) days achieving 60 min
		%	Odds Ratio (95%CI)	Odds Ratio (95%CI)
Knows children’s physical activity guidelines	No	51.65	Ref	Ref
	Yes	48.35	1.41 (1.35, 1.48)	0.90 (0.86, 0.95)
Adult achieves physical activity guidelines	No	75.41	Ref	Ref
	Yes	24.59	1.73 (1.65, 1.82)	0.89 (0.84, 0.93)
Adult sport participation	0 sessions	45.06	Ref	Ref
	1 session	14.62	0.88 (0.82, 0.93)	1.01 (0.95, 1.08)
	2 sessions	13.55	0.94 (0.88, 1.00)	0.97 (0.91, 1.04)
	3 sessions	10.86	1.01 (0.94, 1.08)	1.05 (0.98, 1.13)
	4 sessions	6.46	1.08 (0.99, 1.18)	1.07 (0.98, 1.17)
	5 sessions	4.80	1.40 (1.26, 1.55)	1.06 (0.96, 1.18)
	6 sessions	2.02	1.35 (1.16, 1.58)	1.08 (0.93, 1.26)
	7 sessions	1.41	1.55 (1.28, 1.88)	0.88 (0.72, 1.07)
	8+ sessions	1.21	1.53 (1.24, 1.89)	0.78 (0.63, 0.98)
Child’s companions for physical activity at home in the past week*	No companion	11.52	Ref	Ref
	Whole family together	58.54	0.88 (0.84, 0.92)	0.29 (0.27, 0.30)
	Male adult carer	33.52	1.04 (1.00, 1.09)	0.34 (0.32, 0.36)
	Female adult carer	32.65	1.21 (1.15, 1.26)	0.56 (0.54, 0.59)
	Grandparents	22.56	1.02 (0.97, 1.08)	0.18 (0.16, 0.19)
	Siblings	32.37	1.52 (1.45, 1.59)	1.76 (1.68, 1.84)
	Relatives (e.g. cousins)	8.96	1.38 (1.28, 1.49)	1.31 (1.22, 1.42)
	Friends	37.48	1.66 (1.59, 1.74)	2.41 (2.30, 2.52)
Ease/Difficulty of locating places for the child to be physically active	Difficult	9.64	Ref	Ref
	Easy	90.36	1.65 (1.52, 1.79)	0.69 (0.64, 0.75)
The child finds being physically active fun	Disagree	1.88	Ref	Ref
	Neither agree nor disagree	3.51	1.31 (1.09, 1.58)	0.97 (0.80, 1.16)
	Agree	94.61	2.95 (2.53, 3.44)	1.02 (0.88, 1.19)
Self-efficacy to be active during free time	Disagree	4.52	Ref	Ref
	Neither agree nor disagree	9.15	1.30 (1.16, 1.46)	1.16 (1.03, 1.30)
	Agree	86.33	2.83 (2.56, 3.12)	1.05 (0.95, 1.16)
Self-efficacy to ask an adult (parent, carer) to be physically active with them	Disagree	5.01	Ref	Ref
	Neither agree nor disagree	10.93	1.19 (1.07, 1.32)	0.84 (0.75, 0.94)

Table 4 High and increased physical activity after voucher use and associated personal/social factors (Continued)

		Prevalence among all children (n = 32, 250)	Binomial comparisons from 32,250 children using 41,662 observations	
			Model 1 - Observations of children active ≥ 5 days per week (n = 24,268), compared to those active on < 5 days per week (n = 17,394) after voucher use	Model 2 - Observations from children who increased the number of days they achieve 60 min of physical activity (n = 12,853), compared to those who maintained same level (n = 24,711) or decreased (n = 4098) days achieving 60 min
		%	Odds Ratio (95%CI)	Odds Ratio (95%CI)
Self-efficacy to ask a friend to be physically active with them during their free time	Agree	84.00	1.67 (1.53, 1.83)	0.76 (0.69, 0.83)
	Disagree	6.32	Ref	Ref
	Neither agree nor disagree	10.61	1.27 (1.15, 1.40)	1.00 (0.90, 1.10)
Happiness	Agree	83.07	1.86 (1.72, 2.02)	0.84 (0.77, 0.91)
	Unhappy	7.60	Ref	Ref
	Neither happy nor unhappy	4.06	0.70 (0.62, 0.80)	10.98 (9.15, 13.18) **
Full of energy	Happy	88.35	1.39 (1.29, 1.49)	8.98 (7.69, 10.49) **
	Never/Rarely	8.00	Ref	Ref
	Quite often /Always	92.00	3.45 (3.12, 3.82)	1.32 (0.88, 1.97)
Feels lonely	Never/Rarely	92.05	Ref	Ref
	Quite often /Always	7.95	0.49 (0.44, 0.55)	0.81 (0.73, 0.90)
	Unable to concentrate	16.67	0.64 (0.59, 0.69)	0.87 (0.81, 0.94)

* Participants could select all companions the child had for physical activity, **Due to a low number of children in the comparison group in this model, these values should be interpreted with caution

disadvantaged areas compared to advantaged areas, however the dose-response relationship estimated by Reece et al. using population medians was far smaller in our natural experiment [15]. The Active Kids voucher supported two fifths of children's weekly time participating in structured physical activities. This is the first study to report the contribution of voucher-specific activity to children and adolescent's total time participating in structured physical activity. The contribution of the voucher to expense and structured physical activity duration suggests that children and adolescents who used an Active Kids voucher are participating in a variety of structured physical activities rather than specialising in one, which is ideal for ongoing participation [49]. Vella et al. has previously highlighted that structured physical activity participation alone is not enough to accrue health benefits of physical activity [50]. Our data also shows that children with lower self-efficacy to be active in their free time and those who found it difficult to participate in physical activity increased their physical activity levels after using a voucher. The Active Kids voucher makes a clear contribution to participation in structured physical

activity for children and adolescents in NSW, reducing (but not removing) the cost barrier to structured physical activity participation and with reduced cost barriers, also increasing their physical activity levels.

There is strong evidence that comprehensive, multi-component strategies are required to increase physical activity and prevent non-communicable disease [1, 48]. The ACTIVE trial included peer mentoring and support worker engagement components in addition to the financial incentives, although these were unsuccessful [18]; James et al. reported a need to overcome accessibility barriers [18]. Scalable components which address modifiable barriers, in addition to cost, such as mass-media campaigns and enhanced active travel infrastructure have not been investigated with financial incentive interventions to date.

Regular participation in structured physical activity outside of school has immediate and long-term benefits for children's development, educational attainment, physical, psychological and social health [2, 4, 51]. Participation during childhood is predictive of a lasting commitment to engage in structured physical activity [7, 8]. Previous

research has shown that children and adolescents whose caregivers know children's physical activity guidelines and achieve the physical activity guidelines for adults themselves, are more likely to be Active Kids [52, 53]. This was also true in our study population with female adult caregivers having a stronger association with high activity than male adult carers, grandparents or the whole family together. Children who achieved ≥ 5 days of moderate-to-vigorous physical activity per week were more likely have self-efficacy to be active alone and with others, more likely to be happy, be able to concentrate, and less likely to express feelings of loneliness. Children who were highly active and who increased their active days during their participation in the Active Kids program more likely to be physically active with other children (siblings/friends/teammates/cousins). Social connections developed through hours of structured physical activity participation during the Active Kids program could be associated with higher physical activity levels. These findings demonstrate the strength of social support for initiating and sustaining physical activity, and how essential interpersonal relationships between young people are in positively influencing physical activity participation. Fostering the development of social connections during structured physical activity may provide additional health enhancing benefits.

Program design features of financial incentive interventions for youth physical activity participation have been varied in all settings of implementation [18–21]. Features such as the target population, administration process, activity eligibility, activity duration, and amount of financial support are likely to moderate the effectiveness of these incentives. The Active Kids program targeted all school-enrolled children and, in Australia, was innovative as it broadened from sport to include all structured physical activities, as in the Canadian Fitness Tax-Credit [21]. Prior to this, interventions by the NSW government, Australia with structured physical activity providers were mostly with sports organisations. The Active Kids program was the only known financial incentive program internationally to accredit eligible activities, to ensure they provided moderate-to-vigorous physical activity and lasted for at least 8 weeks. This allowed a diverse range of providers from across the state to register as an activity provider in the program, rather than known sports organisations, perhaps appealing to children who may not be interested in sport but were considering other structured physical activities. Notably though, the Active Kids vouchers could not be used for school holiday programs (duration < 8 weeks) or programs held during school time or delivered by schools [29]. The definition of structured physical activities, the duration of program, and point of sale financial support provided by the Active Kids voucher were central to the high community reach [26], and improvements in physical activity behaviours. The ACTIVE trial has

highlighted the importance of ensuring incentivised activities align with adolescents personal preferences [18]. Although this is a more resource intensive approach, it is a promising strategy for populations who are hard to reach.

Collectively, this population-wide study has implications for public policy maker efforts to increase physical activity participation in children and young people. The prospective cohort study design which explored outcomes in using natural experimentation suggest that these results are may be generalisable to similar populations. The Active Kids program includes a substantial sample of NSW children, compared to Census data, which allows us to provide confident estimates of the outcomes achieved through the program [26]. Although the study sample was generally representative of all children who used an Active Kids voucher (Table 1), limitations exist. Consistent with other natural experiments of policy interventions and the scale of the Active Kids program, we were unable to establish a comparison group [28]. The cohort participants reflect a bias towards a healthier more active population, especially those who completed two surveys, with underrepresentation from children living in socio-economically disadvantaged areas, obese children and children who casually participated in sport in the 12 months before registration. Older adolescents were under-represented in the sample and of those participating, adolescents who used an Active Kids voucher were more active and engaged in sport at registration. The online questionnaire was the most pragmatic measurement tool, however we acknowledge that the use of self-report data (often reported by-proxy through parent/guardian) is prone to social desirability bias and recall bias [39]. There is potential that pre-test sensitization may have inflated the effects of the intervention through repeated use of the measurement tool, however this cannot be estimated. Future studies should strive to use device-based measurement to monitor change in physical activity. Finally, data were collected using validated self-report or proxy-report items where possible; items for all ages (4.5–18 years) included in our study however if adults were completing the survey without the child present, social and wellbeing items were skipped to strengthen internal validity. Further research should continue to strengthen the tools available for the evaluation of scaled-up interventions for children of all ages. The pragmatic approach in the evaluation of this natural experiment was central to beginning to understand the long-term influences of the Active Kids voucher program children and adolescents.

Conclusion

The Active Kids program reduced the cost of structured physical activity for children and adolescents in NSW and significantly increased children's physical activity

levels up to at least 6 months after voucher use. Thereby, the Active Kids program shows promise as a scaled-up effective intervention to increase children and adolescents' physical activity participation. This study provides unique and policy-informing insight into how state-wide public sector financial incentives can positively effect children and adolescents' physical activity behaviours, and the associated economic, personal and social impacts. Further work is needed across government and in the private sector to leverage Active Kids to successfully reduce inequities in children and adolescents' physical activity levels and increase the proportion of school-aged children achieving health enhancing physical activity levels.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-020-10060-5>.

Additional file 1: Active Kids evaluation survey question items

Additional file 2: Multivariable analysis for number of days doing 60 min physical activity

Abbreviations

NSW: New South Wales; BMI: Body Mass Index z-scores; 95%CI: 95% Confidence Interval

Acknowledgements

We would like to thank the children and their parent/caregivers for taking time to participate in this study. We also thank and acknowledge the contributions of the following individuals whom support the SPRINTER partnership and our evaluation of the NSW Government Office of Sport's Active Kids program: Dr. Phil Hamdorf, David Cushway, Jacqueline Nguyen, Nivi Srinivasan, Philippa Taylor, Karen Jones and Associate Professor Philayrath Phongsavan.

Authors' contributions

BCF, AEB, WB and LJR contributed to the evaluation design. BCF, KBO and LJR acquired the data. BCF led the development of the research questions, data analysis, interpretation of the results and the preparation of this manuscript. KBO and AEB provided biostatistical advice. All authors contributed to the interpretation of the results and were involved in revising the manuscript for important intellectual content. All authors critically reviewed the manuscript and had final approval of the submitted version. The authors read and approved the final manuscript.

Funding

The SPRINTER research group is a research partnership between the University of Sydney and Office of Sport NSW Government and receives funding from the Office of Sport to complete an annual workplan of agreed academic and policy relevant deliverables. It is through this research group that this piece of research was conducted. The Office of Sport however did not have any role in the study design, analysis or write up of this research.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the University of Sydney Human Research Ethics Committee (Reference: 2017/947). Consent (written) was indicated by each participant, or by-proxy by their parent/guardian during their registration in the Active Kids program through a bespoke government platform and by return of the online survey.

Consent for publication

Written consent to publish was obtained from all participants, or by-proxy from their parent/guardian.

Competing interests

The authors declare that they have no competing interests.

Received: 26 May 2020 Accepted: 13 December 2020

Published online: 11 January 2021

References

- World Health Organization. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018.
- World Health Organization. Global recommendations on physical activity for health. Geneva, Switzerland: World Health Organization; 2010.
- Australian Government Department of Health. Australian 24-Hour Movement Guidelines for Children and Young People (5 to 17 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep. Australian Government; 2019.
- Mammen G, Faulkner G. Physical activity and the prevention of depression: a systematic review of prospective studies. *Am J Prev Med.* 2013;45(5):649–57.
- Lee JE, Pope Z, Gao Z. The Role of Youth Sports in Promoting Children's Physical Activity and Preventing Pediatric Obesity: A Systematic Review. *Behav Med (Washington, D C).* 2018;44(1):62–76.
- Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc Health.* 2020;4(1):23–35.
- Palomaki S, Hirvensalo M, Smith K, Raitakari O, Mannisto S, Hutri-Kahonen N, et al. Does organized sport participation during youth predict healthy habits in adulthood? A 28-year longitudinal study. *Scand J Med Sci Sports.* 2018; 28(8):1908–15.
- Telama R, Yang X, Viikari J, Valimaki I, Wanne O, Raitakari O. Physical activity from childhood to adulthood: a 21-year tracking study. *Am J Prev Med.* 2005;28(3):267–73.
- Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc.* 2000;32(5):963–75.
- Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *Int J Behav Nutr Phys Act.* 2013;10:135.
- Bronfenbrenner U. The ecology of human development: Harvard University press; 1979.
- Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC Pediatr.* 2018;18(1):47.
- Hardy LL, Kelly B, Chapman K, King L, Farrell L. Parental perceptions of barriers to children's participation in organised sport in Australia. *J Paediatr Child Health.* 2010;46(4):197–203.
- Bellew B, Young S. Voucher schemes to promote increased participation in sport and active recreation: rapid evidence review for the NSW Office of Sport.: SPRINTER Group, The University of Sydney; 2017.
- Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC Public Health.* 2020;20(1):19.
- von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *Am J Public Health.* 2011;101(8):e10–6.
- Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC Public Health.* 2016;16:890.
- James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active children through individual vouchers evaluation: a mixed-method RCT. *Am J Prev Med.* 2020;58(2):232–43.
- Short KR, Chadwick JQ, Cannady TK, Branam DE, Wharton DF, Tullier MA, et al. Using financial incentives to promote physical activity in American Indian adolescents: a randomized controlled trial. *PLoS One.* 2018;13(6): e0198390.

20. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The use of refundable tax credits to increase low-income Children's after-school physical activity level. *J Phys Act Health*. 2015;12(6):840–53.
21. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's fitness tax credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
22. Bauman A, Nutbeam D. Planning and evaluating population interventions to reduce noncommunicable disease risk - reconciling complexity and scientific rigour? *Public Health Res Pract*. 2014;25(1):e2511402.
23. Ogilvie D, Adams J, Bauman A, Gregg EW, Panter J, Siegel KR, et al. Using natural experimental studies to guide public health action: turning the evidence-based medicine paradigm on its head. *J Epidemiol Community Health*. 2020;74(2):203–8.
24. Sport Budget 2017–18: New South Wales Government, Office of Sport; [Available from: <https://sport.nsw.gov.au/sectordevelopment/sport-budget-2017-18>].
25. Reece LJ, Foley BC, Bellew W, Owen K, Cushway D, Srinivasan N, Hamdorf P, Bauman A. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Res Pract*. 2020; Online early publication. <https://doi.org/10.17061/phrp30122006>.
26. Foley BC, Owen KB, Bellew W, Wolfenden L, Reilly K, Bauman AE, et al. Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach? *Int J Environ Res Public Health*. 2020;17(16):5691.
27. Owen KB, Foley BC, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the active kids program across socioeconomic groups. *J Sci Med Sport*. 2020.
28. Crane M, Bohn-Goldbaum E, Grunseit A, Bauman A. Using natural experiments to improve public health evidence: a review of context and utility for obesity prevention. *Health Res Policy Syst*. 2020;18(1):48.
29. Office of Sport. Active Kids: NSW Government; 2018 [Available from: <https://sport.nsw.gov.au/sectordevelopment/activekids>].
30. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol*. 2008;61(4):344–9.
31. Eysenbach G. Improving the quality of web surveys: the checklist for reporting results of internet E-surveys (CHERRIES). *J Med Internet Res*. 2004;6(3):e34.
32. Sport Australia. AusPlay Results: Clearinghouse for Sport; 2020 [Available from: <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/results>].
33. Australian Bureau of Statistics. Census of population and housing: Socio-Economic Indexes for Areas (SEIFA) - Technical paper. Canberra: Australian Bureau of Statistics; 2006. Contract No.: No.2039.0.55.001.
34. Department of Health and Aged Care. Measuring remoteness: accessibility/remoteness index of Australia (ARIA). Canberra: Commonwealth of Australia; 2001.
35. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes*. 2012;7(4):284–94.
36. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155(5):554–9.
37. Scott JJ, Morgan PJ, Plotnikoff RC, Lubans DR. Reliability and validity of a single-item physical activity measure for adolescents. *J Paediatr Child Health*. 2015;51(8):787–93.
38. Commission AS. AusPlay: survey questions. Australian Sports Commission: Canberra; 2016.
39. Hidding LM, Chinapaw MJM, van Poppel MNM, Mokkink LB, Altenburg TM. An updated systematic review of childhood physical activity questionnaires. *Sports Med*. 2018;48(12):2797–842.
40. Motl RW, Dishman RK, Trost SG, Saunders RP, Dowda M, Felton G, et al. Factorial validity and invariance of questionnaires measuring social-cognitive determinants of physical activity among adolescent girls. *Prev Med*. 2000;31(5):584–94.
41. Motl RW, Dishman RK, Saunders R, Dowda M, Felton G, Pate RR. Measuring enjoyment of physical activity in adolescent girls. *Am J Prev Med*. 2001;21(2):110–7.
42. Sorensen K, Van den Broucke S, Pelikan JM, Fullam J, Doyle G, Slonska Z, et al. Measuring health literacy in populations: illuminating the design and development process of the European health literacy survey questionnaire (HLS-EU-Q). *BMC Public Health*. 2013;13:948.
43. Hume C, Ball K, Salmon J. Development and reliability of a self-report questionnaire to examine children's perceptions of the physical activity environment at home and in the neighbourhood. *Int J Behav Nutr Phys Activ*. 2006;3:16.
44. New South Wales Ministry of Health. New South Wales Population Health Survey. Child Population Health Survey. Sydney: New South Wales Government; 2005.
45. Milton K, Bull FC, Bauman A. Reliability and validity testing of a single-item physical activity measure. *Br J Sports Med*. 2011;45(3):203–8.
46. Ding D, Lawson KD, Kolbe-Alexander TL, Finkelstein EA, Katzmarzyk PT, van Mechelen W, et al. The economic burden of physical inactivity: a global analysis of major non-communicable diseases. *Lancet*. 2016;388(10051):1311–24.
47. Crosland P, Ananthapavan J, Davison J, Lambert M, Carter R. The economic cost of preventable disease in Australia: a systematic review of estimates and methods. *Aust N Z J Public Health*. 2019;43(5):484–95.
48. Varney J, Brannan M, Aaltonen G, Cavill N, King S, Guerra L. Everybody active, every day: An evidence-based approach to physical activity. London: Public Health England; 2014.
49. Hallal PC, Victora CG, Azevedo MR, Wells JCK. Adolescent physical activity and health. *Sports Med*. 2006;36(12):1019–30.
50. Vella SA, Schranz NK, Davern M, Hardy LL, Hills AP, Morgan PJ, et al. The contribution of organised sports to physical activity in Australia: results and directions from the active healthy kids Australia 2014 report card on physical activity for children and young people. *J Sci Med Sport*. 2016;19(5):407–12.
51. Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *Int J Behav Nutr Phys Act*. 2013;10:98.
52. Rodrigues D, Padez C, Machado-Rodrigues AM. Active parents, active children: the importance of parental organized physical activity in children's extracurricular sport participation. *J Child Health Care*. 2018;22(1):159–70.
53. Biddle SJH, Atkin AJ, Cavill N, Foster C. Correlates of physical activity in youth: a review of quantitative systematic reviews. *Int Rev Sport Exerc Psychol*. 2011;4(1):25–49.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

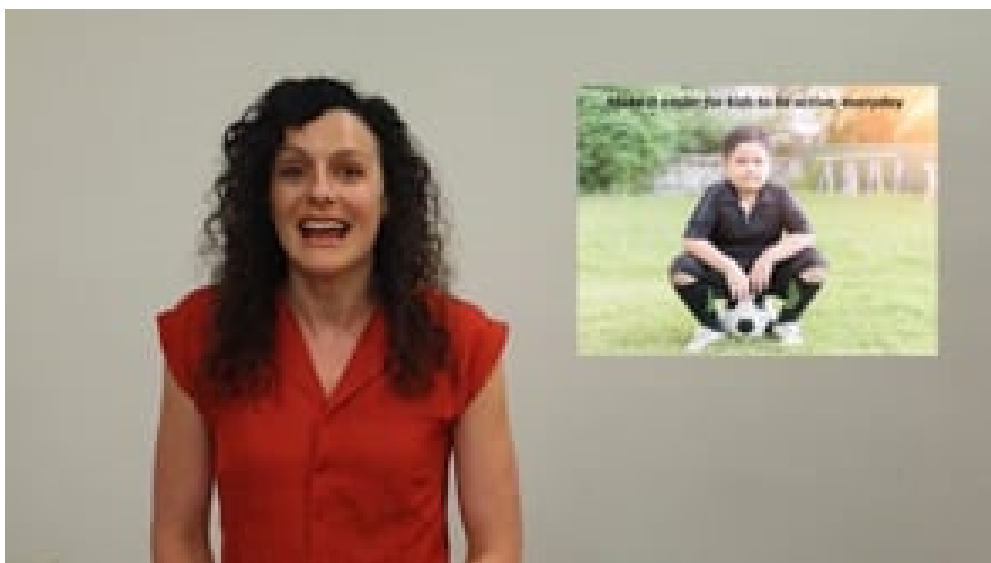


5.2 CHAPTER CONCLUSIONS

This chapter presented original research on the Active Kids program in NSW, addressing the effect dimension of the RE-AIM framework. In summary, children that used an Active Kids voucher increased the number of days per week they achieved 60 minutes of physical activity from 4.0 days to 4.9 days after six months. This is the first large-scale financial incentive program to demonstrate positive effects on children’s physical activity levels (see Chapter 2). The contribution of the subsidised activity to physical activity levels had not been assessed in previous studies (see Chapter 2). This study demonstrated that the Active Kids voucher contributed 42% of the total time children participated in structured physical activities outside-of-school; and made a more significant contribution to participation for 15–18 years olds, Aboriginal and Torres Strait Islanders, children that spoke a language other than English at home, had a disability, lived in socio-economically disadvantaged areas, or were obese (not overweight).

The candidate created a video summarizing the results from Chapters 4 and 5 and entered it into the three-minute thesis competition (Figure 13). Her video entry won the Faculty of Medicine and Health’s competition in 2020 and was a Finalist in the University of Sydney’s 3MT competition.

Figure 13 Three-minute thesis video summarising Chapters 4 and 5 - available: <https://vimeo.com/445433330>



Later, Chapter 8 will present long-term effectiveness of the Active Kids vouchers on children’s physical activity levels. The next chapter in this thesis (Chapter 6) will focus on the children the program reached (i.e., registered for a voucher) but who did not use the voucher to reduce the cost of registration in a structured physical activity program.

6 ADOPTION OF THE ACTIVE KIDS VOUCHER BY REGISTERED CHILDREN

6.1 CHAPTER OUTLINE

The previous two chapters addressed the Reach and Effect dimensions of the RE-AIM framework. This chapter will address the adoption dimension of the RE-AIM framework to provide further insights into the impact of the Active Kids voucher program on school-aged children's physical activity levels in NSW. Program adoption is defined as the redemption of a voucher with a registered Active Kids provider. It is a critical step in the program theory between registration in the Active Kids program (Reach) described in Chapter 4 and accruing the potential effects of using a voucher described in Chapter 5. Adoption of the voucher program is an important aspect of the implementation process because it describes the participation of school-aged children in structured physical activity programs at a subsidised cost.

This chapter compares the characteristics of registered children *who did not use* an Active Kids voucher with children who did redeem a voucher. Reasons for not redeeming an Active Kids voucher before it expired were explored among a sample of research participants. Understanding the reasons for not using a voucher can inform strategies to support and enable more equitable use of the Active Kids vouchers.

6.2 INTRODUCTION

6.2.1 Enabling children to participate in structured physical activity programs

Chapter 1 highlighted the importance of enabling all school-aged children to be physically active(1). The recreational physical activity domain (including structured and unstructured physical activity) has been underutilised for the promotion of physical activity(2, 3). Evidence shows that structured physical activity programs that are delivered by an organisation, such as a sports club, provide school-aged children with health and well-being benefits, in addition to the benefits of unstructured physical activity(4, 5). Skilled and enthusiastic coaches or delivery staff can develop children's fitness, skills, and capability to be active through structured programs(4). The habitual allocation of time to structured physical activity outside-of-school appears to be associated with avoiding dropout and maintaining higher levels of physical activity participation in later life(4). Children may participate in structured physical activity programs as an individual or as part of a team, but the social aspect of team sports appears to enhance social and psychological benefits(4, 5). The benefits of structured physical activity participation are clear, yet mechanisms for equitable delivery of these programs are not well established.

Somerset and Hoare's systematic review of barriers to children's participation in structured physical activity programs (sports) examined qualitative and quantitative studies identifying that 'lack of time', 'high cost' and 'location' are key barriers that make it harder for children to participate(6). Populations most exposed to modifiable barriers include girls, children from low socio-economic backgrounds, culturally and linguistically diverse children and children who identify as Indigenous(6, 7). Chapters 1 explored the barriers to structured physical activity participation for school-aged children across various levels of the socio-ecological model — highlighting that there is no single way to overcome barriers to participation in structured physical activity(6, 8, 9). Inequities in the opportunity to participate in structured physical

activity among sociodemographic population groups are observed internationally and in Australia(3, 10). Effective interventions which address school-aged children's barriers to structured physical activity participation and address persistent inequalities are required(3).

6.2.2 Adoption of financial incentives

Chapter 2 explored financial incentive interventions that reduced the cost barriers to participation in structured physical activity(11). A scoping review identified a lack of comprehensive, real-world evaluations of financial incentives supporting children's participation in physical activity. Among the identified interventions, implementation factors such as awareness, reach, and adoption among the target population were rarely reported (Chapter 2). Previous studies of large-scale financial incentives schemes have shown difficulties in achieving equitable adoption of financial incentives for structured physical activity or sport(12-14). The Canadian Fitness Tax Credit was universally available but provided more support to those with the least need, i.e., socio-economically advantaged families(12, 15, 16). The German "KOMM! In den Sportverein" intervention reported similar results, finding that the vouchers were best adopted by existing sports club members rather than encouraging children to join a sports club(14). Theories of behaviour change, and behavioural economics principles predict that the adoption of a financial incentive will be lower in population groups faced with more significant barriers to participation(17-19). Evidence recommendations indicate that tailored interventions are required to address barriers proportionately among populations where lower program adoption can be anticipated(3).

There is a need to understand factors that influence program adoption and to test the efficacy of additional strategies to improve program adoption in disadvantaged populations. The two large-scale financial incentives implemented in Canada and Germany identified in peer-reviewed literature were studied retrospectively (Chapter 2); therefore, their findings did not inform interventions in practice(12-14). One smaller-scale study identified in Chapter 2 had tailored its financial incentive intervention to enable access to unstructured physical activities for disadvantaged 13-14-year-old students after feasibility testing(20, 21). This financial incentive intervention included multiple strategies to reduce barriers to voucher use for participants. The main strategies tested to improve program adoption were unsuccessful (peer mentoring and support worker engagement); inequities in voucher use were not overcome(20). The Australian large-scale financial incentive programs identified in Chapter 2 may employ strategies to improve program adoption however their effects have not been evaluated. There is limited evidence of strategies that may be implemented to improve program adoption during implementation. The prospective nature of the Active Kids evaluation presented a unique opportunity to build evidence of how to address equality in adoption and whether proportionately targeted strategies enhance program adoption. This study presents annual adoption rates for all children during the first three years of Active Kids implementation and explores the reasons for not using a voucher to identify opportunities to improve program adoption.

6.3 METHODS

This mixed-method repeat cross-sectional study examined the adoption of the Active Kids program among all registered children during 2018, 2019, and 2020, and the reasons for not using a voucher reported by research participants across the same period. Methods and results for the two groups of participants are presented separately.

The ethical aspects of this study were approved by the University of Sydney Human Research Ethics Committee (Reference: 2017/947).

6.3.1 Data collection from all registered children

All children who registered for an Active Kids voucher using the online government administration platform between January 31st, 2018, and December 31st, 2020, were included in the study. Further details on the Active Kids program, participant eligibility, and recruitment are described in Chapter 3.

6.3.1.1 Online Administration platform data

Children's sociodemographic information was collected through a bespoke online government administration platform. The compulsory registration data fields included their name, date of birth, sex, Indigenous status, disability status, language spoken at home, postcode, physical activity levels in the past 7 days, sport participation in the past 12 months, and consent for research. The child's height and weight were requested, although not a compulsory part of registration in 2018 (compulsory in 2019 and 2020). The child's school and Medicare details were also collected to validate children's eligibility but were not shared with the research team for privacy reasons.

6.3.1.2 Voucher redemption data

Participants' Active Kids voucher redemption status (Yes/No), and the date of voucher redemption were recorded by the government platform and sent to the evaluation team with a unique identifier. The unique identification number was used to link an individual redemption status, registration data, and survey responses if they participated.

6.3.2 Data analysis

We classified participants sociodemographic characteristics using registration data. Date of birth was used to categorise children into four age groups (4–8 years; 9–11 years; 12–14 years; 15–18 years), which are consistent with the developmental stages for children and adolescents defined by the Sport sector in Australia(22). Children's socio-economic status was derived from their reported postcode using the Australian Bureau of Statistic's Socio-Economic Index For Areas Index of Relative Disadvantage(23). National percentiles were then recoded into quartiles. Geographic location was classified using the reported postcode and determined using Accessibility/Remoteness Index of Australia Plus(24); outer regional and remote regions were combined in the analysis. Height and weight fields were included in the registration platform; however, the fields were not mandatory during 2018. Body Mass Index z-scores (BMI) were calculated using the height and weight of the child reported during the registration process. Children were classified as thin, healthy weight, overweight or obese using the International Obesity Task Force cut points(25). Children who did not achieve at least 60 minutes of moderate-to-vigorous physical activity on 7 days in the week before registering in the Active Kids program were classified as not meeting physical activity guidelines(26, 27). The child's annual number of structured physical activity sessions they participated in before registering in the Active Kids program was used to classify them into five categories, ranging from non-participant (0 sessions in the past 12 months) to committed participant (>208 sessions in the past 12 months, approximating four times per week).

Frequencies and proportions of redemption status (voucher use) were calculated for each calendar year. Associations between program adoption and sociodemographic characteristics were explored. Regression analyses calculated the odds ratios of redeeming a voucher among sociodemographic groups each calendar year. All analyses were conducted using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, N.Y., USA).

6.3.3 Data collection from research participants

The same data collected from all children registered in the program were available for participants in the research sub-study. Parents/caregivers who provided consent for research at voucher registration were invited to complete an online survey.

6.3.3.1 Online survey

Surveys were administered at various time points each year (Figure 14). The timing of the surveys approximately adhered to the research protocol i.e. 8-weeks after voucher use(28) but were administered at slightly varying times after voucher use due to technical limitations of the platform. Within the online surveys, respondents were asked whether they had used a voucher during the calendar year or not. Self-report redemption status (Yes/No) at the time of completing the survey was used to tailor the survey questions for non-redeemers. Self-reported voucher use was the only way to identify who had and had not used a voucher when surveys were distributed. It was not possible to identify whether the voucher had been used systematically. Therefore, all parents/caregivers were invited to participate in the survey using identical instructions. Survey invitations advised recipients to participate whether they had redeemed their voucher or not, stating, "Even if you have not redeemed your voucher, we still want to hear from you" or similar.

System-recorded voucher redemption status was linked to children's unique ID at the end of each year. The system recorded voucher redemption status was used to classify survey participants' voucher redemption status. Participants that had not redeemed a voucher when they responded to the survey but later redeemed their voucher were categorised post-hoc as redeemers and excluded from this analysis.

Figure 14 Number of responses to each online survey between 2018 and 2020

Survey 1 (Apr 2018)	Survey 2 (Nov 2018)	Survey 3 (Apr 2019)	Survey 4 (Jun 2019)	Survey 5 (Nov 2019)	Survey 6 (May 2020)	Survey 7 (Nov 2020)
➤: 186079	➤: 217346	➤: 687860	➤: 524186	➤: 621071	➤: 767014	➤: 559812
✓: 25990	✓: 38622	✓: 64147	✓: 40572	✓: 32214	✓: 19850	✓: 15386
⊖: 0 (not invited)	⊖: 2461 (6.4%)	⊖: 1395 (2.2%)	⊖: 836 (2.1%)	⊖: 408 (1.3%)	⊖: 199 (1.0%)	⊖: 322 (2.1%)

- Invited to participate.
- ✓ Responded to survey.
- ⊖ Provided a reason for not using the Active Kids voucher.

Parents/caregivers of non-redeemers were asked to report their main reason/s for not redeeming an Active Kids voucher through a multiple-response question with pre-defined options. The question and the pre-defined response options were developed for this study by the research team. Participants could select up to three responses, including 'Other' where an open text field was available for them to enter alternate reasons for non-redemption.

The pre-defined options were:

- Activity not started/registered before the season or term
- Activity cancelled or postponed due to the coronavirus pandemic
- Activity the child does isn't part of the Active Kids program
- Forgot to use the voucher at registration
- Not sure how or where to redeem the voucher
- No registered Active Kids programs available near me
- Technical issues with the activity registration website

- No time for the child to do the activity
- The adult's commitments make registration challenging
- The child feels anxious or nervous about participating
- The voucher has been redeemed
- Child illness or disability
- Child injury
- The child refused to participate
- Other (text entry)

6.3.4 Data analysis

Reported reasons for not redeeming their voucher were descriptively analysed. Frequencies and proportions were calculated for each year and by sociodemographic groups. A large proportion (n=2470, 43.9%) of non-redeemers selected 'Other' while completing the online survey and provided an additional open text reason. The candidate reviewed all responses. The responses were re-coded to the corresponding option, where text aligned with a pre-defined option that had not been selected. Qualitative open coding was undertaken where text did not align with a pre-defined option, and responses were inductively categorised into new themes for not redeeming a voucher. Most open-text responses illustrated additional context of the pre-defined reasons; the additional themes were not commonly reported (<5%). The additional themes were:

- Cost — still too expensive to participate
- The activity was full, no spots available for the child
- Moved/relocated/travelling
- Live near the border to another state/territory where the voucher could not be redeemed (border town)
- The child attends a private school/ does sports at school
- Activity is free; no voucher required
- Used Creative Kids voucher
- Poor quality experience with activity providers
- Saving voucher/s for better value, budgeting

Some open text responses provided more in-depth qualitative data illustrating the pre-defined responses, therefore a selection is presented within the results to provide additional context and understanding of reasons for not using a voucher among sociodemographic groups.

6.4 RESULTS

6.4.1 Program adoption for all registered children

Table 6 presents the number and proportion of all children registered in the Active Kids program who used and did not use a voucher in 2018, 2019 and 2020. Approximately four out of five children (81.2% in 2018; 85.2% in 2019; 81.8% in 2020) that registered for an Active Kids voucher adopted the program each year, indicated by using at least one voucher. In 2019 and 2020, two vouchers were available to all children; 49.4% and 41.4% of registered children redeemed two vouchers in 2019 and 2020, respectively.

Children who indicated they had participated in zero structured physical activity sessions 12 months before registration had the lowest odds of redeeming an Active Kids voucher (OR 0.25 in 2018, OR 0.20 in 2019 and OR 0.16 in 2020). Children who were 15-18 years old, living with a disability, identified as Aboriginal or Torres Strait Islander, spoke a primary language other than English at home, lived in the most disadvantaged areas or outer regional or remote areas, and children who were not meeting physical activity guidelines or participated in fewer sessions of structured physical activity had the lowest odds of redeeming an Active Kids after registering in the Active Kids program (Table 6).

The proportion of participants in each sociodemographic group that did not redeem a voucher varied across each year of program delivery; however, the associations between program adoption and sociodemographic characteristics remained consistent across all years of the program.

Table 6 Odds of redeeming at least one voucher in 2018, 2019 and 2020 by sociodemographic characteristics

	Voucher use in 2018					Voucher use in 2019					Voucher use in 2020				
	No vouchers		1 voucher		Odds of redeeming a voucher in 2018	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2019	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2020
	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)
All persons	124,873	18.78	540,100	81.22		114,995	14.80	662,245	85.21		144,767	18.20	650,761	81.80	
Age category															
4–8 years	43,830	16.40	223,417	83.60	Reference	39,388	12.33	280,057	87.67	Reference	53,200	16.56	268,074	83.45	Reference
9–11 years	30,884	16.80	152,971	83.20	0.97(0.96,0.99)	28,062	13.46	180,486	86.54	0.79(0.77,0.80)	34,240	16.44	174,002	83.56	0.86(0.85,0.88)
12–14 years	28,381	20.76	108,305	79.24	0.75(0.74,0.76)	26,744	16.91	131,433	83.09	0.51(0.50,0.53)	32,233	19.37	134,188	80.63	0.63(0.62,0.65)
15–18 years	21,778	28.22	55,407	71.78	0.50(0.49,0.51)	20,801	22.84	70,269	77.16	0.31(0.30,0.32)	25,094	25.2	74,497	74.80	0.40(0.39,0.41)
Sex															
Boys	62,740	17.51	295,483	82.49	Reference	57,679	14.10	351,319	85.9	Reference	71,134	17.07	345,472	82.93	Reference
Girls	61,929	20.25	243,849	79.75	0.84(0.83,0.85)	57,084	15.56	309,837	84.44	0.89(0.88,0.91)	73,168	19.42	303,618	80.58	0.86(0.85,0.87)
Missing	204	20.99	768	79.01	0.80(0.69,0.93)	232	17.56	1,089	82.44	1.22(1.03,1.45)	465	21.77	1,671	78.23	0.73(0.65,0.82)
Aboriginal identity															
Non-Aboriginal and Torres Strait Islander	114,936	18.51	505,841	81.49	Reference	105,902	14.59	619,871	85.41	Reference	134,173	18.01	610,801	81.99	Reference
Aboriginal and Torres Strait Islander	8,236	23.05	27,502	76.95	0.76(0.74,0.78)	7,590	18.20	34,108	81.79	0.84(0.82,0.87)	9,180	21.29	33,948	78.72	0.88(0.85,0.90)
Prefer not to say	1,701	20.11	6,757	79.89	0.90(0.86,0.95)	1,503	15.39	8,266	84.62	1.07(1.00,1.14)	1,414	19.04	6,012	80.96	1.14(1.06,1.22)
Primary language spoken at home															
English	111,162	18.07	504,076	81.93	Reference	101,672	14.3	609,332	85.70	Reference	125,938	17.4	597,862	82.60	Reference
Other	13,711	27.57	36,024	72.43	0.58(0.57,0.59)	13,323	20.11	52,913	79.88	0.63(0.61,0.64)	18,829	26.25	52,899	73.75	0.58(0.57,0.59)

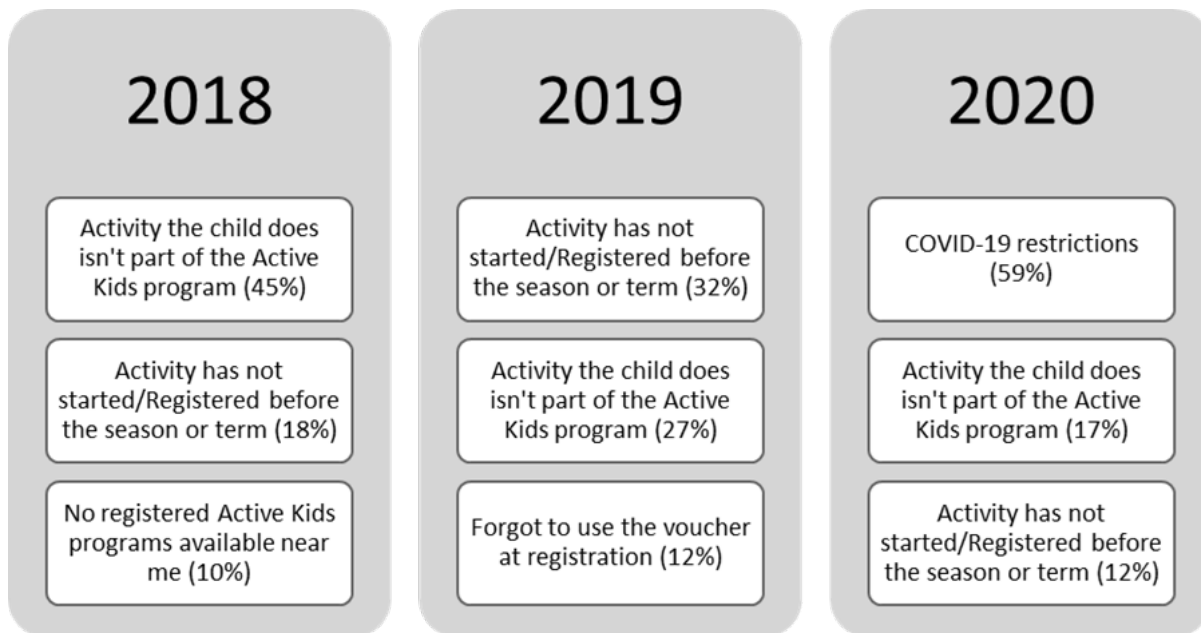
	Voucher use in 2018					Voucher use in 2019					Voucher use in 2020				
	No vouchers		1 voucher		Odds of redeeming a voucher in 2018	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2019	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2020
	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)
Identified disability															
No	117,968	18.48	520,529	81.52	Reference	108,290	14.53	636,923	85.46	Reference	135,077	17.85	621,580	82.15	Reference
Yes	4,908	27.98	12,635	72.02	0.58(0.56,0.60)	4,766	22.1	16,803	77.90	0.62(0.60,0.65)	7,148	26.07	20,269	73.93	0.65(0.63,0.67)
Prefer not to say	1,882	22.92	6,328	77.08	0.76(0.72,0.80)	1,939	18.54	8,519	81.50	0.79(0.75,0.84)	2,542	22.19	8,912	77.80	0.83(0.79,0.87)
Missing	115	15.91	608	84.09	1.20(0.98,1.46)	.	.	.	.	.	.	.	.	.	.
Socio-economic status															
4th (least disadvantaged)	36,723	16.85	181,255	83.15	Reference	35,077	13.28	228,967	86.71	Reference	45,806	16.49	232,013	83.51	Reference
3rd	30,872	17.98	140,815	82.02	0.92(0.91,0.94)	29,649	14.29	177,885	85.71	0.93(0.92,0.95)	38,177	17.82	176,115	82.18	0.93(0.91,0.95)
2nd	27,218	17.97	124,283	82.03	0.93(0.91,0.94)	25,583	14.46	151,312	85.54	0.92(0.90,0.94)	31,578	17.9	144,790	82.09	0.93(0.91,0.95)
1st (most disadvantaged)	25,350	23.58	82,155	76.42	0.66(0.65,0.67)	24,603	19.2	103,543	80.80	0.71(0.69,0.73)	29,142	22.97	97,705	77.02	0.76(0.74,0.77)
Missing	4,710	28.89	11,592	71.11	0.50(0.48,0.52)	83	13.37	538	86.64	1.12(0.70,1.78)	64	31.68	138	68.32	0.34(0.19,0.61)
Location															
Major Cities of Australia	89,305	18.70	388,319	81.30	Reference	86,277	14.91	492,331	85.08	Reference	109,527	18.23	491,338	81.77	Reference
Inner Regional Australia	23,777	17.43	112,620	82.57	1.09(1.07,1.11)	21,900	13.91	135,536	86.09	1.17(1.15,1.19)	27,450	17.50	129,447	82.50	1.09(1.07,1.11)
Outer Regional and remote Australia	7,265	20.52	28,148	79.48	0.89(0.87,0.92)	6,749	16.59	33,938	83.42	1.05(1.02,1.09)	7,729	20.58	29,827	79.42	0.99(0.96,1.02)
Missing	4,526	29.13	11,013	70.87	0.56(0.54,0.58)	69	13.56	440	86.44	0.49(0.29,0.80)	61	29.05	149	70.95	0.87(0.48,1.58)
Body mass index category															
Thin	5,728	16.33	29,348	83.67	0.99(0.96,1.02)	11,404	13.87	70,791	86.13	0.94(0.92,0.97)	15,986	17.42	75,783	82.58	0.95(0.93,0.97)

	Voucher use in 2018					Voucher use in 2019					Voucher use in 2020				
	No vouchers		1 voucher		Odds of redeeming a voucher in 2018	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2019	No voucher		At least 1 voucher		Odds of redeeming a voucher in 2020
	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)	N	%	N	%	OR (95%CI)
Healthy weight	31,384	16.19	162,420	83.81	Reference	57,116	14.02	350,212	85.98	Reference	73,766	17.15	356,461	82.85	Reference
Overweight	9,297	17.81	42,911	82.19	0.89(0.87,0.92)	19,797	15.49	108,046	84.51	0.90(0.88,0.92)	25,539	18.84	110,034	81.17	0.90(0.88,0.92)
Obesity	4,594	19.94	18,443	80.06	0.78(0.75,0.80)	12,752	16.79	63,201	83.21	0.78(0.76,0.80)	16,701	20.45	64,965	79.55	0.80(0.78,0.82)
Missing	73,870	20.47	286,978	79.53	0.75(0.74,0.76)	13,926	16.59	69,995	83.40	0.78(0.76,0.80)	12,775	22.69	43,518	77.30	0.71(0.70,0.73)
Met physical activity guidelines at registration															
Did not meet guidelines	97,052	18.91	416,267	81.09	Reference	91,061	14.8	524,110	85.20	Reference	117,119	18.43	518,435	81.58	Reference
Met guidelines	20,545	16.03	107,586	83.97	1.22(1.20,1.24)	16,982	12.52	118,661	87.48	1.03(1.00,1.05)	21,296	15.09	119,855	84.91	1.09(1.06,1.11)
Missing	7,276	30.93	16,247	69.07	0.52(0.51,0.54)	6,952	26.31	19,474	73.69	0.67(0.65,0.70)	6,352	33.75	12,471	66.26	0.68(0.66,0.71)
Annual participation in structured physical activity at registration															
At least four times a week	14,551	14.49	85,883	85.51	Reference	9,541	10.84	78,515	89.17	Reference	8,819	11.85	65,619	88.15	Reference
At least twice a week	22,182	15.19	123,836	84.81	0.95(0.93,0.97)	24,637	12.79	167,934	87.21	0.68(0.66,0.70)	30,979	15.43	169,746	84.57	0.60(0.59,0.62)
At least once a week	36,300	16.81	179,625	83.19	0.84(0.82,0.86)	27,583	12.28	197,099	87.72	0.68(0.66,0.70)	34,824	14.93	198,392	85.07	0.62(0.60,0.64)
At least once a month	36,830	25.73	106,297	74.27	0.49(0.48,0.50)	31,427	17.21	151,183	82.79	0.44(0.43,0.45)	45,880	21.34	169,108	78.65	0.37(0.36,0.38)
None	4,898	40.52	7,190	59.48	0.25(0.24,0.26)	14,844	29.8	34,970	70.2	0.20(0.19,0.20)	20,871	36.37	36,508	63.62	0.16(0.16,0.17)
Not sure	8,876	22.11	31,269	77.89	0.60(0.58,0.62)	6,963	17.62	32,544	82.38	0.51(0.49,0.53)	3,394	22.96	11,388	77.04	0.43(0.41,0.45)
Missing	1,236	17.08	6,000	82.92	0.82(0.77,0.88)	.	.	.	.	.	.	.	.	.	.

6.4.2 Reasons for not using a voucher

In total, 5621 research participants (2018=2461; 2019=2639; 2020=521) did not redeem a voucher during the calendar year and reported a reason for not using their voucher in the evaluation surveys. The leading reason for not using a voucher are shown in Figure 15. These self-report data provide the best available information on the reasons for not using a voucher. There were no substantial differences in the primary reasons for not redeeming a voucher among sociodemographic groups across years, with a persistent socio-economic gradient in voucher redemption.

Figure 15 Leading reasons for not using a voucher each calendar year (2018–2020)



Responses provided in the online survey across all years were combined to understand participants' reasons for not using a voucher. Across all years, the most common reason reported for not using a voucher for children was "Activity the child does isn't part of the Active Kids program" (34% of all reported reasons for not redeeming 2018–2020). The leading reason for not redeeming a voucher was explored by sociodemographic groups identified among all registered children as less likely to redeem a voucher. Reasons for not using a voucher were not significantly different by the sex of the child however, differences were observed by age, Aboriginal or Torres Strait Islander identity, primary language spoken at home, disability status, or BMI category, socio-economic status, location, and baseline physical activity levels. These differences are described directly, with additional responses collated from the open text box 'other' response that further detail the leading pre-defined reasons.

6.4.2.1 15–18-year-olds (n = 1318)

Older children were more likely to report the "Activity the child does isn't part of the Active Kids program" (38% of 15–18-year-olds compared to 28% of 4–8-year-olds). Open text responses suggest that senior competitions in sports didn't accept Active Kids vouchers or these children preferred gym-based activities, which were not eligible for voucher use.

Child plays in a senior football competition — and they didn't know how to redeem it

As now in Senior year, we were hoping a local gym would be of the Active Kids program, which would help with stress but no gym available. As a senior student they don't want to have to be in a group sport as additional pressure so gym would be perfect

None of the organisations she participates with will accept them despite us trying

15-year-old wants to go to gym, but gym does not accept voucher. Previously danced.

A higher proportion (7%) of 15–18-year-olds reported having "No time for the child to do the activity" compared to younger children (4% of 4–8-year-olds). Open text responses suggest that school-related study and work commitments took up their time for activity during these older years.

Child chooses just to focus on Higher School Certificate

Doing HSC. Prefers to go for a jog in own predetermined time to work around study and part-time work commitments.

He started working on the weekends and couldn't play

A higher proportion (8%) of younger children reported that "The adult's commitments make registration challenging" compared to older children (3% of 15–18-year-olds). This younger group was also more likely to report forgetting to use the voucher at registration (12% of 4–8-year-olds compared to 5% of 15–18-year-olds).

Just started school so I felt it might be too much

Haven't got around to it as focused on other things

I'm a single parent and it's very hard to find a team sport that doesn't play on weekends. Her father has refused to take her on his weekends, and I have no option to as it's his time each fortnight on the Saturday.

We have 4 children and 2 full time working parents. It's just hard to get them there.

6.4.2.2 Children living in low socio-economic areas (n=892)

Children who lived in the most disadvantaged areas of NSW were more likely to report having "No registered Active Kids programs near me" and "Not sure how or where to redeem the voucher" respectively 11% and 10% compared to 8% and 7% of participants living in the least disadvantaged areas. They were also more likely to report having no time and being nervous/anxious about participating than their less disadvantaged counterparts.

The dance school doesn't accept the voucher

Sporting club said they didn't know how to use the voucher

6.4.2.3 Culturally and linguistically diverse (CALD) children (n=673)

CALD participants were more likely to report there were "No registered Active Kids programs available near me" (14% of CALD children compared to 7% of children who only spoke English). They were also more likely to report being "Not sure how or where to redeem the voucher".

I can't find a place who accept the voucher I have no experience in this domain as I'm new to the country wish if there was a list of the places which accept vouchers to make it easier to the parents with poor English & experience

6.4.2.4 Aboriginal and Torres Strait Islander children (n=285)

Aboriginal children were more likely to report "the child feels anxious or nervous about participating" (11%), "Not sure how or where to redeem the voucher" (11%) and "The adults commitments make registration challenging" (8%); compared to reasons for not redeeming from non-Aboriginal children — 4%, 8% and 5% respectively.

6.4.2.5 Children with a disability (n=316)

Participants reported that the child's disability was a major reason for not redeeming a voucher. Children with a disability were more likely to report "the child feels anxious or nervous about participating" (16%), "No registered Active Kids programs available near me" (12%), or "Child refused to participate (10%). Open text responses regarding children living with a disability included:

Difficult to find registered services for children with special needs

Hardly found activity that my kids like to do

Organisation we registered in for the specific activity has long waiting list likely we won't be able to use voucher this year

A smaller proportion reported "Activity not started/registered before the season" was a reason for not redeeming a voucher among children with a disability (17%) compared to children without a disability (24%).

6.4.2.6 Children living in outer regional and remote NSW (n=264)

Reasons for not using a voucher were similar across major cities, inner regional and outer regional and remote areas. Children living in outer regional and remote areas were more likely to report "No registered Active Kids programs available near me" (11%) compared to children living in major cities (8%).

Participants in Major cities were more likely to report they forgot to use their voucher (10%) compared to participants in inner regional (8%), and remote areas on NSW (5%).

6.5 DISCUSSION

The Active Kids program achieved substantial program adoption among school-aged children in NSW who registered for an Active Kids voucher. More than four out of five children who registered for a voucher each year used at least one voucher to register in a structured physical activity program (81% in 2018; 85% in 2019, 82% in 2020; see Table 6). The proportion of registered children who used a voucher increased in 2019 but returned to similar levels in 2020. This may have been influenced by the COVID-19 pandemic amongst other contextual factors in 2020. There was no clear pattern of improved voucher redemption among participants over time. Due to the variation in contextual factors across years, the data were presented in repeat cross-sectional rather than a pooled analysis aid interpretation of voucher redemption annually.

The Active Kids voucher program was launched in 2018 and achieved high awareness and reach to the eligible population in its first year(1, 2). Process evaluation data demonstrated that children living with a disability, speaking a primary language other than English at home, older participants, girls, Indigenous children, and those living in low socio-economic areas had lower voucher redemption rates than their counterparts; in general, this inequity remained stable in the following years. Previous research has well-documented that these population groups tend to have lower physical activity levels and are less likely to adopt financial incentive interventions(3, 4). These socio-economic inequities were not addressed with specific strategies in the first year of implementation.

In 2019, the increase in program adoption may have been due to changes in the program design (only one voucher available in 2018, and two per year available in 2019 and 2020), variations in the number of providers registered in the program, or targeted strategies implemented by the Office of Sport. For instance, the Office of Sport conducted a small media campaign to encourage registration in the program amongst lower socio-economic groups, especially among Indigenous and culturally and linguistically diverse communities in 2019. This study found that adoption improved among these

groups however, this cannot be attributed to the campaign's effectiveness in the targeted areas because details of the campaign's reach were not linked to the routinely collected program data(5). The survey did not detect whether these implementation changes influenced voucher use.

In 2020, the COVID-19 pandemic led to the widespread cancellation of structured physical activity programs in Australia throughout the year. Reece, Owen, Foley et al. reported that 40% of children's voucher activities were postponed, 38% were continuing but in a modified form, 12% were cancelled and only 6% remained unaffected(6). The survey data reflects the impacts of the pandemic on program adoption in 2020, with 59% of survey participants indicating that coronavirus restrictions were the reason they had not redeemed an Active Kids voucher. The impacts of the coronavirus pandemic on children's physical activity levels have been substantial. Systematic review and meta-analysis evidence demonstrates a 20% reduction in children and adolescents daily physical activity, irrespective of pre-pandemic participation levels(7). Further research is required to understand whether the implementation of the Active Kids program in NSW reduced the detrimental effects of the pandemic on children's physical activity participation or enhanced children's return to structured physical activity programs after restrictions eased.

6.5.1 Increasing program adoption for children facing the greatest barriers

One of the WHO Global Action Plan on Physical Activity's guiding principles is proportional universality — in which the scale and intensity of interventions are resourced proportionately to the degree of need(8). Identifying the populations with the highest degree of need at the beginning of implementation can help guide strategies to increase the effectiveness of interventions. In this study, the lowest odds of adopting the program were observed in children who had not participated in structured physical activity before registering in the Active Kids program. This is consistent with previous studies identified in Chapter 2. Few financial incentive programs have utilised or tested the effect of additional intervention components to reduce the cost of school-aged children's structured physical activity participation (see Chapter 2). The ACTIVE program included multiple components “1) a voucher scheme, 2) peer mentoring, and 3) support worker engagement”(9). Peer mentors were nominated by participants and received training on encouraging voucher use. The support workers were based at the university and had drop-in visits at school assemblies once a month to encourage students to design new activities. James et al. reported that the peer-support aspect of their intervention was unsuccessful due to students feeling that the selected peer mentors were not approachable(9). The support workers were considered beneficial for increasing awareness of the financial incentives but not for adoption(9). Further refinement of additional intervention components was recommended to improve program adoption in the ACTIVE study(9, 10). The “KOMM! In den Sportverein” voucher program in Germany included an advertising campaign and providing of a starter kit to all children with a branded t-shirt and drink bottle, however it is unclear whether these additional components improved voucher use(11). There is a need for financial incentive programs to transparently report what complementary intervention components can increase program adoption, particularly among children who do not typically participate in structured physical activity programs.

6.5.2 Additional barriers that require consideration

All participants had actively registered in the Active Kids program and were aware that the voucher could reduce the cost of registration in a structured physical activity program, yet about 20% didn't redeem their vouchers (Table 6). Additional complementary strategies that address other barriers to children's participation in structured physical activities should be explored.

Access to structured physical activity programs is a major barrier faced by school-aged children and their parents/caregivers, in addition to cost(12). In our survey, lack of access i.e. 'No registered Active Kids programs near me', was more common in participants living in disadvantaged areas, outer regional and remote areas, children living with a disability, and culturally linguistically diverse children.

Research suggests that local interactive presentations within schools, shopping centres, or community hubs may help boost program adoption, even when access is a barrier to participation(13). Another complementary approach to improve access to structured physical activity programs is delivering programs nearby schools or within school grounds after-hours(14, 15). Dunton et al. found that socio-economically disadvantaged children were better able to use financial incentives when they did not need to travel to participate in the program(14). Future interventions should allocate resources to increasing the number of activities or type of activities available that children can access in areas with low program adoption, such as supporting activity providers to register in low socio-economic areas to register to be part of the intervention.

The other main reason for not redeeming a voucher during the program's implementation was the transaction process of using a voucher. Participants reported having registered for an Active Kids voucher in anticipation of registering the child in a program however, their voucher was not redeemed. Others reported that they forgot to use the voucher at registration, they 'Don't know how or where to use the voucher' or 'Technical issues with the activity registration website'. This suggests issues with the transaction process where caregivers present their Active Kids vouchers to registered providers. This finding suggests that structured physical activity providers may require additional training or support to ensure that the redemption process is encouraged at registration and is simple for parents/carers. Alternatively, a supportive education campaign may be required to communicate with parents and caregivers and increase knowledge of how the vouchers can be used. Providing practical and supportive information that provides cognitive behavioural prompts to parents/caregivers, such as the steps required to identify a provider and redeem a voucher, may help those motivated to register in the Active Kids program to redeem their vouchers(16). Messages could be tailored based on the child's sociodemographic characteristics to improve salience within low redemption priority groups using knowledge from registration data(17). Communications with parents/caregivers that aim to improve adoption should use videos and images to communicate their messages rather than plain text(17). Additional formative research is needed to gather in-depth information for tailored message development, considering multiple influences on voucher redemption for populations with low redemption rates.

In addition to lack of access and challenges with the transaction process, the remaining challenges identified in the survey were interpersonal and personal factors. These challenges or barriers to voucher use, such as lack of time, lack of interest, the child feeling anxious about participation and child injury, illness, or disability, are unlikely to be overcome using a financial incentive. These reasons are similar to Crane and Temple's systematic review, which indicated that intrapersonal and interpersonal constraints were associated with dropping out of sport(18).

6.5.3 Strengths and limitations

A strength of this evaluation is the information gained through this process evaluation which can inform strategic investment and resource allocation during implementation. The routinely collected data from all registered participants each year (n=664,973 in 2018, n=777,240 in 2019, and n=795,528 in 2020) provides a complete understanding of population-level program adoption, which could not be gleaned from small-scale studies(19). The mixed-method approach enabled an understanding of why changes in adoption did or did not occur during implementation. In the survey, participants self-reported voucher use, which was cross-checked using the system recorded redemption status at the end of the year; this enabled us to exclude all survey participants who successfully redeemed a voucher during the analysis. This approach provides the best possible insight into why Active Kids vouchers were not redeemed by excluding those who had success after responding to the survey.

The majority of children registered in the Active Kids voucher program redeem a voucher to support the cost of registration in a structured physical activity program. This study focused on those who registered and did not redeem a voucher and has substantial limitations.

There is a clear selection bias in the research participants. Data were collected through the online survey to understand better the barriers faced by groups with lower odds of adopting the Active Kids program. The survey participants represented a selected sample that did not provide a true representation of non-redeemers in the Active Kids program (<0.1% of non-redeemers). For example, the group with the lowest odds of redeeming a voucher were those who had not participated in sport in the previous year; however, the research sample was biased toward regular sport participants (1–3.9 sessions per week). This was also apparent in survey responses where participants reported that the 'activity the child does isn't part of the Active Kids program' as their main reason for not redeeming a voucher. This suggests that survey participants were primarily able to access opportunities for structured physical activity yet didn't have the cost of their activity subsidised by the Active Kids voucher. The sociodemographic groups least likely to redeem a voucher were underrepresented in the survey participants. By not explicitly recruiting non-redeemers to this survey, non-response bias is likely.

The survey item for reporting the main reasons for not using a voucher was developed specifically for this study and was not extensively tested with the target group before inclusion in the survey. The multiple-choice question used to collect the reasons for not redeeming a voucher allowed multiple responses and did not rank their perceived importance. The same fourteen response options were used across all surveys to strengthen internal validity; one additional response was added in 2020, "Activity cancelled or postponed due to the 2020 coronavirus pandemic" due to the global pandemic.

Finally, the present study was intended to inform targeted telephone interviews with non-redeemers to identify solutions to the barriers they face; however, these were not feasible to conduct. Interviews with children or their parents/carers would have enabled solutions to be generated, extending from the qualitative survey responses in this study. Due to limited evaluation resources and the political context, it was not feasible to conduct the planned telephone interviews during the implementation period. Additional research is required to identify scalable and practical strategies to overcome modifiable barriers to children's participation and level the entry point to taking part in structured physical activity outside-of-school.

6.6 CONCLUSIONS

The financial incentives provided to reduce the cost barrier to structured physical activity programs through the Active Kids voucher program (\$100 per voucher) were adopted by most registered children during 2018–2020. This study identified inequities in program adoption that should be addressed to strengthen the implementation of this universal financial incentive program. Multiple intervention components are required to enhance program adoption among school-aged children burdened by additional barriers to participation in structured physical activity programs. Process evaluation data identified children who had not participated in sport in the previous 12 months, and specific sociodemographic populations should be prioritised. Future studies should explore appropriate intervention components that support the implementation of financial incentives and assess their effectiveness in reducing inequities in program adoption.

The next chapter furthers the access issues discussed in this chapter by exploring the implementation of the Active Kids program among registered providers.

REFERENCES

1. Chaput J-P, Willumsen J, Bull F, Chou R, Ekelund U, Firth J, et al. 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):141.
2. World Health Organization. *Fair Play: Building a strong physical activity system for more active people*. In: team PA, editor. 2021.
3. World Health Organization. *Global action plan on physical activity 2018–2030: more active people for a healthier world*. Geneva: World Health Organization; 2018.
4. Lee JE, Pope Z, Gao Z. The Role of Youth Sports in Promoting Children's Physical Activity and Preventing Pediatric Obesity: A Systematic Review. *Behav Med*. 2018;44(1):62-76.
5. Eime RM, Young JA, Harvey JT, Charity MJ, Payne WR. A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *The international journal of behavioral nutrition and physical activity*. 2013;10:98.
6. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
7. Hardy LL MS, Drayton BA, Bauman, A. . *NSW Schools Physical Activity and Nutrition Survey (SPANS) 2015: Full Report*. Sydney: NSW Department of Health; 2016.
8. Crane J, Temple V. A systematic review of dropout from organized sport among children and youth. *European Physical Education Review*. 2014;21(1):114-31.
9. Messing S, Rütten A, Abu-Omar K, Ungerer-Röhrich U, Goodwin L, Burlacu I, et al. How Can Physical Activity Be Promoted Among Children and Adolescents? A Systematic Review of Reviews Across Settings. *Frontiers in Public Health*. 2019;7.
10. Vella SA, Schranz NK, Davern M, Hardy LL, Hills AP, Morgan PJ, et al. The contribution of organised sports to physical activity in Australia: Results and directions from the Active Healthy Kids Australia 2014 Report Card on physical activity for children and young people. *Journal of science and medicine in sport*. 2016;19(5):407-12.
11. Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.
12. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
13. Fisher KLM, Amin; von Tigerstrom, Barbara; Larre, Tamara; Cameron, Christine; Chad, Karen E.; Reeder, Bruce; Tremblay, Mark S. Awareness and Use of Canada's Children's Fitness Tax Credit. *Canadian Tax Journal*. 2013;61(3):599-632.
14. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. *ZA Institute of Labor Economics*. 2021(14246).
15. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.

16. Spence JC, Holt NL, Sprysak CJ, Spencer-Cavaliere N, Caulfield T. Non-refundable tax credits are an inequitable policy instrument for promoting physical activity among Canadian children. *Can J Public Health*. 2012;103(3):175-7.
17. McGill B, O'Hara BJ, Bauman A, Grunseit AC, Phongsavan P. Are Financial Incentives for Lifestyle Behavior Change Informed or Inspired by Behavioral Economics? A Mapping Review. *Am J Health Promot*. 2019;33(1):131-41.
18. Kane RL, Johnson PE, Town RJ, Butler M. A structured review of the effect of economic incentives on consumers' preventive behavior. *American Journal of Preventive Medicine*. 2004;27(4):327-52.
19. Haff N, Patel MS, Lim R, Zhu J, Troxel AB, Asch DA, et al. The role of behavioral economic incentive design and demographic characteristics in financial incentive-based approaches to changing health behaviors: a meta-analysis. *Am J Health Promot*. 2015;29(5):314-23.
20. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
21. Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC public health*. 2016;16:890.
22. Sport Australia. *AusPlay Results: Clearinghouse for Sport; 2020* [Available from: <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/results>].
23. Australian Bureau of Statistics. *Census of population and housing: Socio-Economic Indexes for Areas (SEIFA) - Technical paper*. Canberra: Australian Bureau of Statistics; 2006. Contract No.: No.2039.0.55.001.
24. Department of Health and Aged Care. *Measuring remoteness: Accessibility/Remoteness Index of Australia (ARIA)*. . Canberra: Commonwealth of Australia; 2001.
25. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity*. 2012;7(4):284-94.
26. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155(5):554-9.
27. Australian Government Department of Health. *Australian 24-Hour Movement Guidelines for Children and Young People (5 to 17 years): An Integration of Physical Activity, Sedentary Behaviour, and Sleep*. Australian Government; 2019.
28. Reece LJ, Foley, B.C ., Bellew, B ., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.
29. Owen KB, Foley BC, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *Journal of science and medicine in sport*. 2020.

30. Foley BC, Owen KB, Bellew W, Wolfenden L, Reilly K, Bauman AE, et al. Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach? *Int J Environ Res Public Health*. 2020;17(16).
31. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Global Health*. 2018;6: e1077–86.
32. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. *Lancet Child Adolesc Health*. 2020;4(1):23-35.
33. Havas Sport and Entertainment. Active Kids Go Far: Havas Sport and Entertainment 2022 [Marketing Brief]. Available from: <https://www.havas-se.com.au/work/active-kids-go-far>.
34. Reece LJ, Owen KB, Foley BC, Rose C, Bellew W, Bauman AE. Understanding the impact of COVID19 on children's physical activity levels in NSW, Australia. *Health Promotion Journal of Australia*. 2020.
35. Neville RD, Lakes KD, Hopkins WG, Tarantino G, Draper CE, Beck R, et al. Global Changes in Child and Adolescent Physical Activity During the COVID-19 Pandemic: A Systematic Review and Meta-analysis. *JAMA Pediatrics*. 2022;176(9):886-94.
36. James M, Todd C, Scott S, Stratton G, McCoubrey S, Christian D, et al. Teenage recommendations to improve physical activity for their age group: a qualitative study. *BMC Public Health*. 2018;18(1):372.
37. Clark AF, Wilk P, Mitchell CA, Smith C, Archer J, Gilliland JA. Examining How Neighborhood Socioeconomic Status, Geographic Accessibility, and Informational Accessibility Influence the Uptake of a Free Population-Level Physical Activity Intervention for Children. *American Journal of Health Promotion*. 2018;32(2):315-24.
38. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J Phys Act Health*. 2015;12(6):840-53.
39. Virgona N, Foley BC, Ryan H, Nolan M, Reece L. 'One hundred dollars is a big help, but to continue, it's a challenge': A qualitative study exploring correlates and barriers to Active Kids voucher uptake in western Sydney. *Health Promotion Journal of Australia*. 2021;11:11.
40. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet*. 2010;376(9748):1261-71.
41. Williamson C, Baker G, Mutrie N, Niven A, Kelly P. Get the message? A scoping review of physical activity messaging. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):51.
42. Reilly K, Bauman A, Reece L, Lecathelinais C, Sutherland R, Wolfenden L. Evaluation of a voucher scheme to increase child physical activity in participants of a school physical activity trial in the Hunter region of Australia. *BMC Public Health*. 2021;21(1):570.

7 IMPLEMENTATION OF THE ACTIVE KIDS PROGRAM

7.1 CHAPTER OUTLINE

Implementation of public health interventions is essential for interventions to be effective. In the scoping review (Chapter 2), multiple studies were identified that had implemented financial incentive interventions however limited detail on the implementation processes were reported in peer-reviewed or grey literature. This major gap is addressed in this chapter, which focuses on the Implementation dimension of the RE-AIM framework. Understanding of the implementation process is critical to replicate and translate reach, effects, adoption, and maintenance of interventions. In Chapter 3, the implementation dimension of the RE-AIM framework was defined as the uptake of the financial incentive across the implementation setting/s by stakeholders/partners and the degree to which stakeholders/partners facilitate delivery of the intervention. This chapter focuses on implementation of the Active Kids program by examining the impact of the program on organisational capacity of the implementation partners — Structured physical activity providers registered in the Active Kids program. Active Kids providers were key stakeholders in the implementation of the program, fulfilling the role of redeeming children's voucher and providing the subsidised members costs at registration. Critically, Active Kids providers were not allocated finances for their contribution to implementing this government program, therefore, impacts on organisational capacity were likely.

This manuscript was under-review when the thesis was submitted and was published during the examination period(1). The published article can be [accessed online](#).

The citation for the published article is: Foley BC, Turner N, Owen KB, Cushway D, Nguyen J, Reece LJ. "It Goes Hand in Hand with Us Trying to Get More Kids to Play" Stakeholder Experiences in a Sport and Active Recreation Voucher Program. *International Journal of Environmental Research and Public Health* 2023;20:4081.

The article examined as part of this thesis is included herein.

7.2 INTRODUCTION

Organisations in the sport and recreation sector are vital stakeholders in the promotion of physical activity, particularly structured programs delivered outside of school time. Structured physical activity programs delivered by organisations in the sector include team sports (e.g., football, netball, basketball, hockey), individual sports (e.g., swimming, athletics) and structured recreation (e.g., dance, martial arts, bush skills). The typical operating model in the Australian context has three tiers of sport and recreation organisations; National and State Sporting Organisations (NSO and SSO) govern and support affiliated community based, grass-roots clubs and associations to deliver structured physical activity programs. Other operating models in the sport and recreation sector include businesses or independent not-for-profit organisations that an NSO or SSO does not govern. The objective of most sport and recreation organisations is to provide enjoyable, accessible, inclusive, and affordable structured physical activity programs, while maintaining financial sustainability(2). Typically, these organisations are not-for-profit, gain revenue from memberships, and rely on a large volunteer workforce to achieve their objectives(2).

In Australia, organisations in the sports and recreation sector facilitate the participation of approximately 3.5 million children in structured physical activity outside of school time each week(3). Whilst participation in structured physical activity is common among Australian children, participation steeply declines during adolescence and is markedly lower among girls and socio-economically disadvantaged children(3-5). There is a need to build capacity in sport and recreation organisations to create opportunities for all children and adolescents to participate in structured physical activity programs, producing a wide range of benefits for individuals, communities and the broader economy(6, 7).

Research shows that Australian families spend approximately \$1,250 per child per year to enable children to participate in structured physical activity outside school time(8). The high cost associated with structured physical activity programs is a barrier to participation and unfairly impacts girls and socio-economically disadvantaged children(8-10). Organisations delivering structured physical activity programs need to cover operational costs, including staff wages, public liability insurance, goods and services taxes, and facility hire costs which influence capacity and subsequently drive-up costs for participants. Reducing or removing the cost barrier to structured physical activity participation is critical to increasing physical activity participation(9-11). Governments can use economic tools and policies to influence the costs associated with structured physical activity participation(12-14). The effect of government interventions that use economic tools and policies to address the cost barrier to participation for school-aged children is unclear; their influence on the capacity of organisations within the sport and recreation sector is often overlooked(15, 16). There is a need to ensure that government interventions enhance the organisational capacity of structured physical activity providers to deliver affordable, inclusive opportunities for school-aged children to be active.

7.2.1 Theoretical framework

Capacity is broadly defined as an organisation's ability to achieve its objective with available assets and resources(17). The ability of stakeholders in the sector to increase participation in their structured programs can be influenced by multiple contextual factors such as geographic location, organisational size, participant demographics and the activity type (team sport, individual sport, structured recreation). Acknowledging contextual differences, Doherty, Misener and Cuskelly developed a multidimensional framework to understand capacity in community sports clubs(17). The framework includes five dimensions of capacity in sports clubs which influence organisational capacity: human resources, finances, infrastructure, planning and development, and external relationships(17). Changes to each dimension can profoundly affect the already stretched capacity of organisations to provide enjoyable, accessible, inclusive, and affordable structured physical activity programs for all.

For example, if the number of volunteers in an organisation declines, they may need to reduce participation opportunities or increase fees to pay staff to fill the volunteer's role. This vulnerability to change has resulted in a lack of innovative actions in the sport and recreation sector to increase physical activity participation.

Governments are increasingly partnering with NSOs, SSOs, not-for-profits and businesses in the sports and recreation sector to achieve political objectives such as increasing physical activity, improving mental health, and building social cohesion and inclusion(18-20). Partnerships between the government and organisations in the sport and recreation sector are often established through formal agreements and involve organisations receiving annual stipends and/or grant funding that encourages organisations to contribute to the government's objectives(17, 18, 21). These financial agreements strengthen government relations within the sport and recreation sector and can increase capacity of organisations to deliver structured physical activity programs(17). Partnerships can be an effective way for governments to strengthen policy implementation without budget allocation if a policy provides mutual benefits for government and non-government stakeholders. Unequal or bureaucratic partnerships in the sport and recreation sector can significantly impact organisational capacity(17). Therefore, government interventions which engage structured physical activity providers without allocating funding should carefully monitor the impact on organisational capacity.

7.2.2 The Active Kids program

In 2018, the New South Wales (NSW) government in Australia, launched a four-year financial incentive (voucher) program entitled 'Active Kids' that aimed to reduce the cost of participation in structured physical activity programs outside-of-school time for children and adolescents(22). All school-enrolled children (4.5–18 years old) that resided in NSW (2.1 million) were eligible for one Active Kids voucher per year valued at \$100AUD. Parents and caregivers applied for Active Kids vouchers online and could redeem them with approved organisations delivering structured programs which lasted at least 8 weeks and included moderate-to-vigorous physical activity. The voucher could not be used for sports equipment or clothing. The structured physical activity providers that redeemed the vouchers were key stakeholders in the implementation of this program and did not receive reimbursement for redeeming a child's Active Kids voucher.

Evaluation of the Active Kids program has shown that children who redeemed an Active Kids voucher to participate in a structured physical activity program increased their days achieving physical activity guidelines from 4 days per week at registration to 5 days per week over 6 months after using a voucher(8). The most common types of activities school-aged children redeemed their voucher for were soccer (football), netball, swimming, multi-sport, dance, rugby league, gymnastics, basketball, Australian rules, and rugby union(8). The Active Kids voucher reduced the cost of registration or membership fees, supporting on average 20% of a child's annual structured physical activity participation costs(8). Whilst the experiences of children that use an Active Kids voucher have been comprehensively examined, the experiences of stakeholders (Active Kids providers) involved in implementation is a critical process evaluation component that is yet to be explored(23). This large scale, government-led voucher program had the potential to impact the capacity of organisations to provide structured physical activity programs for children and adolescents. The multidimensional framework of capacity was adopted to understand the impacts of the Active Kids program on structured physical activity organisations. Understanding how the government and stakeholders in the sport and recreation sector implemented this large-scale voucher program will provide evidence to inform the design and delivery of future interventions.

7.2.3 Literature review

Financial incentives such as subsidies and vouchers, that are provided to individuals to motivate participation in structured physical activity, are becoming increasingly popular; however, evidence on

the effectiveness and sustainability of these interventions is mixed(12, 14, 24, 25). Most financial incentives have been studied among adults populations, finding that even short-term financial incentives can lead to long-term increases in physical activity(12). Few studies investigating financial incentives among children and adolescents' have been conducted and have demonstrated mixed effects. Internationally, Canada and Los Angeles have trialled refundable tax credits as incentives to promote physical activity which did not increase children's physical activity levels(26-29). Conversely, voucher programs in Wales and Australia that reduce the cost barrier to participation outside-of-school have demonstrated positive effects on physical activity in small- and large-scale studies, respectively(8, 30, 31). In this emerging field of research, financial incentive studies have focused on the reach and effect of financial incentive programs on children and adolescents. No previous studies have reported on implementation processes and stakeholder involvement in financial incentive interventions for children and adolescents. There is limited understanding of the implementation process for financial incentive programs in real-world conditions, and their impact on the capacity of organisations in the sport and recreation sector.

This study aimed to understand the implementation process of the Active Kids program from the perspective of Active Kids providers and explore impacts of the program on organisational capacity of sport and recreation organisations.

7.3 MATERIALS AND METHODS

7.3.1 Study design

This qualitative study used semi-structured telephone interviews to understand the impact of the Active Kids program on Active Kids providers. The ethical aspects of this study were approved by the University of Sydney Human Research Ethics Committee (Protocol number 2019/155).

7.3.2 Active Kids providers

To register as a provider with the Active Kids program, organisations were required to deliver a sport or structured active recreation program and adhere to the Active Kids Provider Guidelines(32). Registered Active Kids providers redeemed Active Kids vouchers from participants by entering the child's voucher number, name, and date of birth into a bespoke centralised government platform. The \$100AUD value of each voucher redeemed was then deposited into the provider's bank account from the NSW Government. Over 550,000 children's Active Kids vouchers were redeemed with a registered Active Kids provider in 2018(8). The voucher was not designed to provide additional revenue to Active Kids providers; their registrations fees should have been consistent whether or not children redeem a voucher.

7.3.3 Semi-structured interviews

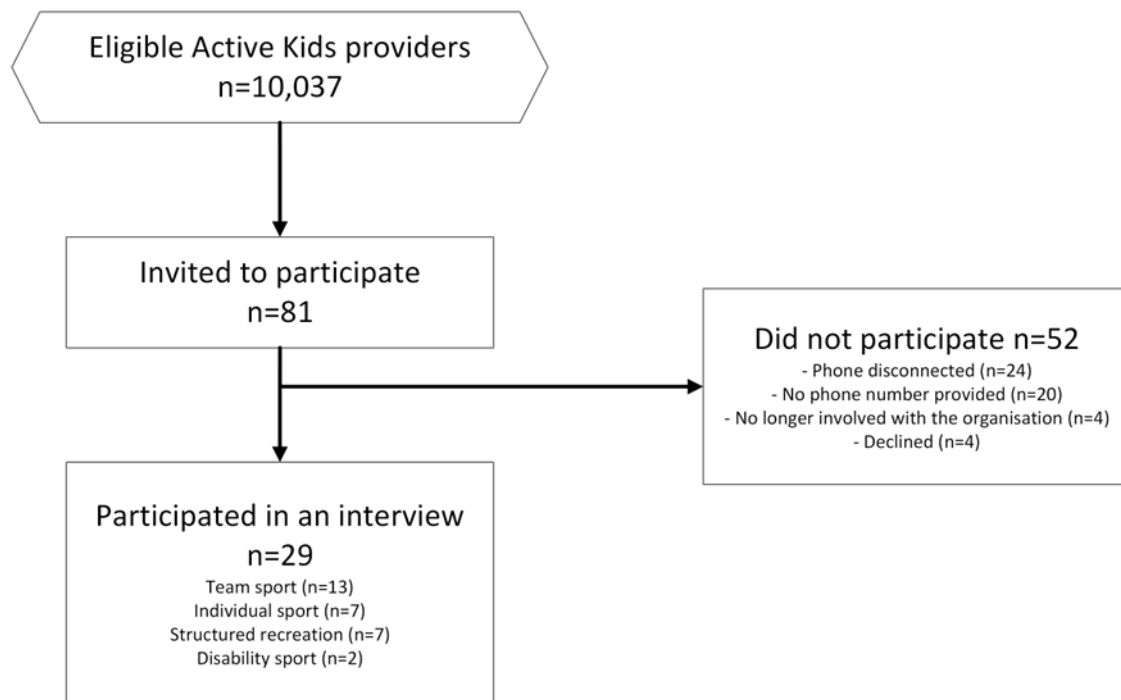
The topic guide was co-developed in partnership with policymakers at the NSW Government Office of Sport to elicit provider's experiences delivering the Active Kids program during a 30-minute telephone interview. The semi-structured interview guide was based on Doherty, Misener and Cuskelly's multidimensional framework of capacity in grass-roots sports clubs(17). The topic guide asked stakeholders about the impacts of the Active Kids program on each dimension of the framework, namely human resources (staff, volunteers, members), finance (memberships, revenue), infrastructure (information technology, facilities), planning and development (tailored initiatives, marketing and promotion), and external relationships (partnerships, relationship with government)(17). The topic guide also asked stakeholders about their reasons for becoming an Active Kids provider, their understanding of the program and their opinions on what worked and what didn't in the implementation process (Supplementary material 2). This study contributes to the process evaluation of the Active Kids program, as part of the larger program evaluation(23).

7.3.4 Participant sampling and recruitment

In June 2019, the NSW Government Office of Sport database of Active Kids providers contained 10,037 approved Active Kids providers offering activities to children across the state. Office of Sport staff selected 81 organisations from the Active Kids database for inclusion in this study using a quota sampling technique, randomly selecting providers from their database until each quota was reached. The sample of providers was selected based on the number of voucher redemptions recorded in the database (small <50, Medium 50-100, and Large >100 vouchers), location where they delivered most of their activities (metropolitan/regional) and SSO affiliation (Yes/No/SSO). SSO 's were defined by whether the provider organisation was a recognised SSO in NSW, and affiliation was defined as a grass-roots club/association affiliated with a recognised SSO(33). Further detail on the selection process was not recorded by the Office of Sport staff. The participant recruitment flow is shown in Figure 16.

The selected Active Kids providers were invited to participate in the study by email from the Office of Sport staff which included the participant information sheet and contact details of the research team. Participants that replied to the email and provided written consent for this study were scheduled for interviews with the researchers. Verbal consent was also obtained from all participants before their interview commenced. The specific structured physical activity program delivered by each organisation is reported in broad categories to maintain anonymity of participants. Table 7 provides details of each participant and the length of their interview.

Figure 16 Participant recruitment flow of Active Kids providers



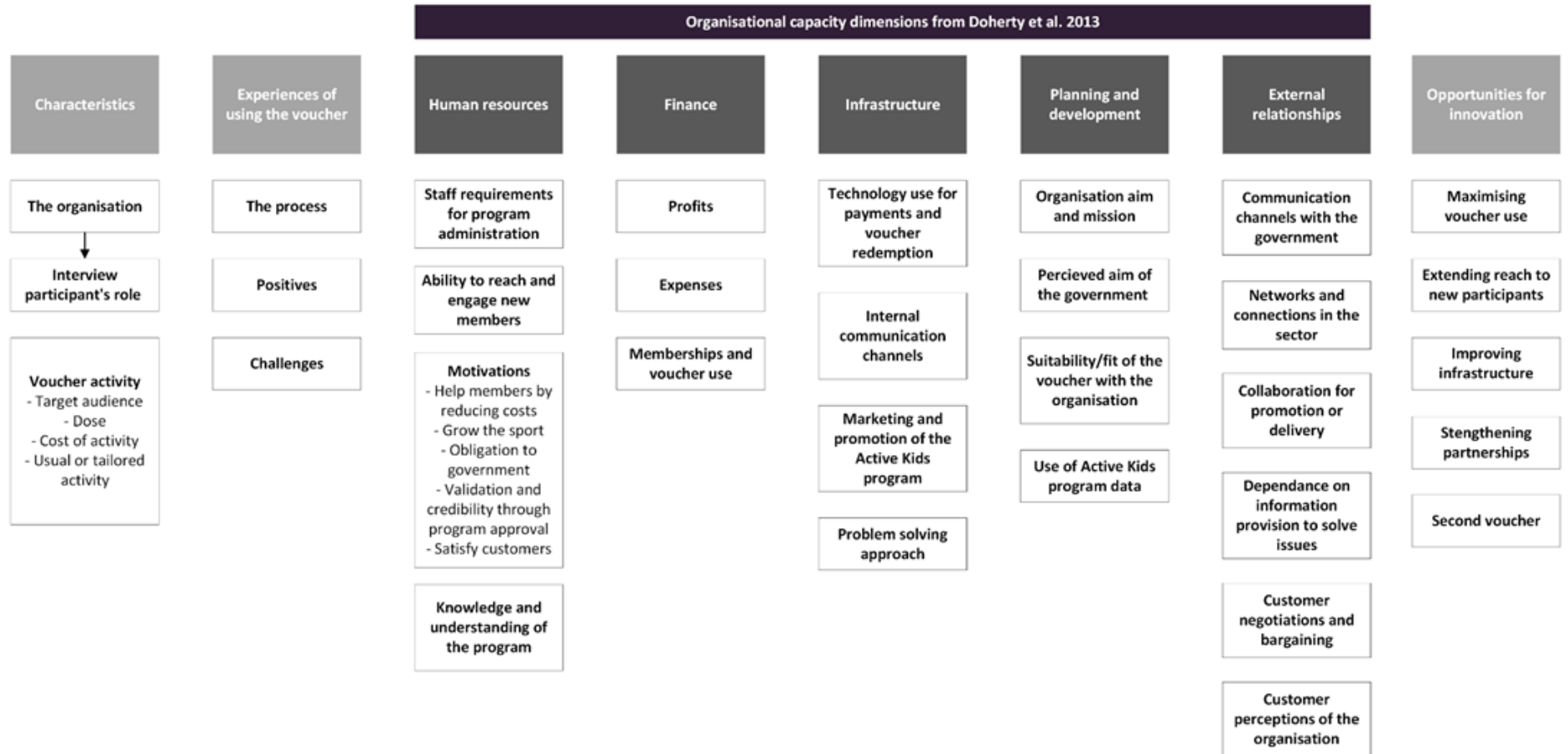
7.3.5 Data collection

The Candidate led the data collection conducting 25 telephone interviews and supervised a student (NT) who conducted 4 telephone interviews. All interviews followed the semi-structured topic guide (Supplementary file). The Interviews were voice recorded and transcribed verbatim by an Australian transcription company. Participants could review the transcription before analysis; four participants opted to be sent their interview transcript with no revisions provided. The names of the individual and their organisation were removed before the analysis; Active Kids providers are not identifiable in this study.

7.3.6 Data analysis

A multi-disciplinary research team used the Framework Method for data analysis to ensure trustworthiness(34, 35). The Framework Method involves six steps after transcription. 1) Familiarisation: The candidate and NT immersed themselves in the data by thoroughly reading and checking the transcripts against the audio-recorded interviews. The candidate was heavily engaged in the evaluation of the Active Kids program, and NT had no prior exposure to the program before the analysis which reduced researcher bias. 2) Coding: Using a constructivist approach, the candidate and NT independently read all transcripts, recording their impressions through open coding. Their open coding involved underlining key segments of the text and annotating the margins with any preliminary impressions. 3) Developing an analytical framework: Building from Doherty, Misener and Cuskelly's multidimensional framework of capacity in grass-roots sports clubs(17), the interview questions, the annotated notes, both researchers discussed the key concepts which had emerged from the data. The candidate and NT then met with LR and KO to discuss the data's key concepts and recurrent themes. Together, using a whiteboard and coloured pens, the researchers devised a set of dependable codes and sub-codes, each with definitions, forming the initial analytical framework for the study. 4) Applying the framework: Systematic application of the major codes was done independently by the candidate and NT using NVivo software (NVivo, RRID:SCR_014802) on three transcripts. Through comparing their application of the analytical framework, the definitions of each code were further defined and updated by grouping and creating codes. This process of revising, applying, and redefining the framework was iterative until a final analytical framework was confirmed (Figure 17). The final coding framework included key concepts that emerged from the data regarding the implementation of the Active Kids program and the five dimensions of sports organisations capacity(17). Once inter-rater reliability reached 80%, the candidate and NT independently coded all transcripts in NVivo, using the brief definitions of the codes to uphold consistency. Illustrative quotes were marked using the 'annotation' feature. 5) Charting the data: Once coding was completed, data were interpreted in a Framework matrix with codes horizontal and cases vertically. This matrix allowed patterns, differences, and similarities to be identified and explored by the researchers. The charted data enabled understanding of the relationships between the implementation of the Active Kids program and capacity dimensions, extending understanding beyond the coded data. 6) Interpretating the data: Ongoing consultation between the multidisciplinary team occurred during the interpretation of the data to ensure trustworthiness and reduce the bias of the analysis. After the analysis was completed, the findings were presented to authors working on the Active Kids program implementation (DC and JN), which confirmed the findings reflected anecdotal feedback from providers as part of daily practice. Three predominant themes were identified which influenced dimensions of organisational capacity during implementation of the Active Kids program.

Figure 17 Coding framework with organisational capacity dimensions from Doherty et al., 2013



7.4 RESULTS

Twenty-nine Active Kids providers participated in the semi-structured interviews, which had an average duration of 31 minutes (Table 7). Participants represented 15 large organisations that had redeemed over 100 Active Kids vouchers, seven medium organisations that had redeemed 50–100 vouchers and seven small organisations that had redeemed <50 vouchers. About half (56%) the participants were operating in metropolitan areas and 76% were affiliated with an NSO/SSO (Table 7). The structured physical activities delivered by participants included team sports (n=13), individual sports (n=7), structured recreation (n=7), and disability sports (n=2) (Table 7).

Table 7 Interview participant details

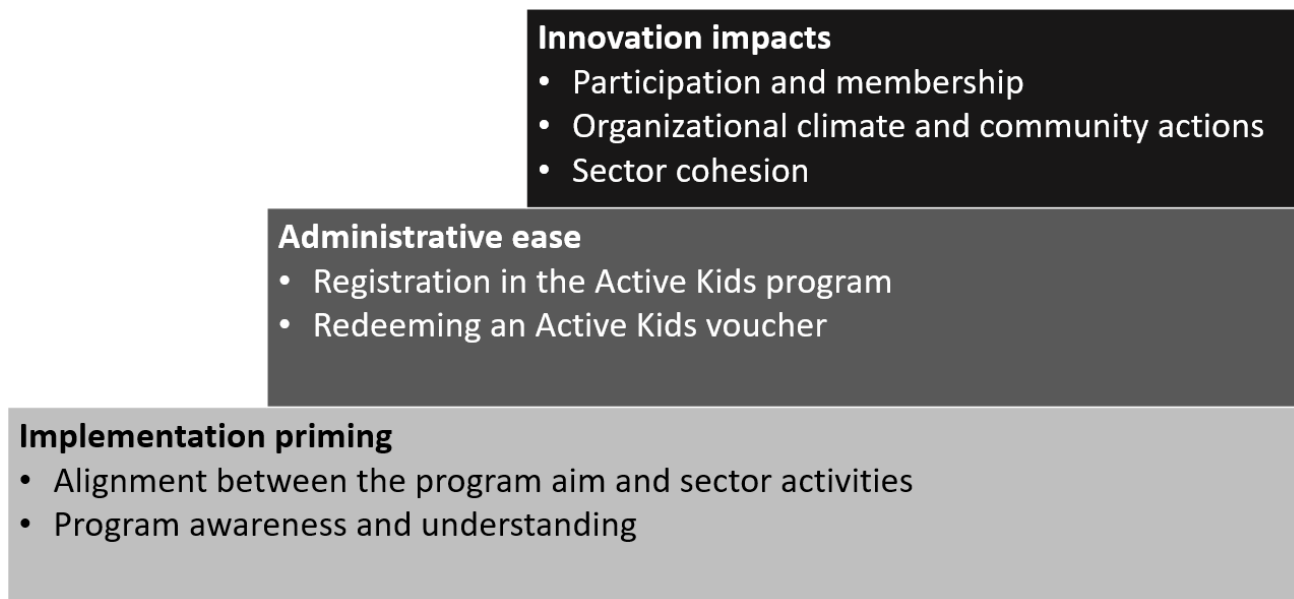
Sport type	Participant's role	Affiliation	Organisation size	Location	Interview duration
Disability sport	Committee member	Yes	Small	Regional	0:29:54
Individual sport	Committee member	Yes	Small	Regional	0:29:25
Individual sport	Committee member	Yes	Small	Regional	0:39:46
Individual sport	Committee member	Yes	Small	Regional	0:18:38
Individual sport	Committee member	Yes	Small	Metro	0:34:14
Team sport	Committee member	Yes	Small	Metro	0:35:08
Structured recreation	Committee member	Yes	Small	Regional	0:25:08
Individual sport	Registrar	Yes	Medium	Regional	0:26:51
Individual sport	Committee member	Yes	Medium	Regional	0:30:50
Team sport	Committee member	Yes	Medium	Metro	0:26:10
Structured recreation	Business owner	Yes	Medium	Metro	0:40:18
Team sport	Committee member	Yes	Medium	Metro	0:31:15
Structured recreation	Business owner	No	Medium	Metro	0:26:05
Team sport	Committee member	Yes	Medium	Regional	0:22:47
Team sport	Committee member	SSO	Large	State	0:35:09
Disability sport	<i>Financial Director</i>	SSO	Large	State	0:22:38
Team sport	Business owner	Yes	Large	Regional	0:39:06
Team sport	Committee member	Yes	Large	Metro	0:32:57

Sport type	Participant's role	Affiliation	Organisation size	Location	Interview duration
Team sport	Business owner	Yes	Large	Metro	0:30:01
Team sport	Program staff	Yes	Large	Regional	0:29:01
Team sport	Committee member	Yes	Large	Metro	0:26:01
Structured recreation	Program staff	No	Large	Metro	0:48:08
Structured recreation	Manager	No	Large	Regional	0:43:51
Structured recreation	Manager	No	Large	Metro	0:27:56
Team sport	Business owner	Yes	Large	Regional	0:26:53
Individual sport	Committee member	Yes	Large	Metro	0:14:35
Structured recreation	Business owner	No	Large	Metro	0:27:01
Team sport	Manager	SSO	Large	State	0:36:34
Team sport	Manager	SSO	Large	State	0:40:13

Note: Organisation size was classified based on the number of vouchers they had redeemed (small <50, Medium 50-100, and Large>100 vouchers).

Implementation of the Active Kids program had varied effects on the five dimensions of Active Kids provider's capacity(17). The structured analysis process identified three predominant themes which supported the organisational capacity of structured physical activity providers during implementation of the Active Kids program – 1) *Implementation priming*, 2) *Administrative ease* and 3) *Innovation impacts* (Figure 18). These themes extend beyond the dimension of capacity described in Doherty, Misener and Cuskelly's multidimensional framework to present practical guidance for future interventions(17). The three themes and seven sub-themes in Figure 18 are detailed with illustrative quotes, providing evidence of what worked and what didn't for various stakeholders involved in implementing the Active Kids program in NSW. The step design in Figure 18 has been used to demonstrate the foundational processes required to achieve innovation impacts during implementation. The relationship between stakeholders and the NSW Government Office of Sport strongly influenced organisational capacity across the three themes, and enabled progress from one step, up to the next (Figure 18).

Figure 18 Themes identified through stakeholder interviews



7.4.1 Implementation priming

7.4.1.1 Alignment between the program aim and sector activities

The Active Kids providers perceived the voucher program overall as a good investment by the government to reduce the cost of structured physical activity for children. The government program aims strongly aligned with those of the providers – to remove barriers to participation. This common goal contributed to the acceptability of the Active Kids program among providers.

"It goes hand in hand with us trying to get more kids to play, so I think it's been a winner." Committee member, Medium Affiliated organisation

Active Kids is a universal program, meaning all children in NSW are eligible to register for and redeem an Active Kids voucher. Providers reported they typically offer inclusive participation opportunities, where anyone could join their activity. One SSO that traditionally offered physical activity programs mainly to older age groups reported using the Active Kids program to encourage their affiliated clubs to engage more kids.

"In the past, a majority of the members are actually more veteran members, and if the sport wants to grow and become larger, it's a good way to attract more younger members." Manager, SSO

Cost reduction through the Active Kids voucher was perceived as a good support for families, making it easier for them to enrol kids and to keep them playing sports offered within their community.

"The older kids, they get to 14, 15 and they start to drop out and forget about sport. But parents are now encouraging those kids to stay in sport and saying hey, we've this \$100 voucher, then those kids are going okay, it's not costing my parents anything." Committee member, Affiliated small organisation

Nearly all (n=28) providers kept offering their usual activities, as they already met the government criteria. The program did not require a change to provider's organisational planning and development. This alignment further contributed to the acceptability of the Active Kids program among providers.

"All of our programs were term-based anyway, they run for greater than the minimum requirement of eight weeks for the Active Kids program. So, it wasn't necessarily a change for us." Manager, Non-affiliated, large organisation

7.4.1.2 Program awareness and understanding

Awareness of the program among providers was achieved in a variety of ways. Providers reported first hearing about the Active Kids program through organisational emails (n=11), the government (n=5), communications from other sports providers in the sector (n=5), media stories/articles (n=4), or, from parents who wanted to redeem vouchers for their activities (n=4). The way providers first heard about the program was influenced by their external relationships. SSO's and affiliated organisations who had existing relationships with the Office of Sport heard about the program before it launched.

"The league actually introduced it to us, saying that it was coming onboard, and we all went through the process of getting signed up and being Active Kids providers... The league did a pretty good job of actually telling us that it was coming." Affiliated SO, President

While non-affiliated organisations found out about the Active Kids program after it launched to the public, resulting in not having human resources (staff) and infrastructure (information technology [IT] systems) available to redeem vouchers from children.

"I had parents contacting me. Do you have the Active Kids program? I'm like, never heard of it, so I had to look it up. I was definitely encouraged by my clients to do it." Non-affiliated, Business owner

All providers reported having a good understanding of what the Active Kids voucher could be used for within their organisation, i.e., membership and registration fees. Few providers (n=12) were aware of additional resources and developments in the program beyond the voucher itself due to limited communication from the Office of Sport to providers, especially non-affiliated providers (Table 8).

"There was no information that they were offering a second one sent to me. Little things like that. I just don't think it's well communicated." Business owner, Large, Non-affiliated organisation

Table 8 Active Kids provider awareness of additional resources to aid implementation

Active Kids program resources and program developments in June/July 2019	Participants aware (n=29)
Adaptable Active Kids provider promotional material e.g., posters and graphics for use across marketing and communication platforms	12
Database for parents/caregivers to search for local Active Kids providers	2
Live data dashboard showing voucher uptake and voucher use by location	1
Announcement of second Active Kids voucher valid July–December in 2019	27

7.4.2 Administrative ease

The NSW Government Office of Sport lead the development and implementation of Active Kids, whilst the voucher administration is undertaken through a centralised government platform led by a government department exclusively devoted to Services, Service NSW. This dual responsibility across government departments caused some communication challenges when providers had issues or

concerns. Identifying the appropriate government department responsible to resolve an issue was not a straightforward process. The main administrative processes for Active Kids providers were registration in the program and voucher redemption. The Active Kids provider's relationships with the Office of Sport influenced their organisational capacity to achieve administrative ease.

7.4.2.1 Registration in the Active Kids program

Large non-affiliated organisations and SSOs were faced with unique administration challenges to meet the requests from government to upload all their affiliated club/association details to the system. Organisations involved in the testing and developing the registration platform for providers did not receive specific remuneration, placing additional resourcing strains on these organisations to meet the government requirements.

"[the government] hadn't thought through all the processes to implement it ... none of the sports had actually budgeted for the cost to get this implemented because of the staff time to collect information and the API that was required. Even though the government provided it, we as a state sporting organisation still had to pay for the implementation of that through our service providers." Manager, SSO

Operationalizing the Active Kids program universally across all sports, using existing systems, within the government timeline, was not regarded as straightforward. SSO's reported a sense of obligation from the government to ensure most of their affiliated clubs/associations participated in the program. Following this, non-SSO's felt pressure from others in the sport and recreation sector being registered, so they were not seen as disadvantaging their membership base.

"We know there were other sports that were signing up for it, so we thought we'd better do it with [our sport]. And it's a good service, obviously, to the players to be able to get a discount." Business owner, Large affiliated organisation

Those who became involved with the program after it had been launched were affiliated to smaller, less-resourced SSO's or independent businesses or franchises. These smaller providers reported the registration process as simple; those who registered themselves, rather than having an SSO do it for them, reported the process as being easy to undertake.

"[The registration process was] no trouble at all. It wasn't hard to do. There was a whole list of things we had to send through. And then we waited a month and then we got a notification that we were a registered provider." Business owner, non-affiliated large organisation

In the second year of the program, providers reported registration and re-registration was simple compared to the initial set-up.

7.4.2.2 Redeeming an Active Kids voucher

The voucher redemption process generally exceeded expectations, where providers log on and redeem the voucher through an online government portal. Active Kids providers reported that the process was simple if they had automated the system or were redeeming vouchers in small numbers.

"Initially, there was those couple of, let's call them logistical hurdles. But once they were overcome, it ran very smoothly. It was quick to redeem. It was quick to get the money back into the bank." Affiliated SO, regional

Organisations that received large volumes of Active Kids registrations had typically developed sophisticated systems for redemption in partnership with the Office of Sport within the first year of implementation. Large organisations reported the administration changes came at a significant

expense to the organisation however they deemed this cost worthwhile to ease the administrative burden on their affiliated clubs/organisations and simplify voucher redemption process.

Non-affiliated organisations were still refining the ongoing voucher redemption process, which had mixed effects on organisational resources. Medium/Large organisations that did not have sophisticated online systems in place or did not have the budget to change their registration IT systems, expressed frustrations in processing the vouchers manually. Small organisations did not share the same frustrations as medium/large organisations without sophisticated IT systems due to the reduced frequency of the task.

"It became such a gigantic job that I've had to get one of my staff members now to take over [redeeming the vouchers] ... its' an admin nightmare. I now have to pay a staff member to do all the inputting, because I just don't have time to do it. It's become an additional cost for the business." Business owner, non-affiliated organisation

While overall the voucher redemption had been refined by the time the interviews took place, confusion remained among providers when something went wrong during the redemption process. The providers and their affiliated organisations, or individual providers, did not know where to report and solve administrative issues. The different roles of the two government agencies, the Office of Sport, and Service NSW, led to confusion in communication pathways.

"The level of information that we were provided was pretty much sub-standard. It was difficult because we were told one situation but then our members were told something else. And it just sort of went around in a, in a circle." Manager, SSO

7.4.3 Innovation impacts

Stakeholders reported implementation of the Active Kids program had impacts across their participation and memberships (finances), human resources in terms of improved organisational climate and community actions, and sector cohesion (external relationships). There was limited innovation to the planning and delivery of structured physical activity programs by stakeholder organisations. This lack of change to planning and delivery among stakeholders appeared to be related to the alignment between the program aims and sector activities i.e., there was no need to modify their activities to suit the guidelines of the Active Kids program.

7.4.3.1 Participation and membership

Provider's perception of the Active Kids program on their membership was largely positive. Some participants had easily accessible records to monitor voucher use (n=4), while others did not have access to the information or were not monitoring (n=25) voucher redemption rates in their sport. Anecdotally eight providers reported increased participation numbers.

"It's significant. We've seen 25% growth in our club, literally this year. Last year, we took a big step up." Affiliated SO, President

Three providers described that the voucher was attracting more family members of their usual participants to begin memberships after the organisation became a provider.

"Siblings join them who wouldn't have before. We've got one family whose kids are foster care kids, and so they might not have had that opportunity to [play sport together], but now they do because [the Active Kids voucher] gives them that extra bit of financial help to be able to do that." Committee member, SSO

Two providers reported they thought the voucher might increase their older children's participation and retention. However, the majority did not perceive the voucher to impact the number of registrations or membership at their organisation.

"I don't think it's made an impact in terms of numbers or, even the demographics. I think it's really just been helping out in our existing members financially." Manager, Large organisation

7.4.3.2 Organisational climate and community actions

The Active Kids vouchers provided new motivation for some providers and their staff members to recruit new participants. Those working in socio-economically disadvantaged areas and/or with low-cost activities most commonly reported this shift in approach. Knowing that families would be assisted financially through the Active Kids program and that membership wouldn't result in less money for essential items, empowered staff to encourage families to invest in their child's sports registration.

"It's been a positive impact on staff because, they feel that they can better sell our programs to other people and know the fact that everybody can be involved in these programs, even if they are a little bit socio-economically disadvantaged ... it makes staff feel more confident and empowered when talking to people on the phone." Manager, Non-affiliated large organisation

"I think it's the first time in many years memberships have all been paid up, and I'm not chasing families for money during the year." Committee member, SSO

This empowerment of staff and volunteers facilitated further promotional activities to increase participant recruitment. Providers took the Active Kids program as an opportunity to promote their activity as well as ensure their community members were aware of how to utilise the vouchers. Many providers (n=16) reported increasing their marketing activity after becoming approved Active Kids provider and highlighted Active Kids in their marketing material.

"I've now added the approved provider logo that the New South Wales government said that we were allowed to add.... certainly, having that logo on our marketing is reducing the barrier to entry." Committee member, Medium Affiliated organisation

One participant reported holding a forum in her regional community after noticing that local families were unaware of the voucher or how to access it. They conducted sessions to increase the registration of children in any structured physical activity opportunity, not just specifically their sport.

"In our community hall, we set up three stations of laptops. And we got parents to come in with a group of community people and show them how to use the laptops to get onto their sites to get the access, and then they could print them out there and then, or they could just write their number down and access them later on and lodge it wherever they wanted to" Committee member, Medium Affiliated organisation

Another organisation reported doing presentations at local schools to increase awareness of their sport and the Active Kids program. Most providers (n=26) reported asking individuals whether they had an Active Kids voucher when they began the registration process with a new or existing member. Those who actively asked parents and caregivers if they had a voucher would often help people to sign up their children to the Active Kids program online before taking their registration fee. Some providers (n=3) were less proactive in promoting the Active Kids voucher, although they would agree to redeem vouchers when customers presented them. These passive Active Kids providers were the organisations who reported administrative challenges redeeming larger volumes of vouchers.

7.4.3.3 Sector cohesion

Through delivering the Active Kids program, the collegiality of the sports industry may have increased collaboration between providers within one structured physical activity and/or across different organisations. For example, providers who adopted the program early could assist their peers in registering in the program, in the absence of SSO guidance.

Providers reported promotional activities were primarily focused on ensuring community members were aware of the Active Kids program and that their children could utilise it to be active. Providers were still satisfied if their participants had used their voucher with another provider, as long as they had used the voucher. With the introduction of a second voucher in the latter part of the year, some providers reported developing informal partnerships with other sports for their off-season.

“a lot of the other codes are starting to realise that what we’re training from a skill basis is enhancing their skills and their own codes. Some of the clubs in some of the areas including ours are actually actively promoting to go and play [approved activity] if you want to up your skills. We’re no longer looked at as the enemy anymore. We’re looked at as supplementary...The cross promotion has 100% been influenced by the Active Kids program” Committee member, Affiliated organisation

The majority (n=25) of providers did not report ongoing changes in their partnerships with others in the industry. Providers were more likely to report impacts on their organisation’s community engagement, marketing, and membership and could clearly link the Active Kids program to their observed changes. Sector cohesion impacts were more implicit, such as talking about daily experiences of being an Active Kids provider, a common thread across different activities/businesses.

7.5 DISCUSSION

This study was the first to explore the impact of implementing a large-scale financial incentive intervention on the capacity of structured physical activity organisations. As part of a comprehensive evaluation of the Active Kids program, this study provides evidence with practical implications for policy makers planning and designing financial incentive programs in partnership with stakeholders in the sport and recreation sector. The introduction of the program initially reduced organisational capacity related to their finances, infrastructure (IT systems) and human resources. During ongoing implementation, these initial challenges were mostly resolved. Three themes were identified from the data that demonstrated practical supports that should be considered when implementing a financial incentive or similar intervention. Firstly, organisations reported intervention priming (e.g., receiving email updates about the program) helped enhance their ability to respond to the government program. Second, support to update administration systems were required, particularly for medium-large organisations and those not affiliated with national or state sporting organisations. Third, stakeholders that were well supported had the capacity to leverage positive impacts from the intervention. Government interventions that require structured physical activity providers to achieve their objectives should include strategies to build capacities such as funding or training. This study highlights the unintended impacts of a large-scale financial incentive program on implementation partners and identified ways to strengthen the capacity of structured physical activity providers for smooth implementation.

7.5.1 Building capacity as part of government interventions

Research has shown that sport and recreation sector organisations have limited capacity yet, financial incentive interventions have not previously assessed the impact of the intervention on organisational capacity(2, 26, 36, 37). Monitoring the impact of interventions on the capacity of structured physical activity providers is important for research translation, and to ensure children and adolescents

continue to have the opportunity to participate in physical activity outside of school time(17, 38). In the present study, Doherty et al.'s multidimensional framework for organisational capacity was used to inform data collection and aid interpretation of the results, providing a deeper understanding of the impacts of the intervention on stakeholders' capacity(17). The most critical aspects of capacity for the implementation of the Active Kids program were infrastructure and finances available to achieve administrative ease. Where possible, future programs should allow more time for testing and development of administration or IT systems. Some organisations required substantial support to align their unique administration processes with the government administration requirements. Other studies of structured physical activity provider's organisational capacity have found that human resources were the most critical aspect of capacity for structured physical activity providers(18). This difference is likely due to the program not requiring enthusiastic staff/volunteers to achieve voucher redemption, compared to sports participation programs where human resources (e.g., coaches) can substantially influence program outcomes and sustainability. This study adds to previous capacity research and is a first step to guide how governments may avoid potential detrimental effects in the delivery planning and implementation of future financial incentive interventions.

7.5.2 Engaging a diverse group of stakeholders

The sport and recreation sector comprises a range of different organisations in NSW, including SSO's, non-affiliated organisations, and business owners that provide structured physical activity programs. Traditionally, the government engage most with SSO's however a broader definition of stakeholders was adopted for the Active Kids program to remove barriers to sport and other types of structured active recreation. This broader definition resulted in a more diverse group of stakeholders being involved in the program, many of whom had not previously had a direct relationship with the Office of Sport. It also increased the number of potential stakeholders that could be engaged as partners in the implementation process. Nichols et al. have demonstrated the need for different types of organisations in the sport and recreation sector to receive different types of support to achieve government objectives(21). Future sport and recreation interventions should continue to adopt this broader definition to strengthen partnerships with organisations aiming to promote physical activity in the community but consider tailored support for non-traditional stakeholders.

7.5.3 Strategies to promote financial incentives

Details of implementation processes have been under-reported in previous studies of financial incentives encouraging children and adolescents to participate in physical activity outside of school. For the Active Kids program, promotion was the responsibility of stakeholders which achieved high awareness among parents and caregivers(39). Staff and volunteers in the sport and recreation sector had capacity to mobilise and encourage parents/caregivers to engage with the Active Kids program. Some providers who serviced socially disadvantaged groups championed the program in their community to increase awareness of the Active Kids program, irrespective of the administrative ease or government support for these activities. Physical activity champions are widely recognised as important in effective physical activity interventions, and are often difficult to replicate when interventions are delivered at scale(15). Research has shown that face-to-face promotion of interventions can increase the uptake of similar interventions(40). Stakeholders that reported going above and beyond their organisational role to promote the Active Kids program were driven by the program's goal to remove barriers and promote the program to community members who needed financial support. Future government interventions should consider allocating funding for organisations or human resources from the government to actively promote the program among disadvantaged or inactive communities and study the effect of this approach on voucher use. Other interventions such as targeted mass media campaigns may also be successful to promote financial incentive interventions, however these have not been documented(41). Future programs should

include and document the strategies employed to increase engagement of stakeholders and participants in financial incentive interventions.

7.5.4 Working together towards a shared goal

There is great potential for interventions delivered by the sport and recreation sector to increase physical activity levels and improve public health(15, 19, 42). Traditionally structured physical activity providers, particularly sports organisations, have focused on competition and elite performance(15, 43). The concept of health promoting sports clubs has been discussed over the past few decades but has been underutilised in practice(15, 19). There is increasing recognition of the potential organisations in the sport and recreation sector have to achieve health, wellbeing, inclusion, and sustainability agendas in partnership with governments(7). Whitelaw et al. described five different models of health promotion through sports clubs, which progressively incorporate policies and practices into the daily practice of sports organisations(19, 20). The first and most passive model involves the promotion of total physical activity, in addition to structured participation. The Government-led Active Kids program appears to have improved sector cohesion and alignment toward physical activity promotion rather than the traditional performance focus. Further actions are required in NSW to build the capacity of structured physical activity providers to promote health as part of their core business(20).

7.5.5 Strengths and limitations

This study is part of a complex pragmatic evaluation of the impact of the Active Kids program(44). Structured physical activity providers were identified in the evaluation's logic model as key stakeholders that would influence the effectiveness of the Active Kids program. Therefore, the Active Kids program evaluation protocol included this study focusing on the capacity of structured physical activity organisations(24). This research is novel compared to previous research which focused primarily on participant outcomes and under-reported stakeholders' involvement in implementation(26, 27, 30, 31). The multidisciplinary research team involved in the qualitative analysis had a range of experience in the program and qualitative analysis; using the Framework analysis method the researchers were able to ensure findings were trustworthy. Engagement with policy makers involved in program implementation after the interpretation of the results further strengthened the credibility of the findings against their anecdotal experiences in daily practice. This study has been critical to providing insights and learning to inform policy and practice in NSW and will provide useful guidance for similar interventions.

This study took place during the second year of the four-year Active Kids program (2018–2023) and is not without its limitations. There were over 10,000 stakeholders involved in implementing the Active Kids program across NSW; the NSW Government Office of Sport limited the recruitment process to a sample of 81 participants. The research team asked that organisations were selected from the larger database using a quota sampling technique, however, were not involved in the selection process due to privacy constraints. The Office of Sport staff selected the 81 participants using the appropriate sampling technique however with only 35% of invited Active Kids providers providing consent there is a potential for response bias. Saturation was not achieved in this study, and we acknowledge that the representative sample includes a small proportion of the total number of providers registered in the Active Kids program. Therefore, the results should be interpreted with caution and may not reflect the experiences of all Active Kids providers. Future research should monitor stakeholder experiences throughout the implementation of financial incentive interventions to understand program adaptations, impacts of these on organisational capacity and program maintenance in real-world contexts.

7.6 CONCLUSIONS AND IMPLICATIONS

This qualitative study is the first to explore the stakeholder experience and organisational impact of implementing a universal financial incentive (voucher) program focused on increasing children and adolescents' participation in structured physical activity programs. The Active Kids program provided stakeholders guidelines for what was required to be an Active Kids provider but did not allocate resources to help stakeholders modify their daily practice to align with the guidelines. Organisations across the sport and recreation sector engaged as partners in implementation of the program and most had the capacity to administer the program however, support for infrastructure and finance dimensions of capacity would have been beneficial. Once administrative ease was achieved, implementation became institutionalised among Active Kids providers. Stakeholders reported that government action to increase children and adolescents' participation in structured physical activity outside of school hours through the voucher program was acceptable, aligned with their goals, and supported its continuation. Similar government-led interventions should embed capacity-building strategies which address the dimensions of organisational capacity most substantially impacted by the new program and monitor the response of structured physical activity providers. Further identification of mutually beneficial interventions to enable more children and adolescents to participate in structured physical activity should be undertaken and implemented considering stakeholder capacity.

7.7 CHAPTER CONCLUSIONS

This chapter examined the extent to which Active Kids providers engaged in the implementation of the Active Kids program. Structured physical activity providers were critical partners in the implementation of this government-led program yet received no financial support for delivery. Sustaining a viable sport and active recreation sector means ensuring that structured physical activity providers can fulfil their primary objectives — to deliver sport and active recreation programs to children and adolescents. This chapter provides helpful insights for policymakers and researchers interested in implementing a large-scale financial incentive program with the sport and active recreation sector.

In this study, we found that the Active Kids program was implemented differently by organisations throughout the sector. The ability of organisations to leverage the program was limited by the extent to which they were primed and informed about the program, and their ability to adjust administration processes. These steps may indicate why program adoption improved in the second year of the Active Kids program implementation once administrative challenges were overcome. Future financial incentive programs of this scale need to monitor the impact of large-scale financial incentive programs on organisational capacity of partners and provide support for partner organisations to change their systems and financial structures. Overall, the Active Kids program has engaged a large number of structured physical activity providers across the State, which enabled most children registered in the program to use their vouchers (see Chapter 6). The sustained investment in the implementation of the Active Kids program by the NSW Government has institutionalised the program within the sport and recreation sector. The following chapter explores whether the sustained implementation of the Active Kids program has influenced long-term changes in school-aged children's physical activity levels.

7.8 REFERENCES

1. Foley BC, Turner N, Owen KB, Cushway D, Nguyen J, Reece LJ. "It Goes Hand in Hand with Us Trying to Get More Kids to Play" Stakeholder Experiences in a Sport and Active Recreation Voucher Program. *Int J Environ Res Public Health*. 2023;20(5):4081.
2. Robertson J, Eime R, Westerbeek H. Community sports clubs: are they only about playing sport, or do they have broader health promotion and social responsibilities? *Annals of Leisure Research*. 2019;22(2):215-32.
3. Sport Australia. *Children's Organised Out-of-school Participation*. 2018.
4. Kemp BJ, Cliff DP, Chong KH, Parrish A-M. Longitudinal changes in domains of physical activity during childhood and adolescence: A systematic review. *Journal of Science and Medicine in Sport*. 2019;22(6):695-701.
5. Active Healthy Kids Australia. *Active Healthy Kids Australia. Is Sport Enough? The 2014 Active Healthy Kids Australia Report Card on Physical Activity for Children and Young People*. 2014.
6. Hume C, Richards, R., Lenton, L. Economic contribution of Sport: Clearinghouse for Sport and Physical Activity; 2016 [updated 18 April 2019. Available from: https://www.clearinghouseforsport.gov.au/knowledge_base/organised_sport/value_of_sport/economic_contribution_of_sport.
7. World Health Organization. *Fair Play: Building a strong physical activity system for more active people*. In: team PA, editor. 2021.
8. Foley BC, Owen KB, Bauman AE, Bellew W, Reece LJ. Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention. *BMC public health*. 2021;21(1):22.
9. Hardy LL, Kelly B, Chapman K, King L, Farrell L. Parental perceptions of barriers to children's participation in organised sport in Australia. *Journal of paediatrics and child health*. 2010;46(4):197-203.
10. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
11. Howie EK, Guagliano JM, Milton K, Vella SA, Gomersall SR, Kolbe-Alexander TL, et al. Ten Research Priorities Related to Youth Sport, Physical Activity, and Health. 2020;17(9):920.
12. Mitchell MS, Orstad SL, Biswas A, Oh PI, Jay M, Pakosh MT, et al. Financial incentives for physical activity in adults: systematic review and meta-analysis. *British Journal of Sports Medicine*. 2020;54(21):1259-68.
13. Vlaev I, King D, Darzi A, Dolan P. Changing health behaviors using financial incentives: a review from behavioral economics. *BMC Public Health*. 2019;19(1):1059.
14. Luong M-LN, Hall M, Bennell KL, Kasza J, Harris A, Hinman RS. The Impact of Financial Incentives on Physical Activity: A Systematic Review and Meta-Analysis. *American Journal of Health Promotion*. 2020:0890117120940133.
15. World Health Organization. *Global action plan on physical activity 2018–2030: more active people for a healthier world*. Geneva: World Health Organization; 2018.

16. Priest N, Armstrong, R, Doyle, J, Waters, E. Interventions implemented through sporting organisations for increasing participation in sport. *Cochrane Database of Systematic Reviews*. 2008(3).
17. Doherty A, Misener K, Cuskelly G. Toward a Multidimensional Framework of Capacity in Community Sport Clubs. *Nonprofit and Voluntary Sector Quarterly*. 2013;43(2_suppl):124S-42S.
18. Elmoose-Østerlund K, Cuskelly G, Høyer-Kruse J, Voldby CR. Building and Sustaining Organizational Capacity in Voluntary Sports Clubs: Findings From a Longitudinal Study. *Journal of sport management*. 2021;35(5):440-51.
19. Whitelaw S, Baxendale A, Bryce C, MacHardy L, Young I, Witney E. 'Settings' based health promotion: a review. *Health promotion international*. 2001;16(4):339-53.
20. Europe WROf. Health-promoting sports clubs national audit tool. Copenhagen: World Health Organization; 2022.
21. Nichols G, Padmore J, Taylor P, Barrett D. The relationship between types of sports club and English government policy to grow participation. *International Journal of Sport Policy and Politics*. 2012;4(2):187-200.
22. New South Wales Government. Sport Budget 2017-18: Office of Sport; 2017 [Available from: <https://sport.nsw.gov.au/sectordevelopment/sport-budget-2017-18>].
23. Reece LJ, Foley, B.C., Bellew, B., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(e30122006).
24. Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.
25. Kahn EB, Ramsey LT, Brownson RC, Heath GW, Howze EH, Powell KE, et al. The effectiveness of interventions to increase physical activity. A systematic review. *American journal of preventive medicine*. 2002;22(4 Suppl):73-107.
26. von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *American journal of public health*. 2011;101(8):e10-6.
27. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J Phys Act Health*. 2015;12(6):840-53.
28. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.
29. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
30. Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC public health*. 2016;16:890.

31. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
32. New South Wales Government. Active Kids program: Provider guidelines. In: Sport Oo, editor. Sydney Olympic Park: New South Wales Government; 2017.
33. NSW Government. Recognised State Sporting Organisations in NSW Online: Office of Sport; 2019 [Available from: <https://sport.nsw.gov.au/recognised-state-sporting-organisations-nsw>].
34. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*. 2013;13(1):117.
35. Ritchie J LJ. *Qualitative research practice: a guide for social science students and researchers*. London: Sage; 2003.
36. Spence JC, Holt NL, Sprysak CJ, Spencer-Cavaliere N, Caulfield T. Non-refundable tax credits are an inequitable policy instrument for promoting physical activity among Canadian children. *Can J Public Health*. 2012;103(3):175-7.
37. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. *ZA Institute of Labor Economics*. 2021(14246).
38. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322-7.
39. Owen KB, Foley BC, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *Journal of science and medicine in sport*. 2020.
40. Clark AF, Campbell J, Tucker P, Wilk P, Gilliland JA. If You Make it Free, Will They Come? Using a Physical Activity Accessibility Model to Understand the Use of a Free Children's Recreation Pass. *J Phys Act Health*. 2019;16(7):493-503.
41. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet*. 2010;376(9748):1261-71.
42. Priest N, Armstrong R, Doyle J, Waters E. Interventions implemented through sporting organisations for increasing participation in sport. *Cochrane Database of Systematic Reviews*. 2008(3).
43. Allender S, Occhipinti J-A, Bauman A, Bellew B, Cavill N, Chau J, et al. *Getting Australia Active III: A systems approach to physical activity for policy makers*2020.
44. Reece LJ, Foley BC, Bellew B, Owen K, Cushway D, Srinivasan N, et al. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.

8 MAINTENANCE OF PHYSICAL ACTIVITY OVER TIME

8.1 CHAPTER OUTLINE

This chapter addresses the final element of the RE-AIM Framework — *Maintenance*. Maintenance is the least reported RE-AIM dimension(1). Glasgow et al. define maintenance as “the extent to which: a) a behaviour is maintained six months or more after treatment or intervention; and b) a program or policy becomes institutionalised or part of routine organisational practices and policies.”(1). Part a) of this definition focuses on individual behaviour, while part b) describes a setting/organisational concept also referred to as institutionalisation. The focus of this chapter is part a) of Glasgow’s definition — considering the maintenance school-aged children’s physical activity behaviours after more than 24 months.

In Chapter 2 of this thesis, the scoping review identified that most financial incentive programs in the peer-reviewed literature were implemented for between 8 weeks–12 months(2-7). The longest follow-up period for peer-reviewed studies of financial incentives was 12 months finding mixed effects(3, 7, 8). The only example of long-term implementation of a financial incentive identified in Chapter 2 was the Canadian Fitness Tax Credit; it was available annually for a decade but did not demonstrate positive effects on physical activity(8, 9). In Australia, many States and Territories have delivered financial incentive (voucher) programs for more than 5 years (Western Australia, South Australia, Queensland, Northern Territory) yet there is limited understanding of the outcomes these programs achieve (Chapter 2). Although these programs have been institutionalised, a lack of outcome evaluation has resulted in uncertainty regarding the effectiveness of financial incentives on increasing physical activity or sport participation of participants (Chapter 2). Chapter 5 presented the first study investigating short-term effects of an Australian financial incentive program on children’s physical activity levels. This study showed a positive effect on children achieving 60-minutes of physical activity per week, increasing from 4 days per week to 5 days per week six months after using a voucher. These positive effects observed in research participants warrant follow-up over a longer period to understand whether the effects of the Active Kids program on children’s physical activity levels were maintained more than six months after voucher use.

This chapter focuses on the maintenance of individual participants’ physical activity behaviours among children who registered in the Active Kids program between 2018 -2020. The chapter follows two groups of children involved in the Active Kids program to identify the long-term effect of the voucher program on physical activity behaviours over time. The first group of children; all registered children, and the second group of children; participants who consented to be a part of the research sub-study.

8.2 INTRODUCTION

8.2.1 Maintenance of intervention effects on school-aged children's physical activity

Interventions which maximise opportunities for school-aged children to be active in all aspects of their lives are needed to improve total physical activity participation(10). In recent decades, there has been limited progress toward increasing the prevalence of children meeting physical activity guidelines(11, 12). Actions to increase school-aged children's physical activity participation have been fragmented despite strong evidence that comprehensive, multicomponent interventions would be effective(10). Strategic long-term investment in policies and programs that act across all levels of the socioecological model to increase and maintain children's physical activity participation throughout their development are urgently required(10, 13).

Maintenance is a key dimension of the RE-AIM framework, which involves assessing changes in behaviour over six months or more after an intervention(1). Glasgow et al. acknowledge that six months was arbitrarily selected as the cut-point(1). Six months after an intervention provides good insights for effectiveness; however, the ability of physical activity interventions to maintain their effects over more extended periods is essential and seldom reported(14-18). McGoey et al. conducted a systematic review of youth physical activity interventions that applied the RE-AIM framework and found that 52 of the 78 (67%) of the identified studies did not report maintenance(18). Studies investigating the effect of physical activity interventions typically follow up within six months or less after an intervention(15). Interventions that follow physical activity behaviours over more extended periods (>12 months) typically report intervention effects return to similar levels to the comparison(18). These relapses may be due to the intervention no longer being delivered at follow up, or the intensity of delivery being reduced across the study period. Large scale or population-wide physical activity interventions delivered over extended periods rarely collect physical activity data within routine monitoring. There is a need for ongoing evaluation of programs beyond their initial impact to strengthen the current understanding of how physical activity interventions can maintain physical activity improvements over time.

8.2.2 Role of financial incentives to increase physical activity participation

Many physical activity interventions focus on creating positive experiences for children involved in physical activity without concurrently addressing systemic barriers to participation(19). Somerset and Hoare report that cost, time and location are systemic barriers to participation in structured physical activity for school-aged children; interventions should be trialled to address these barriers at the population level(20). Financial incentive interventions that reduce the cost of participation in structured physical activities are one approach to addressing the cost barrier and can be maintained in real-world conditions for many years. Financial incentives are popular among policymakers and politicians; however, research studies have reported mixed effects of financial incentives in the short term. Few interventions have studied the effect of financial incentives on physical activity after 12 months or more(21) (Chapter 2). One financial incentive had been implemented in Canada for a decade, but the effects on participants physical activity have only been studied in small-scale studies(8, 9). This Canadian financial incentive appeared to have no positive effect on the population prevalence of physical activity among school-aged children in the short or long term(8, 9, 22). Another study in Germany of a financial incentive available to students for 12 months followed up the effects 7–9 years after the intervention, finding no significant effect on physical activity or other health behaviours. No large-scale studies have demonstrated long-term (>12 months) benefits of financial incentive interventions on school-age children's physical activity behaviours.

In Australia, all State and Territory governments have taken to implementing financial incentive interventions to reduce cost barriers to school-aged children's participation in structured physical activity, yet only one Australian intervention (the Active Kids program) has followed up the effects of the intervention on children's physical activity levels (Chapter 5). The quasi-experimental study presented in Chapter 5 demonstrated positive short-medium term effects on physical activity behaviours six-months after using a voucher to reduce the cost of structured physical activity participation (see Chapter 5)(23). The NSW Government have invested \$650 million to implement the Active Kids program over across five years (Program details are described in Section 3.2 of this thesis); Further study to understand the importance of long-term investments on enabling children to be active are warranted. Maintenance in this thesis is defined as the long-term effectiveness of the Active Kids voucher in improving children's physical activity levels after *more than* 12 months.

This chapter aims to answer the following research question: To what extent did the Active Kids program influence school-aged children's physical activity levels over time?

8.3 METHODS

8.3.1 Study design

The evaluation of the Active Kids program is a prospective cohort study which includes research sub-study, see Chapter 3. This chapter focuses on the maintenance of individual children's physical activity behaviours after registering in the Active Kids program during 2018–2020.

8.3.2 Active Kids program 2018–2020

A comprehensive description of the Active Kids program is presented in Chapter 3. This section provides a summary of the Active Kids program investment during the study period (2018–2020).

The Active Kids voucher program is a state-wide, whole-of-government initiative led by the NSW Government Office of Sport that began on January 31, 2018, and is funded to June 30, 2023. The voucher program supports parents and caregivers by subsidising the cost of children's participation in structured physical activity programs. In the program's first year, one Active Kids voucher valued at up to \$100 was available for eligible children between January 31–December 31, 2018. After the first year of implementation, the NSW Government increased the investment in the program from \$207 million across four years to \$650 million across five years. As part of this increased investment, the Government changed the program from providing one voucher per calendar year to two Active Kids vouchers valued at \$100 AUD each. The first annual voucher was available between January 1 and December 31, and the second voucher was available during the second half of the year, between July 1, and December 31 (2019–2020).

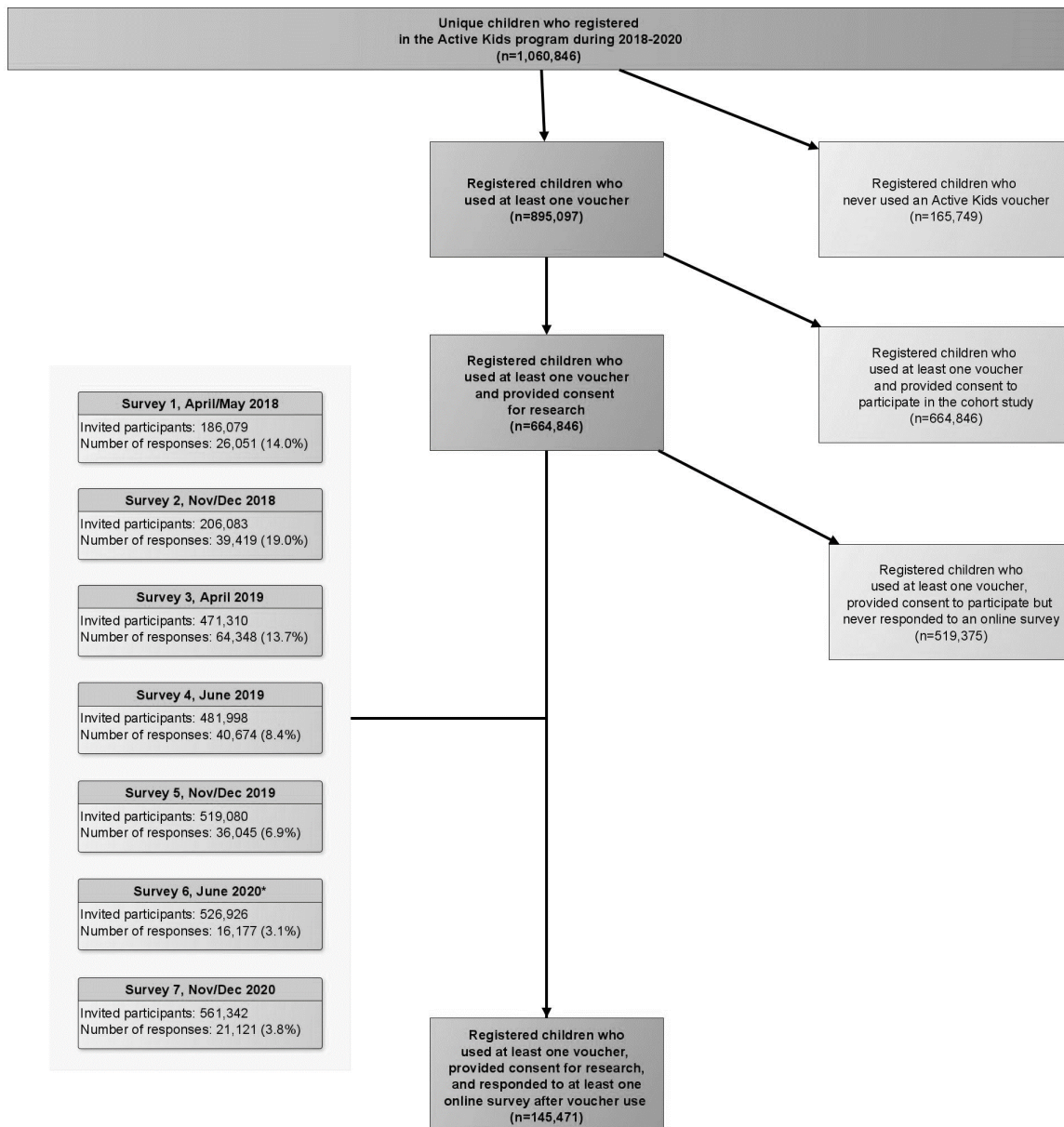
8.3.3 PARTICIPANT RECRUITMENT

This chapter follows two groups of children involved in the Active Kids program — all registered children, and participants in the research sub-study. All registered children includes all children who applied for an Active Kids voucher online (by-parent/caregiver proxy) during 2018–2020. During the online registration, parents/caregivers were asked for their consent to participate in additional research about the Active Kids program. Participants that provided consent were invited to respond to evaluation surveys during 2018–2020 (see Figure 19).

To be included in the research study, children needed to complete the online registration form at least once (by-parent/caregiver proxy), redeem at least one Active Kids voucher, and

respond to at least one survey after using a voucher during 2018–2020. The flow of participants through the study is shown in Figure 19.

Figure 19 Participant flow during 2018–2020



*Survey 6 was delayed from April and conducted during a pandemic lockdown period while delivery of structured physical activity programs had ceased to reduce the spread of COVID-19.

8.3.4 Data collection

The two groups of children included in the analysis of the primary outcome (days the child participated in at least 60-minutes of physical activity in the past week) were all children registered ($n=1,060,846$) and participants in the research sub-study ($n=145,471$). All school-enrolled children (4.5–18 years) in NSW could register for a voucher online each year. During this time, five vouchers in total were available — one in 2018, and two in 2019 and two in 2020. Each year during online registration, demographic information and the primary outcome were obtained from all children.

Information about the child’s use of each voucher (date of voucher redemption, voucher activity type) were systematically recorded and linked with registration data within the online

government administration platform for all registered children. All registered children including the children in the research sub-study could have used between 0–5 vouchers.

During 2018–2020, registered children who provided consent for research were invited to participate in up to seven online surveys (Figure 19). The survey was administered by the research team and responses were linked to the child’s registration information using a unique ID.

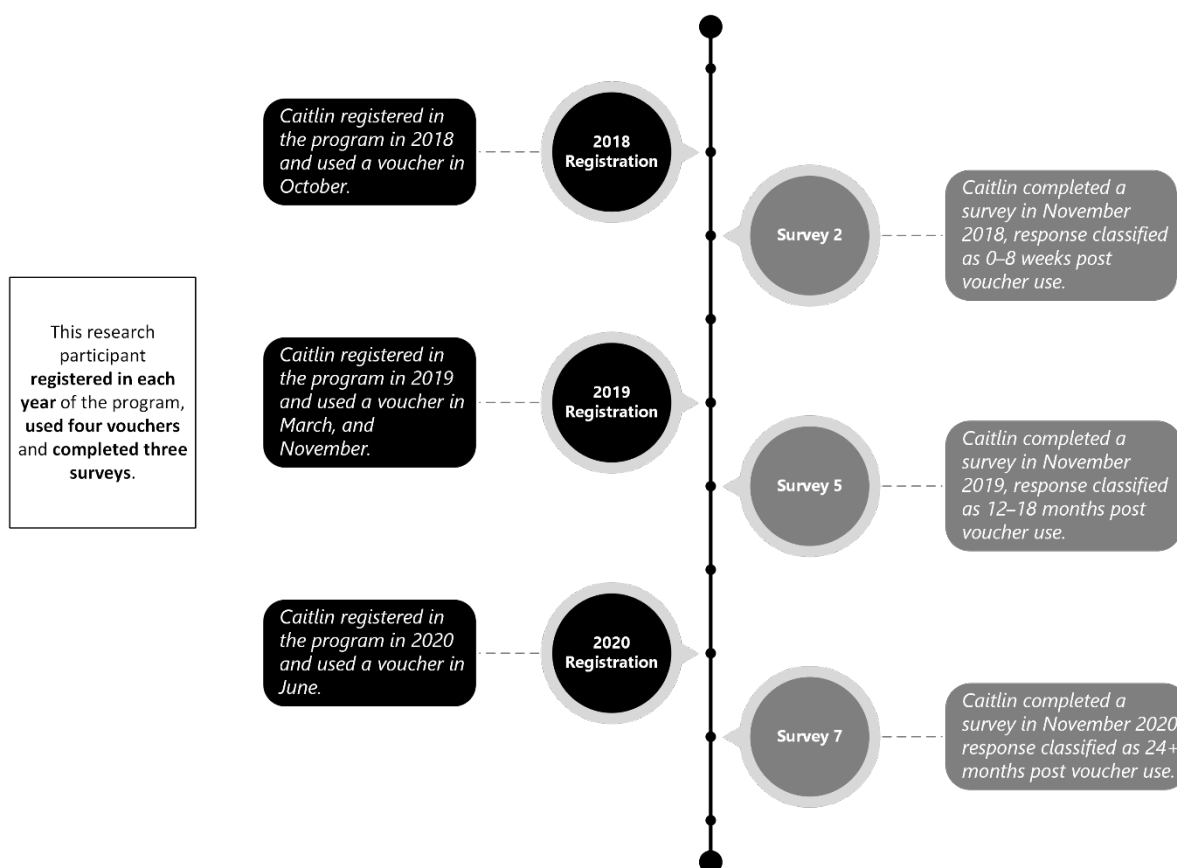
8.3.4.1 Primary outcome: Children’s physical activity levels

The primary outcome was the number of days the child participated in at least 60-minutes of physical activity, measured using Prochaska’s validated 60-minutes/day single-item screening measure of moderate-to-vigorous physical activity in children(24). Participants were asked “In a typical week, on how many days is the child physically active for at least 60 minutes? This could be made up of different activities accumulated throughout the day including walking quickly, cycling to school, organised sport and physical activities at school or an exercise class.”. Nine response options were available, including 0–7 days, or ‘not sure’. Achieving 60-minutes of physical activity on seven days was classified as meeting physical activity guidelines, 0–6 days was classified as not meeting physical activity guidelines and ‘not sure’ was treated as missing data.

The primary outcome question was repeated in the online registration platform and the online surveys. Survey responses about the child’s physical activity were categorised based on when participants used their first Active Kids voucher (Figure 20). Time categories for research participants included registration, 0–6 months, 6–12 months, 12–18 months, 18–24 months, 24+ months. This approach allows an understanding of physical activity behaviour change relative to the time the voucher was used. For example, if Caitlin used her first voucher in October 2018, all surveys were then categorised based on the time between October 2018 and the survey completion date. A survey completed about Caitlin in November 2018 would be classified as “0–8 weeks”, and a survey completed in November 2019 would be classified as “12–18 months” after her first voucher redemption, and a survey completed in November 2020 would be classified as “24+ months”. This approach is common in natural experimental studies where the researchers did not have control over when participants were exposed to the intervention.

Research participants were also categorised based on the number of Active Kids vouchers they redeemed during the study period (1–5 vouchers).

Figure 20 Example of research participant data collection and survey classification



8.3.4.2 Demographic characteristics

Demographic data fields in the online registration platform included the child’s date of birth, sex, Aboriginal identity, disability status, language spoken at home, and postcode. Date of birth at registration was used to categorise children into four age groups (4–8 years; 9–11 years; 12–14 years; 15–18 years). These age groups are consistent with the developmental stages for children and adolescents, defined by the sports sector in Australia(25). The socio-economic status of children was derived from their reported postcode using the Australian Bureau of Statistic’s Socio-Economic Index For Areas (SEIFA) Index of Relative Disadvantage(26). State (NSW) SEIFA percentiles were categorised into quartiles of relative disadvantage. Geographic location was classified using the reported postcode and determined using Accessibility/Remoteness Index of Australia Plus (27); Outer regional and remote were combined in the analysis due to small numbers. Annual sport participation was collected in the registration form using an AusPlay survey item(28).

Height and weight fields were included in the registration platform; however, the fields were not mandatory during 2018. This was amended in 2019 and 2020 so that all participants need to enter the height and weight of the child. Body Mass Index z-scores (BMI) were calculated using the height and weight of the child reported during the registration process. Children were classified as thin, in the healthy weight range, overweight, or obese using the International Obesity Task Force cut points(29).

8.3.5 Data analysis

Descriptive statistics, including frequencies and proportions, of children’s demographic characteristics were calculated for all children who registered in the Active Kids program each

year (Table 8). Table 8 also presents the demographic characteristics of children retained in the Active Kids program for all three years (2018, 2019 and 2020), from the second year to the third (2019–2020) and in the first and third year (2018–2020) to demonstrate who returned to the program each year.

Table 9 shows the demographic characteristics of all unique registered children and the research study participants. Figure 19 demonstrates how children progressed through the study flow.

8.3.6 Statistical analysis

Generalised linear mixed models (GLMMs) were used to examine changes in children's physical activity over time. GLMMs are a flexible method for analysing data with different distributions and data that is repeatedly collected over time from the same individuals (i.e., multiple surveys from the same child). The GLMMs estimate the adjusted means or proportions with 95% confidence intervals (CI). All GLMMs adjusted for demographic characteristics that were potential confounders (sex, age, Aboriginal identity, identified disability, language spoken at home, socio-economic status, geographic location, and BMI). Missing data were handled using Maximum Likelihood estimation, which allows all available data to be used to provide accurate parameter estimates and retain power (30, 31).

8.3.6.1 Changes in all children's physical activity levels during 2018–2020

For all children, program registrants who applied for a voucher between January 1 and December 31 each year were included. The number of days the child participated in 60-minutes of physical activity in the past week (registration data) was used to assess changes in the primary outcome across years. GLMMs estimated the mean number of days that all children achieved physical activity guidelines each year. Missing data occurred when children were not retained in the program.

8.3.6.2 Changes in research participant's physical activity levels, by voucher use

To understand the effect of voucher use on maintaining physical activity levels, a GLMM estimated the mean number of days spent participating in 60-minutes of physical activity in the past week over time by the number of vouchers children redeemed during 2018–2022. Missing data occurred when a survey was not completed about the child during the specified period after the child redeemed a voucher. All children had missing data because surveys were only distributed a few times a year (Figure 19). For example, a survey was not completed about Caitlin at 9–26 weeks post voucher redemption or 18–24 months post voucher redemption but was completed at 12–18 months post voucher redemption.

8.4 RESULTS

To assess the maintenance of individual children's physical activity over time, this study included all 1,060,846 school-aged children who registered for an Active Kids voucher and a research sub-study of 145,471 school-aged children who used a voucher and responded to an online survey after using the voucher during 2018–2020 (Figure 19, Table 10). The number of school-aged children who registered in the Active Kids program increased each year during implementation (2018 N = 664,973; 2019 N = 777,240; 2020 N = 795,528). Most children re-registered in the program after their first year, and 42% of them registered in the program in all three years (Table 9). Most registered children (89%) used at least one voucher during the study period, and 14% of registered children used all five available Active Kids vouchers (Table 10).

8.4.1 All registered children

8.4.1.1 Sociodemographic characteristics of all registered children

Of the 1,060,846 school-aged children who registered, (Table 10) 38% were aged 4–8 years (Table 8). Most new participants in 2019 and 2020 were younger children starting school who were not eligible to participate in the previous years (Table 9). A higher proportion of boys than girls registered for an Active Kids voucher each year. Children who identified as Aboriginal and Torres Strait Islander and registered for a voucher comprised 5.9% (Table 10), which remained consistent across each program year (Table 9). The proportion of children who spoke a language other than English at home increased yearly (2018 = 7.5%; 2019 = 8.5%; 2020 = 9.0%), as program information was translated into multiple languages and more widely disseminated. The proportion of children living with a disability who registered in the Active Kids program increased each year (2018 = 2.6%; 2019 = 2.8%; 2020 = 3.5%), as more disability sports providers registered in the Active Kids program. There was a clear gradient in registration across socioeconomic status, with a higher proportion of children living in high socioeconomic areas registered in the program compared to children living in low socioeconomic areas (33% compared to 17%) (Table 9); this remained consistent across the three years of implementation (Table 10). The proportion of registered children living in major cities increased during implementation, while the proportion of children from remote areas decreased (Table 9). Half of the children who registered for a voucher were categorised as having a healthy weight (Table 10). There is no clear trend across years for children by BMI categories due to the large proportion of missing data in 2018, when height and weight data were not mandatory during registration (Table 9).

8.4.1.2 Changes in all children's physical activity levels

Overall, the proportion of all registered children meeting the physical activity guidelines (60 minutes of physical activity on 7 days per week) decreased from 19% in 2018 to 17% in 2019 and 2020. The mean number of days all registered children achieved the recommended 60 minutes of physical activity in the week before registration was compared across years (Figure 20). The mean days children achieved physical activity guidelines remained stable across the implementation of the Active Kids program (2018 = 4.4 days per week [95% CI 4.4–4.4]; 2019 = 4.1 days per week [95% CI 4.1–4.2]; 2020 = 4.3 days per week [95% CI 4.3–4.3]). The proportion of registered children who had not participated in structured physical activity programs outside of school in the previous 12 months increased from 2% in 2018 to 6% and 7% in 2019 and 2020, respectively.

8.4.1.3 Retention of all registered children 2018–2020

Three-year retention was highest among 9–14-year-olds, as these children remained eligible throughout the follow up period (Table 9). Lower retention of children in the 15–18 age group may reflect them being no longer eligible to claim a voucher in 2019 or 2020. Boys were more likely to remain in the program throughout 2018–2022 compared to girls (Table 9). The program retained children who identified as Aboriginal and Torres Strait Islander to a similar degree as non-Indigenous children (Table 9). Children who spoke a language other than English at home were less likely to be retained year on year in the program than English speaking children (Table 9). A lower proportion of children living in disadvantaged areas and children living in outer regional and remote areas were retained in the program compared to less disadvantaged children and children living in inner regional and metropolitan areas (Table 9). A high proportion of children classified as having a healthy BMI were retained from 2018–2020, compared to children living with obesity. The highest retention rates across the three years were in children who participated in sport at least four times per week (77%).

8.4.2 Children in the research sub-study

8.4.2.1 Sociodemographic characteristics of research participants

Children who participated in the research study largely represented all children who registered in the Active Kids program during 2018–2020, and all children who used at least one voucher (Table 10). Demographic groups that were underrepresented in the research participants include children who identified as Aboriginal or Torres Strait Islander, children who lived in the most disadvantaged areas (1st quartile), children who had participated in less sport in the past 12 months, and children who used fewer vouchers. Research participants were mostly registered during the first year of the program. Research participants were more likely to have used all five available vouchers (30%) compared to all registered children (14%) (Table 10).

Table 11 shows the number of surveys completed at each time point after voucher use and by the number of vouchers used. Children who only used one voucher mostly responded to the survey within six months of voucher use however, some responded over 24 months after using the Active Kids voucher. Children who used more vouchers were more likely to continue to participate in the research and respond at later time points.

8.4.2.2 Changes in physical activity levels among research sub-study participants, by the number of vouchers they used

The research study participants had higher physical activity levels at registration compared to all registered children, with 21% of research participants meeting physical activity guidelines when they first registered in the program, compared to 17% of all children. The mean number of days children achieved 60-minutes of physical activity in the past week increased after using a voucher (Figure 22). Increases were observed in all voucher use groups (1–5 vouchers). The greatest increases in physical activity were observed in the first 12 months after using a voucher (Figure 22). Children who redeemed more vouchers during 2018–2020 were more likely to maintain increased physical activity levels compared to children who used fewer vouchers.

Children who used one voucher increased the number of days they achieved 60-minutes of physical activity from 4.1 days per week (95% CI 4.1–4.1) at registration to 5.1 days per week (95% CI 5.0–5.1) at 6–12 months and declined to 4.8 days per week at 24+ months (95% CI 4.5–5.1). Children who only used one Active Kids voucher were still active on more days per week after 24+ months than their registration levels.

Among children who used three out of five vouchers, declines in physical activity levels occurred at 12–18 months, which was earlier than children who used four or five vouchers. Children who used five vouchers were more active initially, achieving 60-minutes of physical activity on 4.6 days per week (95% CI 4.6–4.6) at registration, which increased after using a voucher to 5.8 days per week at 12–18 months (95% CI 5.8–5.8), and declined slightly to 5.6 days per week after 24+ months (95% CI 5.5–5.6). Children who used all five available Active Kids vouchers added an additional day per week achieving 60-minutes of physical activity and maintained this increase after 24+ months. A similar trend was observed among children who used 4 out of 5 vouchers.

8.4.2.3 Sub-group physical activity levels

The general trend of increased physical activity levels *by voucher use* were consistent across most sociodemographic groups (see Supplementary material 3), except for children who identified as Aboriginal and Torres Strait Islander and children living with a disability — the number of vouchers used were not associated with their physical activity increases. Variation in these two demographic groups may be due to other barriers in their lives impacting participation which overrode the influence of the vouchers on physical activity levels.

Using four or five out of the five available vouchers had a substantial difference on physical activity at 24+ months compared to children who used one voucher for children who spoke a language other than English at home, children living in the most disadvantaged areas and children living with overweight or obesity. Children who spoke a language other than English at home who used five vouchers reported achieving 60 minutes of physical activity on 3.9 days per week (95% CI 3.9–3.9) which increased after voucher use and was maintained at 4.9 days per week (95% CI 4.7–5.9) after 24+ months, compared to children who spoke a language other than English at home who used one voucher who started at a similar activity level and returned to the same level of activity after 24+ months (3.6 days per week [95% CI 3.6–3.7], and 3.7 days per week [95% CI 2.9–4.5] respectively). Children living in the most disadvantaged areas (1st quartile) who used 5 vouchers reported achieving 60 minutes of physical activity on 4.4 days per week (95% CI 4.3–4.4) which increased after voucher use and was maintained at 5.4 days per week (95% CI 5.2–5.5) after 24+ months, compared to disadvantaged children who used one voucher who started at a similar activity level and returned to the same level of activity after 24+ months (4.0 days per week [95% CI 3.9–4.0], and 4.6 days per week [95% CI 3.8–5.4] respectively). Children living with overweight and obesity who used 5 vouchers reported achieving 60 minutes of physical activity on 4.4 days per week (95% CI 4.4–4.4) which increased after voucher use and was maintained at 5.5 days/week (95% CI 5.4–5.5) after 24+ months, compared to children living with overweight and obesity that used one voucher who started at a similar activity level and returned to the same level of activity after 24+ months (4.0 days per week [95% CI 3.9–4.0], and 4.6 days per week [95% CI 3.8–5.4] respectively).

Table 9 Retention of school-enrolled children in the Active Kids program during 2018, 2019, and 2020

	Children registered for an Active Kids voucher in 2018		Children who registered for an Active Kids voucher in 2019		Children who registered for an Active Kids voucher in 2020		Children who registered for an Active Kids voucher in 2018, 2019 and 2020		Children who registered for an Active Kids voucher in 2019 and 2020		Children who registered for an Active Kids voucher in 2018 and 2020	
	N	%	N	%	N	%	N	%	N	%	N	%
All children	664,973	100	777,240	100	795,528	100	441,776	100	171,822	100	29,541	100
Age category												
4–8 years	267,247	40.2	319,445	41.1	321,274	40.4	109,715	24.8	100,271	58.4	6,376	21.6
9–11 years	183,855	27.7	208,548	26.8	208,242	26.2	146,795	33.2	33,495	19.5	8,656	29.3
12–14 years	136,686	20.6	158,177	20.4	166,421	20.9	118,544	26.8	23,910	13.9	7,937	26.9
15–18 years	77,185	11.6	91,070	11.7	99,591	12.5	66,722	15.1	14,146	8.2	6,572	22.2
Sex												
Boys	358,223	53.9	408,998	52.6	416,606	52.4	238,771	54.0	85,558	49.8	15,409	52.2
Girls	305,778	46.0	366,921	47.2	376,786	47.4	201,889	45.7	85,787	49.9	14,031	47.5
Aboriginal identity												
Aboriginal and/or Torres Strait Islander	35,738	5.4	41,698	5.4	43,128	5.4	22,768	5.2	8,966	5.2	2,108	7.1
Non-Aboriginal and/or Torres Strait Islander	620,777	93.4	725,773	93.4	744,974	93.7	414,636	93.9	161,454	94.0	27,121	91.8
Prefer not to say	8,458	1.3	9,769	1.3	7,426	0.9	4,372	1.0	1,402	0.8	312	1.1
Primary language spoken at home												
English	615,238	92.5	711,004	91.5	723,800	91.0	413,242	93.5	152,415	88.7	26,817	90.8
Other	49,735	7.5	66,236	8.5	71,728	9.0	28,534	6.5	19,407	11.3	2,724	9.2
Identified disability												
Yes	17,543	2.6	21,569	2.8	27,417	3.5	13,465	3.0	6,227	3.6	1,457	4.9
No	638,497	96.0	745,213	95.9	756,657	95.1	422,225	95.6	163,067	94.9	27,568	93.3

	Children registered for an Active Kids voucher in 2018		Children who registered for an Active Kids voucher in 2019		Children who registered for an Active Kids voucher in 2020		Children who registered for an Active Kids voucher in 2018, 2019 and 2020		Children who registered for an Active Kids voucher in 2019 and 2020		Children who registered for an Active Kids voucher in 2018 and 2020	
Prefer not to say	8,210	1.2	10,458	1.4	11,454	1.4	6,086	1.4	2,528	1.5	516	1.7
Socio-economic status (quartiles)												
1 st (most disadvantaged)	107,505	16.2	128,146	16.5	126,847	16.0	61,767	14.0	28,503	16.6	6,059	20.5
2 nd	151,501	22.8	176,895	22.8	176,368	22.2	100,276	22.7	36,799	21.4	6,844	23.2
3 rd	171,687	25.8	207,534	26.7	214,292	26.9	118,590	26.8	46,876	27.3	7,715	26.1
4 th (least disadvantaged)	217,978	32.8	264,044	34.0	277,819	34.9	161,032	36.5	59,609	34.7	8,910	30.2
Missing	16,302	2.5	621	0.1	202	0.0	111	0.0	35	0.0	13	0.0
Location												
Major cities	477,624	71.8	578,608	74.4	600,865	75.5	329,379	74.6	131,906	76.8	22,117	74.9
Inner regional	136,397	20.5	157,436	20.3	156,897	19.7	90,691	20.5	32,097	18.7	5,965	20.2
Outer regional and remote	35,413	5.3	40,687	5.2	37,556	4.7	21,578	4.9	7,787	4.5	1,448	4.9
Body mass index category*												
Thin/ underweight	35,076	5.3	82,195	10.6	91,769	11.5	46,638	10.6	21,691	12.6	2,806	9.5
Healthy weight	193,804	29.1	407,328	52.4	430,227	54.1	256,926	58.2	88,340	51.4	15,308	51.8
Overweight	52,208	7.9	127,843	16.5	135,573	17.0	78,891	17.9	27,676	16.1	5,716	19.3
Obesity	23,037	3.5	75,953	9.8	81,666	10.3	38,083	8.6	19,970	11.6	3,537	12.0
Missing	360,848	54.3	83,921	10.8	56,293	7.1	21,238	4.8	14,145	8.2	2,174	7.4
Met physical activity guidelines at registration												
No	513,319	77.2	615,171	79.2	635,554	79.9	361,720	81.9	135,750	79.0	24,337	82.4
Yes	128,131	19.3	135,643	17.5	141,151	17.7	73,782	16.7	31,944	18.6	3,971	13.4
Missing	23,523	3.5	26,426	3.4	18,823	2.4	6,274	1.4	4,128	2.4	1,233	4.2
Sport participation												
None	12,088	1.8	49,814	6.4	57,379	7.2	9,631	2.2	8,985	5.2	5,301	17.9

	Children registered for an Active Kids voucher in 2018		Children who registered for an Active Kids voucher in 2019		Children who registered for an Active Kids voucher in 2020		Children who registered for an Active Kids voucher in 2018, 2019 and 2020		Children who registered for an Active Kids voucher in 2019 and 2020		Children who registered for an Active Kids voucher in 2018 and 2020	
At least once a month	143,127	21.5	182,610	23.5	214,988	27.0	103,556	23.4	52,214	30.4	9,462	32.0
At least once a week	215,925	32.5	224,682	28.9	233,216	29.3	138,661	31.4	54,257	31.6	6,380	21.6
At least twice a week	146,018	22.0	192,571	24.8	200,725	25.2	125,683	28.4	42,668	24.8	5,976	20.2
At least four times a week	100,434	15.1	88,056	11.3	74,438	9.4	57,362	13.0	10,478	6.1	1,802	6.1
Not sure	40,145	6.0	39,507	5.1	14,782	1.9	6,883	1.6	3,220	1.9	620	2.1

**Height and weight were not mandatory fields in the registration during 2018, which resulted in most participants not entering the child's information; this was changed to mandatory in 2019 and 2020.*

Figure 21 Changes in mean number of days achieving 60 minutes of physical activity for all registered in the Active Kids program

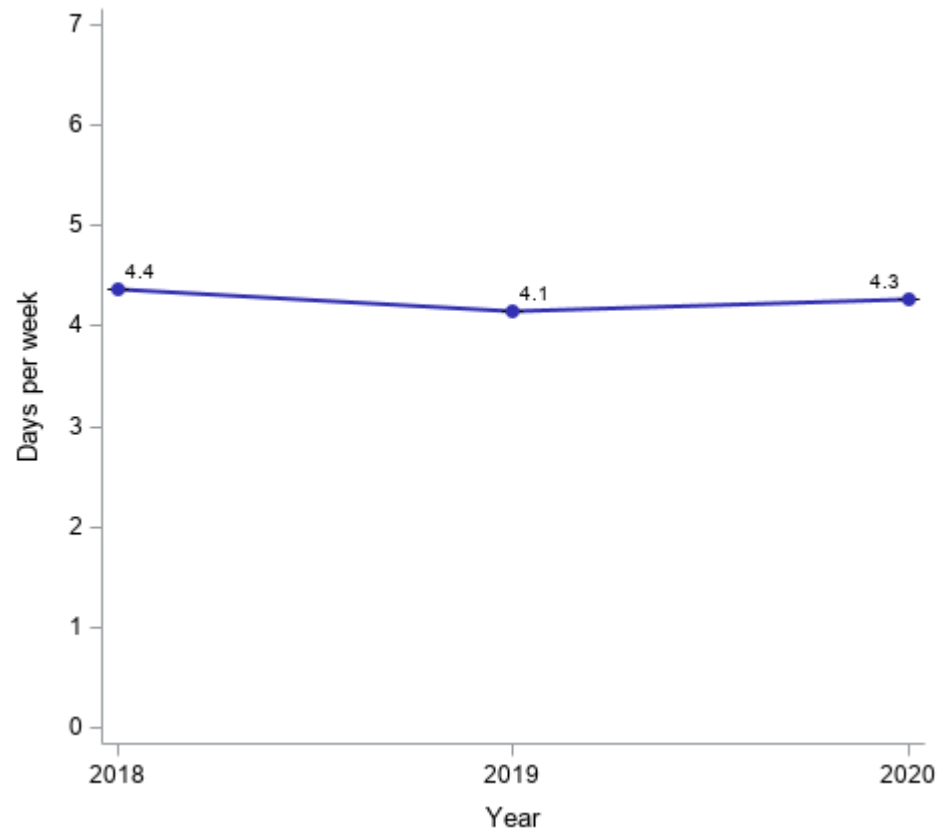


Table 10 Demographic characteristics of all registered children and research sub-study participants

	All registered children during 2018–2020		Registered children who used at least one voucher 2018–2020		Registered children who used at least one voucher and provided consent to participate in the research study 2018–2020		Participants in the research sub-study	
	N	%	N	%	N	%	N	%
All persons	1,060,863	100.0	895,097	100.0	664,846	100.0	145,471	100.0
Year of first registration								
2018	664,990	62.7	575,308	64.3	417,246	62.8	114,719	78.9
2019	243,484	23.0	204,581	22.9	158,498	23.8	27,037	18.6
2020	152,389	14.4	115,208	12.9	89,102	13.4	3,699	2.5
Age category								
4–8 years	399,299	37.6	349,380	39.0	262,672	39.5	58,395	40.1
9–11 years	264,052	24.9	230,050	25.7	170,467	25.6	38,358	26.4
12–14 years	221,726	20.9	183,220	20.5	136,153	20.5	29,877	20.5
15–18 years	175,784	16.6	132,446	14.8	95,554	14.4	18,838	13.0
Sex								
Boys	555,509	52.4	472,476	52.8	352,143	53.0	76,284	52.4
Girls	502,843	47.4	420,558	47.0	311,567	46.9	69,009	47.4
Missing	2,511	0.2	2,063	0.2	1,136	0.2	178	0.1
Aboriginal identity								
Aboriginal and Torres Strait Islander	62,355	5.9	49,980	5.6	40,596	6.1	6,180	4.3
Non-Aboriginal and Torres Strait Islander	987,217	93.1	835,822	93.4	618,091	93.0	137,617	94.6
Prefer not to say	11,291	1.1	9,295	1.0	6,159	0.9	1,673	1.2
Primary language spoken at home								
English	962,498	90.7	819,120	91.5	602,460	90.6	133,190	91.6

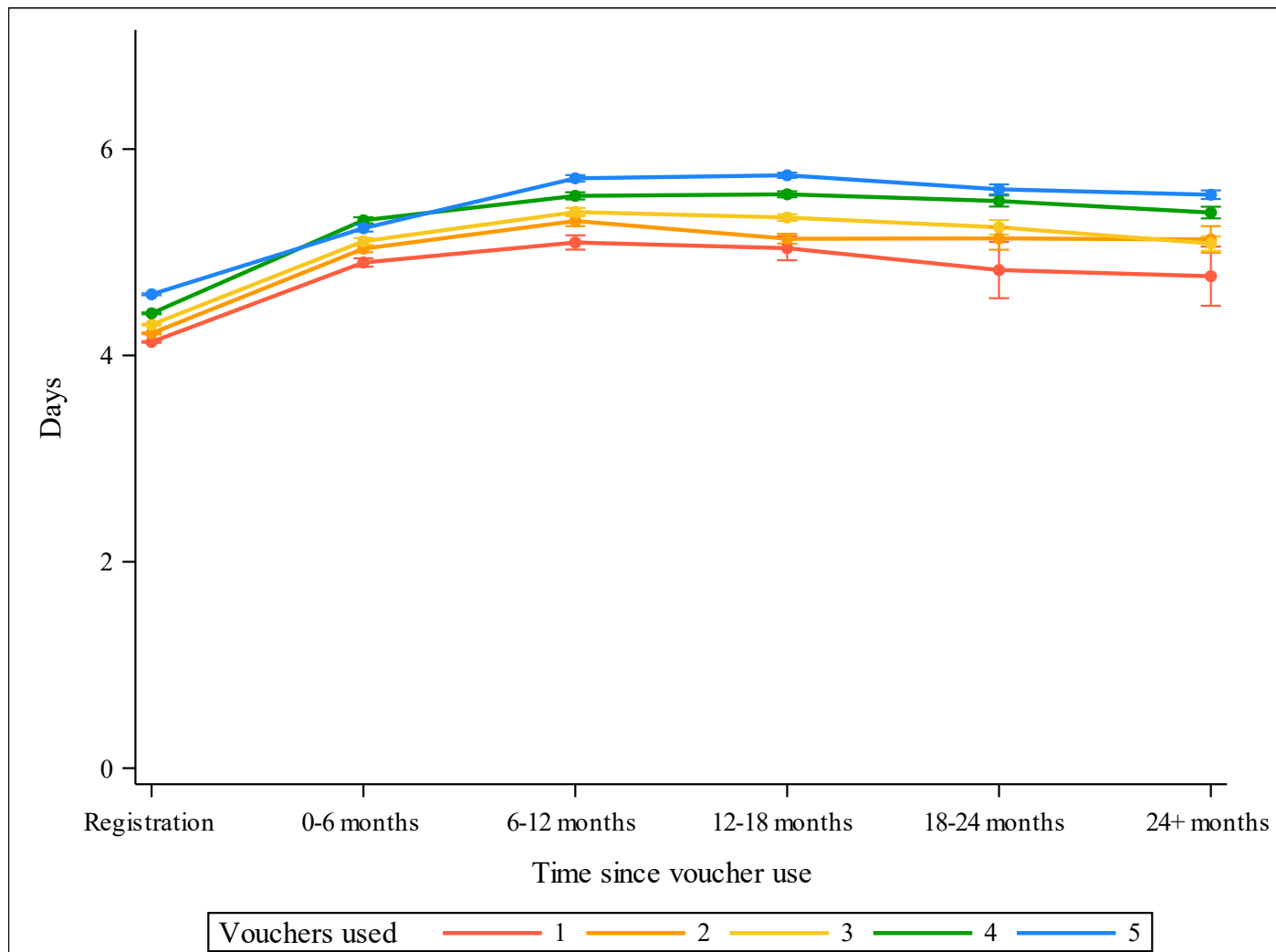
Other	98,365	9.3	75,977	8.5	62,386	9.4	12,280	8.4
Identified disability								
Yes	37,160	3.5	28,267	3.2	21,516	3.2	4,283	2.9
No	1,008,100	95.0	854,378	95.5	635,007	95.5	139,482	95.9
Prefer not to say	15,492	1.5	12,368	1.4	8,258	1.2	1,681	1.2
Missing	111	0.0	84	0.0	65	0.0	25	0.0
Socio-economic status								
1st (most disadvantaged)	184,617	17.4	145,432	16.3	115,195	17.3	19,240	13.2
2nd	239,272	22.6	202,732	22.7	151,411	22.8	32,512	22.4
3rd	280,523	26.4	238,274	26.6	177,406	26.7	39,540	27.2
4th (least disadvantaged)	347,957	32.8	303,012	33.9	217,260	32.7	51,873	35.7
Missing	8,494	0.8	5,647	0.6	3,574	0.5	2,306	1.6
Location								
Major Cities of Australia	784,908	74.0	663,263	74.1	493,995	74.3	107,867	74.2
Inner Regional Australia	213,084	20.1	181,144	20.2	133,168	20.0	28,692	19.7
Outer Regional and remote Australia	54,573	5.1	45,169	5.1	34,188	5.1	6,632	4.6
Missing	8,298	0.8	5,521	0.6	3,495	0.5	2,280	1.6
Body Mass Index category								
Thin	109,310	10.3	94,938	10.6	70,406	10.6	15,409	10.6
Healthy weight	531,584	50.1	461,010	51.5	342,132	51.5	76,856	52.8
Overweight	168,879	15.9	143,223	16.0	109,495	16.5	21,489	14.8
Obesity	101,422	9.6	84,293	9.4	66,682	10.0	10,800	7.4
Missing	149,668	14.1	111,633	12.5	76,131	11.5	20,917	14.4
Met physical activity guidelines								
Did not meet guidelines	833,619	78.6	703,196	78.6	530,904	79.9	111,435	76.6

Met guidelines	176,330	16.6	154,334	17.2	116,580	17.5	30,035	20.7
Missing	50,914	4.8	37,567	4.2	17,362	2.6	4,001	2.8
Sport participation								
None	79,646	7.5	52,741	5.9	41,305	6.2	5,194	3.6
At least once a month	284,967	26.9	230,974	25.8	177,797	26.7	31,429	21.6
At least once a week	306,099	28.9	269,952	30.2	194,792	29.3	45,845	31.5
At least twice a week	251,576	23.7	221,830	24.8	163,875	24.7	37,520	25.8
At least four times a week	102,075	9.6	92,137	10.3	67,234	10.1	20,225	13.9
Not sure	35,369	3.3	26,658	3.0	19,171	2.9	5,251	3.6
Missing	1,131	0.1	805	0.1	672	0.1	7	0.0
Number of vouchers								
0	120,800	11.4	0	0.0	0	0.0	0	0.0
1	224,647	21.2	192,758	21.5	144,806	21.8	12,703	8.7
2	195,635	18.4	182,558	20.4	139,801	21.0	22,447	15.4
3	187,122	17.6	187,122	20.9	140,175	21.1	32,863	22.6
4	182,038	17.2	182,038	20.3	133,746	20.1	38,501	26.5
5	150,621	14.2	150,621	16.8	106,318	16.0	38,957	26.8

Table 11 Number of surveys completed by voucher redemption at each timepoint across the Active Kids program

Number of vouchers used	Surveys completed at each time point					Total
	0–6 months	6–12 months	12–18 months	18–24 months	24+ months	
1 voucher	10,232	3,400	1,224	289	223	15,368
2 vouchers	13,660	6,441	6,691	1,614	997	29,403
3 vouchers	15,966	9,651	14,399	3,834	3,216	47,066
4 vouchers	18,393	12,271	16,942	5,777	4,786	58,169
5 vouchers	13,224	14,109	21,876	7,367	8,027	64,603
Survey responses provided before participants used their first voucher (n= 29,226) were excluded.						214,609

Figure 22 Changes in physical activity after registering for the first Active Kids voucher by the number of vouchers redeemed



8.5 DISCUSSION

This prospective cohort study examined school-aged children's physical activity behaviours after they registered in the Active Kids program, following two groups of children over 24+ months. This study was the first longitudinal study to follow the effects of a financial incentive intervention on school-aged children's physical activity behaviours over more than 12 months. The findings from this evaluation provide evidence to guide researchers and policymakers involved with large-scale actions to incentivise improvements in children's physical activity at the population level.

Among all school-aged children registered in the Active Kids program (n=1,060,863), less than one in five met physical activity guidelines. This prevalence remained stable throughout implementation (2018–2020), despite most children (89%) using an Active Kids voucher to support the cost of participation in a structured physical activity program. These findings suggest the Active Kids program did not lead to population-level improvements in school-aged children's physical activity levels during the first three-years of implementation. Children who participated in structured physical activity programs at least four times per week demonstrated the highest program retention. The Active Kids program would need to engage with and encourage participation amongst children who were not already participating in sport to shift the prevalence of children meeting physical activity guidelines.

There was a distinction between the long-term effects of the Active Kids program on school-aged children's physical activity levels for all registered children and participants in the research sub-study. Research participants who used an Active Kids voucher demonstrated increased physical activity levels which were maintained over 24 months after using a voucher; improvements peaked between 6–12 months after voucher use and receded over time. Children who used most of the available Active Kids vouchers (4–5 vouchers) were more physically active at registration and maintained greater levels of physical activity 24+ months after using a voucher. There was a substantial difference in physical activity at 24+ months between children who used one voucher and those that used 4–5 vouchers. This difference demonstrates the importance of retaining children in the Active Kids program over time and enabling ongoing voucher use to maintain improvements in children's physical activity levels. Among all school-aged children registered in the Active Kids program, 42% were retained in the program across 2018, 2019 and 2020, and only 14% used all five available Active Kids vouchers. To maintain improvements in school-aged children's physical activity levels greater adoption of the program year-on-year is required, particularly among children with lower levels of physical activity at registration.

8.5.1 Long-term effects of financial incentives on population-level physical activity

At this point in time, \$650 million has been invested in the Active Kids program yet the program has not yet influenced the population prevalence of children meeting physical activity guidelines (Figure 21). This finding is similar to other large-scale, universally designed financial incentives(8, 9, 22, 32). Studies of the Canadian Fitness Tax Credit did not demonstrate improvements in children's physical activity participation across the decade-long implementation period(8, 9, 22). The Canadian Fitness Tax Credit was primarily used by high-income families, for whom cost may not be a major barrier to children's structured physical activity participation(9). The financial incentive intervention in Saxony, Germany ("KOMM! In den Sportverein") did not assess the effectiveness during implementation; a cross-sectional study was conducted 7–9 years after implementation ceased(32). The KOMM! In den Sportverein program evaluation used a register-based survey to compare the physical activity behaviours of participants in Saxony to two neighbouring comparable states that did not receive financial incentives. Marcus, Siedler and Ziebarth reported participants in Saxony had

strong recall of the intervention, however there were no short or long-term effects on physical activity, sports club memberships, BMI or motor skills(32). These large-scale studies, and the Active Kids evaluation demonstrate that universally designed financial incentives are appealing for government implementation and can reach large numbers of children, providing the impression of a successful intervention. However, the children reached by these programs are typically already participating in structured physical activity programs. Financial incentives demonstrate little success in enabling children to start participating if they were not already and may have increased physical activity inequities among some demographic. Universally designed financial incentive programs do not appear to motivate greater long-term participation or increase the prevalence of children achieving physical activity guidelines at the population level. There is a need to implement complementary interventions that enable children who are not participating in structured physical activity programs to start, and to encourage greater physical activity participation outside-of-school. The WHO recommends that proportionate universalism principles are adopted to tailor interventions to those who are least active(10); this may include the provision of additional vouchers, or greater investment in promotion in disadvantaged areas.

8.5.2 Role of vouchers to maintain behaviour change

The evidence remains mixed on the effect of voucher programs on improving children's physical activity behaviours in the long-term. There are many factors which can influence the effectiveness of financial incentives on improving physical activity behaviours. The ACTIVE intervention in Wales provided students with four 20-pound vouchers over a 12-month period that could be used to reduce the cost of participation in unstructured physical activity sessions(7). James et al. reported improved cardiovascular fitness in students 12 months after the intervention period, i.e., vouchers were no longer available, but the improvements were maintained(7). This mixed method randomised control trial demonstrated positive effects of financial incentive vouchers, but the resource-intensive intervention was only implemented for 12 months at a relatively small-scale reaching 524 students(7). Chapter 2 identified multiple large-scale Australian financial incentives that have been implemented for many years, in real world conditions. Large-scale financial incentives appear to be delivered with less frequent, higher value incentives. The Active Kids program in Australia provided 1–2 vouchers per year valued at \$100AUD over a longer duration (3+ years). The research sub-study found improvements in physical activity levels of children who used an Active Kids voucher and these improvements were maintained over more than 2 years. The number of Active Kids vouchers used across three years was associated with the long-term effects. Children in the research sub-study who used the most available vouchers (4 or 5 vouchers) were more active and maintained their improvements, compared to children who used fewer vouchers. This suggests that regular and ongoing use of vouchers may enable children to maintain their improved physical activity levels. Whilst these two voucher programs show promising effects, the ACTIVE intervention (Wales) was delivered in socioeconomically disadvantaged areas, while the Active Kids program (Australia) was universally available – therefore it's unclear which design achieves the best outcome for children's physical activity. The age of children participating in these interventions, and the types of activities that vouchers could be used for were heterogenous. Whilst the characteristics of an effective voucher program remain unclear, it is clear that more than just a voucher is required to reduce population levels of physical inactivity.

8.5.3 Impacts of incentive design on long-term effects

Research has highlighted the importance of behavioural economics principles and theoretical underpinning of financial incentive interventions to achieve long-term improvements in physical activity behaviours(33-36). The Canadian Fitness Tax Credit, which was not effective

at increasing physical activity behaviours, lacked a theoretical underpinning(8, 9, 22, 37). It provided the financial incentive at tax-time, which was typically a long time from when the costs for structured physical activity participation were incurred. This delayed incentive and other intervention design features such as providing a more significant rebate to people that spend more money would have reduced the effectiveness of the incentive. Financial incentives using this tax-rebate design have not demonstrated positive effects(2, 9, 22). Financial incentives underpinned by theory which addresses the cost barrier at the point of payment using vouchers have shown promise to increase physical activity participation (Figure 22)(7). In addition to the design of the incentive itself, there is limited evidence available to guide the development of other intervention components which would complement a financial incentive and address barriers at other levels of the socioecological model(38).

8.5.4 Pragmatic evaluation approach

This natural experiment evaluation of the Active Kids program was conducted to build evidence regarding large-scale financial incentives that reduce the cost barrier to children's participation in structured physical activity programs. Most financial incentive interventions have not rigorously assessed the long-term effects of their intervention (Chapter 2). Maintenance of physical activity behaviours 12 months after voucher use was explored in the ACTIVE trial, however this was not a large-scale intervention(7). Research by Stearns et al. evaluated the effect of the large-scale Canadian Fitness Tax Credit through secondary analysis data collected in Alberta. This cross-sectional study used device-based measurement of physical activity and parent reported use of the tax credit in the previous year. This approach provided objective data to confirm the estimates from previous studies on the effects of this tax credit(8). Collection of device-measured physical activity data in a representative sample of children overtime would have provided more robust data, however, was not feasible for the Active Kids evaluation. Through establishing an independent evaluation partnership with the government agency leading the Active Kids program, this evaluation was able to explore program reach, retention, and long-term outcomes on physical activity using self-report data. All participants were followed over time to provide novel insights into the effects of the intervention over 24+ months, across a three-year study period. This evidence will help inform policy and program decisions of similar government-led interventions.

8.5.5 Limitations

Some limitations should be considered when interpreting these findings. Firstly, children's physical activity was measured by-proxy self-report through an online administration platform and an online survey. No device-based measurement of physical activity was conducted in this study. The potential self-selection bias, social desirability bias, and pre-test sensitisation must be acknowledged for those who voluntarily participated in the Active Kids evaluation surveys and had benefited from voucher use(39). The research study participants reflected a bias towards socioeconomically advantaged, more active children, who used more Active Kids vouchers. To address this bias, future studies could actively recruit research participants from less active population groups and provide incentives for participation in research. Second, consistent with other natural experiments of policy interventions at the scale of the Active Kids program, we could not establish a comparison group(40, 41). The absence of traditional experimental design means firm conclusions about the causal reasons for change are limited. Another consideration when interpreting the results is that in 2020, the COVID-19 pandemic caused substantial disruptions to the sport and recreation sector in NSW, described in detail in Chapter 3. The COVID-19 pandemic and disruptions to children's routines may have diluted the long-term effect of the Active Kids program observed in this study.

8.6 CONCLUSIONS

This chapter followed two groups of children involved in the Active Kids program to identify the effect of the voucher program on physical activity behaviours, and whether any effects are maintained over time. Among all school-aged children registered in the Active Kids program, physical activity levels remained stable at the population level during the first three-years of program implementation. Children who already participated in structured physical activity programs demonstrated the highest engagement and retention in the program. Additional actions are required to enable children to initiate participation in structured physical activity programs, beyond addressing the cost barrier alone.

Children in the research sub-study who used an Active Kids voucher to reduce the costs associated with participation in structured physical activity programs increased their physical activity levels. Changes in the mean number of days achieving 60-minutes of physical activity from four days per week to five days per week were observed across all socio-demographic groups. Improvements in physical activity occurred within 6-12 months of using a voucher and increases were maintained after 24+ months. Among children who used most available vouchers (4 or 5 vouchers), the greatest improvements were observed in children who spoke a language other than English at home, children living in the most disadvantaged areas, and children living with overweight or obesity. Ongoing access to multiple Active Kids vouchers each year was beneficial to maintaining improvements in children's physical activity levels.

The findings from this chapter provide in-depth understanding of the maintenance school-aged children's physical activity behaviours more than 24 months after using an Active Kids voucher. This study included a large sample of school-aged children and is the longest prospective study investigating the effects of a financial incentive intervention. The pragmatic evaluation approach has strengthened understanding of the role of financial incentives in addressing the cost barrier to structured physical activity programs. In studies which apply the RE-AIM framework for evaluation, reports on the maintenance dimension are often omitted. For the Active Kids program evaluation, all RE-AIM dimensions have now been addressed in this thesis.

8.7 REFERENCES

1. Glasgow RE, Harden SM, Gaglio B, Rabin B, Smith ML, Porter GC, et al. RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*. 2019;7.
2. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J Phys Act Health*. 2015;12(6):840-53.
3. Finkelstein EA, Lim RSM, Ward DS, Evenson KR. Leveraging family dynamics to increase the effectiveness of incentives for physical activity: the FIT-FAM randomized controlled trial. *The international journal of behavioral nutrition and physical activity*. 2020;17(1):113.
4. Finkelstein EA, Tan Y-T, Malhotra R, Lee C-F, Goh S-S, Saw S-M. A Cluster Randomized Controlled Trial of an Incentive-Based Outdoor Physical Activity Program. *The Journal of Pediatrics*. 2013;163(1):167-72.e1.
5. Ngo CS, Pan C-W, Finkelstein EA, Lee C-F, Wong IB, Ong J, et al. A cluster randomised controlled trial evaluating an incentive-based outdoor physical activity programme to increase outdoor time and prevent myopia in children. *Ophthalmic & physiological optics : the journal of the British College of Ophthalmic Opticians (Optometrists)*. 2014;34(3):362-8.
6. Berk M, McGivern LM. Effects of a Facilitated Fee Waiver Program on Participation in Youth Sports Programs. *Journal of Park & Recreation Administration*. 2016;34(3):99-105.
7. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
8. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.
9. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
10. World Health Organization. *Global action plan on physical activity 2018–2030: more active people for a healthier world*. Geneva: World Health Organization; 2018.
11. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *The Lancet Child & adolescent health*. 2020;4(1):23-35.
12. Ding D, Ramirez Varela A, Bauman AE, Ekelund U, Lee IM, Heath G, et al. Towards better evidence-informed global action: lessons learnt from the Lancet series and recent developments in physical activity and public health. *British Journal of Sports Medicine*. 2020;54(8):462.
13. Cushing CC, Brannon EE, Suorsa KI, Wilson DK. Systematic Review and Meta-Analysis of Health Promotion Interventions for Children and Adolescents Using an Ecological Framework. *Journal of Pediatric Psychology*. 2014;39(8):949-62.
14. Antikainen I, Ellis R. A RE-AIM evaluation of theory-based physical activity interventions. *J Sport Exerc Psychol*. 2011;33(2):198-214.

15. McGoey T, Root Z, Bruner MW, Law B. Evaluation of physical activity interventions in youth via the Reach, Efficacy/Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework: A systematic review of randomised and non-randomised trials. *Preventive Medicine*. 2015;76:58-67.
16. Blackman KC, Zoellner J, Berrey LM, Alexander R, Fanning J, Hill JL, et al. Assessing the internal and external validity of mobile health physical activity promotion interventions: a systematic literature review using the RE-AIM framework. *J Med Internet Res*. 2013;15(10):e224.
17. White M, Adams J, Heywood P. How and why do interventions that increase health overall widen inequalities within populations. *Social inequality and public health*. 2009:65-82.
18. McGoey T, Root Z, Bruner MW, Law B. Evaluation of physical activity interventions in children via the reach, efficacy/effectiveness, adoption, implementation, and maintenance (RE-AIM) framework: A systematic review of randomized and non-randomized trials. *Preventive Medicine*. 2016;82:8-19.
19. Brown H, Hume C, Pearson N, Salmon J. A systematic review of intervention effects on potential mediators of children's physical activity. *BMC Public Health*. 2013;13(1):165.
20. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
21. Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.
22. von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *American journal of public health*. 2011;101(8):e10-6.
23. Foley BC, Owen KB, Bauman AE, Bellew W, Reece LJ. Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention. *BMC public health*. 2021;21(1):22.
24. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155(5):554-9.
25. Australia S. AusPlay Results: Clearinghouse for Sport; 2020 [Available from: <https://www.clearinghouseforsport.gov.au/research/smi/ausplay/results>].
26. Australian Bureau of Statistics. Technical Paper: Socio-Economic Indexes for Areas (SEIFA). 2013.
27. Department of Health and Aged Care. Measuring remoteness: Accessibility/Remoteness Index of Australia (ARIA). . Canberra: Commonwealth of Australia; 2001.
28. Australian Sports Commission. AusPlay: Survey Questions. Canberra: Australian Sports Commission; 2016.
29. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatric Obesity*. 2012;7(4):284-94.
30. Graham JW. Missing data analysis: making it work in the real world. *Annu Rev Psychol*. 2009;60:549-76.

31. Enders CK. Applied missing data analysis. New York, NY, US: Guilford Press; 2010. xv, 377-xv, p.
32. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. ZA Institute of Labor Economics. 2021(14246).
33. Vlaev I, King D, Darzi A, Dolan P. Changing health behaviors using financial incentives: a review from behavioral economics. BMC Public Health. 2019;19(1):1059.
34. Mitchell MS, Orstad SL, Biswas A, Oh PI, Jay M, Pakosh MT, et al. Financial incentives for physical activity in adults: systematic review and meta-analysis. British Journal of Sports Medicine. 2020;54(21):1259-68.
35. McGill B, O'Hara BJ, Bauman A, Grunseit AC, Phongsavan P. Are Financial Incentives for Lifestyle Behavior Change Informed or Inspired by Behavioral Economics? A Mapping Review. Am J Health Promot. 2019;33(1):131-41.
36. Haff N, Patel MS, Lim R, Zhu J, Troxel AB, Asch DA, et al. The role of behavioral economic incentive design and demographic characteristics in financial incentive-based approaches to changing health behaviors: a meta-analysis. Am J Health Promot. 2015;29(5):314-23.
37. Fisher KLM, Amin; von Tigerstrom, Barbara; Larre, Tamara; Cameron, Christine; Chad, Karen E.; Reeder, Bruce; Tremblay, Mark S. Awareness and Use of Canada's Children's Fitness Tax Credit. Canadian Tax Journal. 2013;61(3):599-632.
38. Bronfenbrenner U. The Ecology of Human Development: Harvard University Press; 1979.
39. Hidding LM, Chinapaw MJM, van Poppel MNM, Mokkink LB, Altenburg TM. An Updated Systematic Review of Childhood Physical Activity Questionnaires. Sports Medicine. 2018;48(12):2797-842.
40. Crane M, Bohn-Goldbaum E, Grunseit A, Bauman A. Using natural experiments to improve public health evidence: a review of context and utility for obesity prevention. Health Research Policy and Systems. 2020;18(1):48.
41. Craig P, Cooper C, Gunnell D, Haw S, Lawson K, Macintyre S, et al. Using natural experiments to evaluate population health interventions: new Medical Research Council guidance. J Epidemiol Community Health. 2012;66(12):1182-6.

9 DISCUSSION

9.1 CHAPTER OUTLINE

This thesis has described the NSW Government's Active Kids program evaluation during 2018–2020. This chapter reflects on the studies presented throughout the thesis, their place in the published academic literature on child and adolescent physical activity, and their contribution to fulfilling the objectives of the thesis (see Chapter 1).

The chapter has six main sections. First, key findings from the Active Kids program evaluation regarding the effects on school-aged children's physical activity levels are summarised. Second, the quality of the evidence generated in this thesis is critiqued in the context of the broader evidence base considering public health evidence generation pathways, measurement, theories, and frameworks. The reasons for the disconnect between research, policy and practice among physical activity and financial incentives studies are discussed along with research implications. Third, lessons from evaluating a universal voucher program are described, accompanied by evidence-informed program design considerations for decision-makers with control over program design and implementation. The fourth section of this chapter focuses on the RE-AIM evaluation framework that provided structure to the thesis and program evaluation (see Chapter 3). The evaluation collected process and outcome data from over 1.06 million school-aged children with a nested prospective cohort study embedded within the government-led program. A reflection of the RE-AIM framework's strengths and challenges is presented. Finally, the strengths and limitations of the thesis are highlighted, followed by concluding remarks.

9.2 SUMMARY OF KEY FINDINGS

The evaluation of the Active Kids program has strengthened the evidence base to provide new understanding of the role financial incentives play in addressing the cost barrier to structured physical activity participation; however, the evidence is still quite limited and heterogeneous. Findings from the studies presented in this thesis demonstrate the potential of the Active Kids program to increase physical activity levels of school-aged children by addressing the cost barrier.

The Active Kids program reached a substantial proportion of the population (Chapter 4). Although the proportion achieving the physical activity guidelines was low among all school-aged children registered in the Active Kids program, 70% had participated in structured physical activity programs at least once a week in the previous 12 months(1). This suggests that most children registered for a voucher were already participating in structured activities. Financial incentives programs implemented in Germany, Canada, and the UK demonstrate similar trends with children who were more engaged in structured physical activity and sport initially adopting financial incentives, rather than children facing the greatest barriers using them to increase participation(2-10).

Chapters 4 and 8 report increases in the number of days per week that children achieved the recommended '60 minutes of daily physical activity' each week, however only in the sub-sample of research participants. Research participants increased the mean number of days per week achieving at least 60 minutes of physical activity from four to five days per week. This improvement was maintained over at least two years, particularly if children continued to use Active Kids vouchers (Chapter 8). Furthermore, the benefits of using an Active Kids voucher extended beyond increases in physical activity – with research participants reporting

significant increases in happiness, energy levels, concentration, and reduced feelings of loneliness (Chapter 4)(11). These positive effects highlight the *potential impact* that financial incentives could have on improving and maintaining physical activity participation at the population level.

Interestingly, the Active Kids program demonstrated mixed effects on reducing inequalities in physical activity participation among socio-demographic groups in the research sub-study. Inequalities in physical activity decreased between sexes, with more significant improvements in physical activity observed in girls over 24 months after voucher use compared to boys (Chapter 8). There are multiple reasons for this positive impact on girls; cost could be a more significant barrier to participating in structured physical activity programs for girls than boys, and activities of choice for girls could also be more expensive. Conversely, inequalities increased after voucher use among other socio-demographic groups. The Active Kids program resulted in more positive effects on physical activity among children who spoke English at home compared to their culturally and linguistically diverse counterparts, and for younger children (4.5–14-year-olds) compared to 15–18-year-olds. The growth in inequalities could reflect lower program adoption among culturally and linguistically diverse populations and older children. It may also reflect a need for these groups to receive more targeted interventions. Among other socio-demographic groups, inequalities in physical activity participation remained stable. These socio-demographic inequalities in physical activity should be addressed if changes in population physical activity are the desired outcome of a financial incentive intervention.

Whilst the positive effects of using an Active Kids voucher were observed in the research sub-sample, physical activity levels in all children registered in the Active Kids program each year remained stable from 2018–2020 (Chapter 8). Many children registered in the Active Kids program each year regularly participated in structured physical activity programs but did not achieve physical activity guidelines. Previous research has shown that structured physical activity participation contributes just 4% of children’s total physical activity(12). Although Chapter 5 demonstrated a more significant contribution (42% of total activity) among research participants, there is no evidence to support the contention that the Active Kids program increased the prevalence of children meeting physical activity guidelines at the whole population level. This finding aligns with previous research which highlights the need for multi-component interventions which act across all levels of the socio-ecological model to influence and maintain positive changes in children’s behaviours.

9.3 REFLECTION ON STUDIES OF FINANCIAL INCENTIVES THAT ADDRESS THE COST BARRIER TO PARTICIPATION

The scoping review (Chapter 2a) identified 24 peer-reviewed studies that investigated 12 financial incentive interventions that reduced the cost of structured physical activity participation for school-aged children. Some smaller scale mixed-method RCT’s conducted in the UK, Singapore, US and Germany have demonstrated positive effects from financial incentive interventions however these were not scaled up for delivery at the population level(2, 5, 13-16); whilst other small scale studies have shown null effects(3, 15, 17, 18). The second part of the scoping review (Chapter 2b) focused on financial incentives implemented in Australia by State and Territory Governments. There was no evidence identified from these interventions (n=12) that the government-led voucher’s influenced children’s physical activity participation, except for the Active Kids voucher program described in this thesis (Chapters 5 and 8). Large scale interventions delivered at the population level in Germany and Canada have demonstrated null effects on children’s physical activity levels(6-10). The Active Kids evaluation was the first known study to identify positive effects of a large-scale financial

incentive on children's physical activity behaviours, however not all children benefitted equally. No previous studies of financial incentives had reported reducing disparities in children's physical activity participation, and the Canadian Fitness Tax credit may have increased disparities(2-10). The in-depth analysis of the effects of the Active Kids vouchers on children's physical activity demonstrated that financial incentives had a stronger influence on the behaviours of children for whom cost was a large barrier. The studies presented in this thesis have generated new evidence which could inform the design of future financial incentive interventions or additional strategic interventions to address inequalities in physical activity behaviours. The rigorous but pragmatic evaluation has started to fill the gaps between small-scale research studies and large-scale government interventions that use financial incentives to increase children's physical activity behaviours. Additional research is required to understand the population effects of large-scale government financial incentive interventions. Section 9.3 presents a reflection on financial incentives intervention studies considering the approach to evidence generation, outcome measurement, theoretical underpinnings, and the use of evaluation frameworks.

9.3.1 Approach to evidence generation

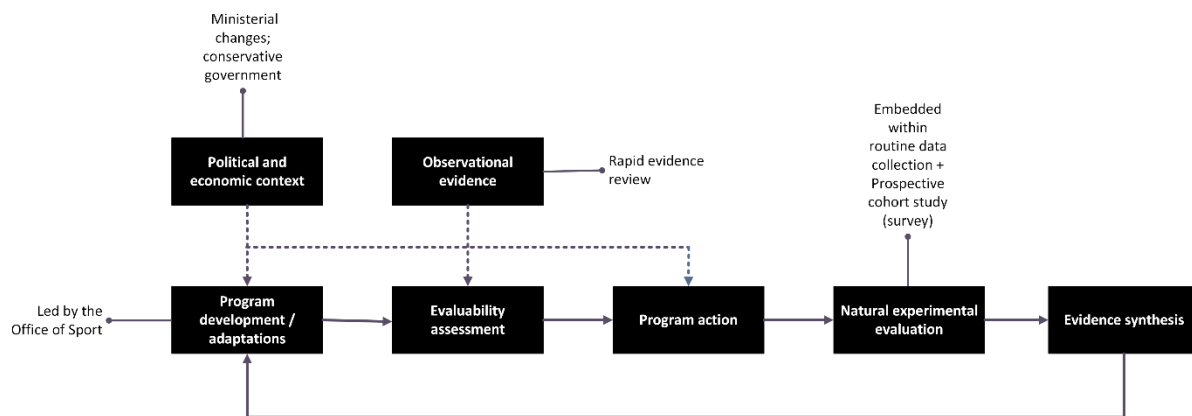
The evaluation of the Active Kids program demonstrates how researchers and policymakers may work in partnership to evaluate large-scale interventions and enhance understanding of children's physical activity behaviours. Ogilvie et al. have described two complementary pathways of evidence generation for public health interventions — 'evidence-based' and 'practice-based' pathways(19). Many physical activity interventions follow an evidence-based pathway, exploring potential solutions to increase physical activity participation under controlled conditions, using rigorous methods to assess the efficacy of an intervention(19). These studies generate high-quality evidence that may inform government actions following an evidence-based practice pathway(19-21). Studies following the evidence-based pathway often generate internally valid findings; however, these studies are prone to evaluation and selection bias because participants may be systematically different from the general population. It is unclear whether these interventions would be feasible to deliver in dynamic real-world conditions at the population-wide level. Most financial incentive intervention studies identified in the scoping review followed the evidence-based pathway (Chapter 2a). They conducted small-scale RCTs that did not lead to continued implementation or scale-up(2, 5, 14-18). Vlaev et al. recommend that financial incentive interventions are studied in more natural settings to avoid randomisation bias however, studies that generate practice-based evidence are less common(22).

The second pathway of evidence generation described by Ogilvie is the practice-based pathway, which is driven by government actions that are sometimes taken in the absence of relevant evidence and involve studies using natural experiment designs(19). This evidence-generation pathway can produce timely evidence from government-led interventions that have the potential to respond to the need to increase population physical activity levels yet their effectiveness is unknown(19). Rather than waiting until the best evidence is available to inform government action, natural experiments can be used to generate policy-relevant evidence whilst a policy or program is being implemented(19). The use of natural experiment studies to understand the effects of government actions are more often used to evaluate complex public health interventions(19, 23). Three financial incentive interventions identified in the scoping review followed the practice-based evidence pathway, including the evaluation of the Active Kids program(6, 9, 11).

Figure 23 depicts the practice-based evidence generation pathway for the Active Kids program, adapted from Ogilvie et al.(19). The Active Kids program evaluation was set in motion by the political and economic context in NSW and informed by observational evidence

collated in a rapid review (Figure 23). The rapid review provided policymakers with the best available evidence to guide their decisions(24). The natural experiment design followed program implementation designed and led by the Government. The evaluation utilised routine data collection to obtain pre-intervention measurements of children’s physical activity for the evaluation of the Active Kids program (Chapter 3). This pre-intervention assessment of children’s physical activity was the comparison for everyone in the study, to assess change over time. Baseline measurement of the primary outcome, days per week that children achieved 60 minutes of physical activity, measured through the online administration platform, was central to estimate the intervention effect.

Figure 33 Evidence generation pathway for the Active Kids program evaluation adapted from Ogilvie et al.'s model of evidence generation



Government-led program driving research: Practice-based evidence

During the Active Kids program's development, the evaluability of the intervention was assessed by the candidate and the research team before the program was launched (Figure 23). Regular assessments were required because the program development and political context changed several times during the planning of the Active Kids program. These assessments were achieved through frequent communication between the research team and policy-makers leading the implementation. In Ogilvie et al.'s original model, the evaluability of intervention was assessed retrospectively (after policy action) rather than between program development and policy action, as in Figure 23. Early involvement of the research team through an existing research-policy partnership allowed the establishment of the most rigorous study design possible to evaluate the government-led Active Kids program(25). The partnership between the Office of Sport and the researchers evaluating the Active Kids program enabled co-design of a logic model and program planning to collect process and outcome data, reducing selection effects common in evidence-based pathways. Evaluation should be planned from the outset of government-led programs and policies to strengthen evidence generation.

Often the political and economic context demands that government-led policies and programs are enacted quickly, and evaluability assessments are conducted retrospectively (as in Ogilvie's model). Crane et al. reported that few natural experiment studies applied rigorous research designs or included pre-intervention measurements(23). The two other examples of natural experiments identified in the scoping review undertook retrospective evaluability assessments. Marcus et al. designed a cross-sectional study with a comparison group to understand the effects of the 'KOMM! In den Sportverein' program(6). Stearns et al. adopted a repeat cross-sectional study design which compared the physical activity behaviours of

children who used the Canadian Fitness Tax Credit to those who did not(9). Both study designs have merit for understanding the effects of the financial incentive however, due to the retrospective nature of the analysis, information was not available during implementation to test how program adaptations might influence the observed effect (or lack of effect). The mixed methods prospective cohort study design for the Active Kids evaluation provided real-time information to track program impacts over time. Data about the program reach, adoption, and impacts were shared with policy makers during implementation which helped close the gap between research, policy, and practice for this program. There is a need for more natural experiments to be used to evaluate government-led programs and policies.

There has been a significant increase in government-led financial incentive interventions in practice, with little evidence of their effectiveness(26). For example, in Australia, all states and territories in Australia have implemented large scale financial incentive programs (see Chapter 2). It is estimated that over \$470 million have been invested in financial incentive programs across Australian states and territories(27). Although these programs exist in practice, few evaluation plans could be identified, and only the Active Kids program had a published evaluation protocol(28). Due to the complex and dynamic nature of conducting natural experiments, developing and publishing an evaluation protocol is recommended to improve transparency and guide the evaluation methods(19).

9.3.2 Assessment of physical activity (primary outcome)

Assessment of physical activity in intervention studies can be undertaken using a variety of approaches, including device-based measurement and self-report(29, 30). The advantages of device-based measurement are greater accuracy in understanding physical activity intensity and duration compared to self-report, in which physical activity is often over-estimated. Device-based measurement of physical activity is commonly used in small-scale randomised controlled trials but are more resource intensive and may not be feasible in large-scale studies(30). Among large population-level studies, surveys/questionnaires are more often used to assess physical activity(30). In addition to being more feasible at scale, surveys also allow more detailed information about the type and context of physical activity to be collected, i.e., structured, or unstructured(29, 30). Children's physical activity in this thesis was assessed using a validated single-item question in an online survey completed by parents/caregivers of children (proxy-report) (Chapter 3). Proxy report assessment of physical activity was selected for pragmatic reasons, as it was not feasible to conduct device-based physical activity assessments with many thousands of participants. The survey item aligned with the current population surveillance tools and methods used to assess physical activity in NSW, and assess structured participation nationally(31, 32). By aligning the measurement with population surveillance survey items, the Active Kids evaluation strengthened the ability to compare findings from the evaluation with concurrent population trends.

The methods identified in the scoping review (Chapter 2) to measure physical activity were varied. Device-based measures (accelerometers or pedometers, and device wear-time diaries) were used in eight studies which included fewer than 1500 participants per study(2, 5, 9, 14-18). Most studies using device-based measurement also collected self or proxy- report surveys (PAR-Q, PAQ-C, WHO Outdoor time questionnaire). The combination of device-based measures and validated self-report surveys may provide strong evidence but are often not feasible in large-scale studies(33). Furthermore, there remains no standardised approach to measuring children and adolescents' participation in structured and unstructured physical activity as discrete aspects of physical activity. Understanding how structured and unstructured physical activity contributes to children achieving the recommended levels of physical activity is an important next step to advance the evidence base.

In Canada, most studies of the Canadian Fitness Tax Credit used self-report or parental proxy-report measures of physical activity, until recently(4, 7, 9). In 2021, Stearns et al. reported the effects of the Canadian Fitness Tax Credit on children's physical activity through secondary analysis of an intervention using device-based measurement of physical activity and self-report data(9). Although only collected in a small sample of eligible Canadian children, Stearns et al. confirmed findings from self-report studies to demonstrate the Canadian Fitness Tax Credit did not increase children's physical activity participation(9). A nested/sub-study was reported in this thesis to assess the effects of the voucher on children's physical activity, but it should be noted that this sub-study collected proxy-report data which still may be prone to reporting bias. It would have been preferable to conduct a sub-study within the research cohort using device-based measurement of physical activity, however, there was insufficient budget and time to embed this within the evaluation(34). One study in Australia undertook secondary analysis of device-measured physical activity among Active Kids program participants, like the study conducted by Stearns et al. for the Canadian Fitness Tax Credit(9). The sample in Reilly et al.'s study was not representative of the NSW population and was already highly physically active and no improvements following the Active Kids voucher were seen(35). Future studies should explore device-measured physical activity in representative samples, particularly as physical activity measurement devices become more affordable and accessible for research(33). Alternatively, self/proxy report measurement that assess all domains of school-aged children's physical activity (i.e., activity at school/work, home, transport, and recreation) could provide further insights(30).

9.3.3 Theory-driven evaluations

Underpinning interventions with theory is considered important in public health behaviour change interventions(36, 37); Yet McGill et al. have found that many public health interventions do not use relevant theory(38), a consistent theme within this thesis. Chapter 2 found that financial incentive interventions that addressed the cost barrier to participation in structured physical activity also lacked clear theoretical underpinning. Furthermore, incentives using lotteries and rewards identified in the peer-reviewed literature overlooked behavioural research evidence which had previously shown external motivators have a weak, or even negative effect on children's physical activity(14, 15, 18, 39). Underpinning the Active Kids program with theory was an important first step in the evaluation design. This thesis demonstrated that a logic model is a valuable tool to characterise and embed theory into the design of financial incentive interventions.

During the development of the Active Kids program, the candidate collaborated with the policymakers and other stakeholders to create a logic model to underpin the intervention (Figure 8). The logic model approach allows a broad theoretical framework without selecting a specific behaviour change theory, avoiding theoretical conflicts between stakeholders from different disciplines(36). A logic model approach is considered best practice to identify potential causal pathways to guide measurement of policy-level evaluations and natural experiments(36). The Active Kids logic model was finalised before the program's launch, providing clarity to all stakeholders on how the program could work, for achieving which outcomes and for whom. The detailed logic model for the Active Kids program was presented in Chapter 3, Figure 8. Pragmatic changes were made to both the program and the evaluation during implementation; however, the logic model united the multidisciplinary stakeholders to look beyond the processes and make informed decisions to achieve the program's intended outcomes.

While the logic model's broad theoretical framework is a strength of the Active Kids evaluation, a specific breakdown of how theories were applied may enhance future program design. For example, the Active Kids program provided the incentive at the point of sale, providing an

immediate benefit to the parent/caregivers using the voucher. This is an example of overcoming the behavioural economics principle of present bias. Present bias involved people's preference for the here-and-now rather than delayed benefits such as chronic disease prevention. This program feature, which provides immediate benefit to parents/caregivers when they use a voucher, was not specifically noted within the logic model. This immediate benefit of reducing the cost of sports registration at the point of sale appears to be a successful approach rather than incentives reimbursed a few weeks later or at tax time. Another behavioural concept embedded within the intervention design was the need for voucher activities to provide moderate-to-vigorous physical activity for at least 8 weeks, which is an example of habit theory. Habit theory describes the importance of establishing a pattern on behaviour in a particular context to maintain the behaviour, such as attending training each week after school(38). Understanding specific theoretical approaches underpinning financial incentives may enhance the design of future interventions.

9.3.4 Evaluation frameworks

The Active Kids program was the first large-scale financial incentive intervention to be evaluated prospectively. The RE-AIM framework provided a useful structure to guide the evaluation(28). Most financial incentive interventions in research or practice did not use an evaluation framework during intervention planning or reporting. The Active Kids program and the ACTIVE intervention in the UK are the only examples that used an evaluation framework. These two studies include critical process and outcome data. An in-depth reflection of the application of the RE-AIM framework in this thesis is presented in the next section of this chapter (Section 4).

Fynn et al. report that less than a quarter (23%) of physical activity interventions report using evaluation frameworks(40). The low use of evaluation frameworks in physical activity intervention studies has reduced the quality of evaluation studies in the field. Fynn et al. identified over 68 evaluation frameworks in their systematic review appropriate for physical activity interventions. In addition to these, many evaluation frameworks can be used to explore the economic or cost-effectiveness of evaluations specifically. To our knowledge, there has been no reporting of the economic aspects of financial incentive interventions in peer-reviewed or grey literature (Chapter 2). Future studies of financial incentive interventions should select an appropriate evaluation framework and report on its use to strengthen the evidence base.

9.3.5 Summary of research implications

To better understand the role of financial incentives in addressing the cost barrier to children's participation in structured physical activity programs, researchers and decision-makers should prioritise the integration of evaluation, as well as enhance evaluation quality. Recommendations to enhance evidence for large-scale interventions include utilising natural experiments, publishing evaluation protocols, underpinning interventions with theory, conducting outcome evaluation to understand changes in physical activity, and adopting evaluation frameworks to guide comprehensive evaluations. Through adopting these approaches, researchers can improve their understanding of large-scale financial incentive program implementation, identify effective intervention components, and inform policy decisions to increase opportunities for children and adolescents to be active. In addition to these research implications, the following section presents insights from evaluating the universal Active Kids program and presents implications for the decision-makers who have control over the design and implementation of financial incentive interventions.

9.4 LESSONS FROM EVALUATING A UNIVERSAL FINANCIAL INCENTIVE PROGRAM

The NSW Government's universal design of the Active Kids program was simple and clear – all school-enrolled children in NSW were eligible for voucher/s valued at \$100 each. The 'KOMM! In den Sportverein' intervention in Germany took a similar approach offering a fixed-value voucher to children. Both these interventions achieved high program awareness amongst the population(6, 41). The Active Kids program also demonstrated substantial population reach (Chapter 4). Although children from particular socio-demographic groups were under-represented in the Active Kids program, it remains unclear whether the same levels of population reach, program adoption among disadvantaged groups would have been achieved if the program was not available to all. Irrespective of the program awareness, reach, and adoption, there is no evidence to support that universally designed financial incentive programs lead to increases in population level physical activity; nor is there clear evidence showing that another design would be effective. Collaboration between decision-makers and researchers is required to generate evidence that can be used to inform government actions.

A challenge of the universal design of the Active Kids program was that the intervention did not specifically address existing inequalities. Chapter 4 presented the demographic characteristics of participants in the Active Kids program, finding that only one in five children (19%) were meeting the physical activity guidelines recommended at that time. Lower physical activity levels were observed for girls, children that were older (12+ years), who spoke a language other than English at home, who identified as having a disability, who lived in socio-economically disadvantaged areas, lived in major cities or who were above a healthy weight compared to their counterparts. These disparities are consistent with global trends in physical activity participation of children and adolescents(42). Low physical activity levels in population sub-groups are a global challenge which cannot be addressed with a one-size-fits-all intervention. Children and adolescents that face greater barriers to physical activity participation may require greater or different types of investment to enable behaviour change.

Chapters 5 and 8 the Active Kids program achieved improvements in school-aged children's physical activity behaviours among research sub-study, however inequalities were insufficiently addressed. Most children who used an Active Kids voucher to subsidise participation in structured physical activity programs were not the children for whom cost was a barrier. This is demonstrated by more than three-quarters of children that used a voucher already participating in structured physical activity programs regularly, and children who did not participate had the lowest odds of using their vouchers (Chapters 5, 6 and 8). It may be prudent to adopt proportionate universal approaches to reduce inequalities in physical activity; this means that investment and delivery of services are provided relative to the degree of need(43). Financial incentives may be designed using principles of proportionate universalism, however there were no examples of this identified in the scoping review (Chapter 2). The Canadian Fitness Tax Credit aimed to support an equal proportion ($\leq 15\%$) of expenditure, up to \$500, for children(8). This approach provided greater support to those who spent more on structured physical activity programs and was mainly accessed by high-income families, which was unlikely to redress inequalities in physical activity participation(8). Instead of supporting an equal amount or proportion of structured physical activity costs, financial incentive interventions should explore providing a greater subsidy to children who are less active.

9.4.1 Tailoring interventions for priority populations

Although the Active Kids program was universally designed, the studies presented in this thesis and broader evidence-base can be used to inform the design of financial incentive interventions tailored to address inequalities in children's physical activity participation. Research has demonstrated that certain population groups are less involved in structured

physical activity and sport than others - one such population are adolescents(42, 44-46). Typically, participation increases during childhood reaches a plateau and then declines during adolescence(47, 48). This phenomenon is often referred to as 'drop out' from structured physical activity programs or 'sport drop out'. Once drop out occurs, adolescents are less likely to return to participate in structured physical activity programs in later life(49). Financial incentives which address the cost barrier to participation may prevent or delay adolescent drop out. Foley et al. have shown that children who used an Active Kids voucher for sports registration were twice as likely to re-register in the same sport the following year(50); however, the same pattern of adolescent dropout persists. Providing the same financial incentive program to all school-aged children (4.5–18 years) does not consider the dynamic changes children experience during school years(21, 51, 52). Therefore, to disrupt the trend of adolescent drop out, financial incentives should include intervention components targeting this unique life stage. The ACTIVE intervention specifically targeted adolescents (13–15-year-olds) and provided financial incentives to align with adolescents physical activity preferences(2, 5), which led to positive effects on adolescents fitness, health and perspectives of physical activity(5). This voucher intervention was designed to encourage individual choice among adolescents and could be used for unstructured physical activities. Suchert et al. targeted students aged 12–15 years through schools and also had promising effects on physical activity through group competitions using activity trackers(16). During adolescence, the influence of peers on behaviour increases and this may be harnessed by intervention design features to incentivise adolescents to be active. Future interventions should focus on a specific age group and include additional intervention components to better align the program with the needs of adolescents, rather than providing the same intervention to all school-aged children.

Some financial incentive programs were purposively implemented in disadvantaged areas to address socio-economic inequalities in physical activity participation(2, 3, 5, 13, 16). These smaller scale studies selected schools in disadvantaged areas to ensure the program was reaching a less active population sub-group. Some large-scale Australian financial incentive programs were identified that used means testing to identify eligible children. Means testing involves checking a person's degree of need before providing support. These Australian incentive programs were only available to children that met the pre-defined government criteria. Although these targeted programs exist in practice, it is unclear whether this resulted in more equitable program adoption or had positive effects on children's physical activity behaviours due to a lack of evaluation. Criteria for the Australian programs were set based on socio-economic disadvantage but means testing could also be established based on other demographic characteristics such as disability, age, or gender. Following means testing the degree of support allocated through the financial incentive programs could be increased or decreased depending on the individuals need. Future interventions should investigate how proportionate universalism principles could be applied, for example through means testing, to align financial incentives with the needs of specific demographic groups of children.

9.4.2 Evidence-informed program design components/features

Another practical approach to using proportionate universalism principles in large scale financial incentive interventions may be to implement multi-component interventions. Multi-component interventions may overcome the additional barriers faced by the least active populations while the financial incentive itself remains universally available. There are few examples in the literature to guide the selection of which additional intervention components would complement financial incentive interventions and that address inequalities.

Whilst financial incentives reduce the costs associated with structured physical activity participation, many socio-ecological factors influence children's physical activity levels and will

not be addressed by a financial incentive alone(21, 43, 53). Virgona, Foley et al. conducted qualitative research with parents of overweight and obese children living in socio-economically disadvantaged areas and culturally and linguistically diverse backgrounds to understand the additional barriers and identify opportunities to increase Active Kids voucher use(53). They found that even though parents were aware of the Active Kids program, a range of socio-ecological factors influenced decisions around Active Kids voucher use and participation in structured physical activity(53). These included transportation challenges, additional costs not supported by the vouchers, lack of access to providers, and were consistent with barriers to participation in populations who do not have access to a financial incentive(53-55).

The socio-ecological model was introduced in Chapter 1, presenting influences on school-age children's participation in structured physical activity at the personal, interpersonal, organisational/community and public policy levels(56). A systematic review of reviews by Messing et al. reported that most interventions which aim to promote physical activity do not include intervention components beyond the personal level(21). Personal level factors include socio-demographic characteristics, psychological factors such as motivations and previous life experiences. Interpersonal level factors include family structure, family cohesion and support, family income, as well as social and cultural influences(56). Some financial incentive interventions included additional components which utilised personal and interpersonal level factors(5, 16). The "läuft" intervention provided participants with pedometers to self-monitor and record their daily steps on a web-based platform(16). This approach provided lottery rewards for the highest steps and motivated participants to increase their daily steps(16). James et al. trialled adding interpersonal level factors using a peer mentoring scheme and by engaging council support workers alongside their voucher intervention(5). The peer mentor students were nominated by participants and trained to support and encourage voucher use; however, this was unsuccessful, with adolescent participants reporting they didn't need mentoring to be active(5). Adolescents recommended enhancing their autonomy to choose what met their needs, rather than needing support from others(57). Other interpersonal-level intervention components that may complement financial incentive interventions have not been studied.

Table 12 proposes additional intervention components that may be implemented among inactive groups to increase voucher use and reduce inequalities in physical activity participation. Interpersonal level intervention strategies aim to overcome accessibility barriers by reducing the need for families to enable children to participate in structured activity programs and strengthen social support for participation. No organisation, community level or public policy level intervention components were reported in studies identified in the scoping review; some strategies were identified during the thesis from participants in the research sub-sample, Active Kids providers and broader evidence (Table 12). For instance, the Office of Sport developed marketing materials for Active Kids providers to organically promote the program to their communities, including an Approved provider logo, editable social media tiles, and an editable flyer. This approach appears successful at increasing awareness of the program in NSW(41). Another promising approach identified in Chapter 2 was the promotion of the financial incentive through schools. The ACTIPASS intervention assessed the use of a free recreation pass and found that participants that were actively recruited through face-to-face interactions and received information about how and where to use the pass had greater adoption of the intervention(58). Active promotion of the financial incentives through presentations at schools and community hubs (e.g., halls and shopping centres) appears promising to increase awareness and adoption of financial incentives. These organisational/community level strategies may be utilised to promote voucher use in disadvantaged areas.

Public policy level interventions include policies, large-scale programs, legislation, guidelines, media, and advertising. As mentioned earlier in this section, means testing may be one public policy level strategy to reduce inequities in voucher use. Program guidelines may also be modified to better align with the needs of priority populations. To identify different public policy approaches, decision-makers must establish systems which enable consultation or co-design of interventions with the target group the program is trying to reach; for the Active Kids program these are children, adolescents and/or their families. Understanding what appeals to the target group during the intervention design may strengthen the theory underpinning an intervention. Public education campaigns including segmented mass-media campaigns have the potential to complement financial incentive interventions. The 'KOMM! In den Sportverein' intervention included paid adverts on bus stops and other media, which achieved high awareness of the program many years later(6). Although not an exhaustive list, future interventions could trial strategies in Table 12, alongside financial incentive interventions to develop multi-component interventions.

Table 22 Intervention strategies that may increase voucher use among school-aged children

Socio-ecological model level	Intervention strategies to improve voucher use	Rationale
Interpersonal	Encourage sports organisations to provide 'bring a friend/ family' discounts	Principle of herd behaviour from behavioural economic or social norms.
	Provide children with activity trackers to motivate increased physical activity	Promising approach from Suchert et al.
	Locate activities where vouchers can be used near student's home/school	Addressing accessibility barriers.
	Provide community transportation (additional busses) to improve access to programs	Addressing accessibility barriers.
	Co-locate programs for different age groups to enable siblings to play	Addressing accessibility barriers.
Organisational/ Community	Active promotion of voucher use in schools, and community hubs (shopping centres, town halls)	Effective in ACTIPASS intervention, not assessed in Active Kids.
	Digital collateral for partners to distribute to raise awareness of the program and certify the as an approved organisation.	Strategy from Active Kids described in Chapter 7.
	Provide technical support for parents/caregivers to obtain vouchers in community hubs	Recommendation from Chapter 7.
	Increase the number of organisations accepting vouchers and ensure they provide inclusive activities	Recommendation from Chapter 6

	Provide administrative support for sports organisations to redeem voucher	Recommendation from Chapter 7.
	Align programs with cultural celebrations or the end of cultural celebrations (i.e., not during Ramadan)	Recommendation from Virgonia, Foley et al.
	Provide 'Sport libraries' with equipment, shoes or uniforms which can be shared between disadvantaged communities.	Recommendation from Virgonia, Foley et al.
	Seasonal sports partnerships to refer winter sport participants to a summer sport	Recommendation from Chapter 7.
	Permit free trial periods of activities before voucher use	Principle of loss aversion in behavioural economics. Not wanting to waste the voucher was reported in Virgonia, Foley et al..
	Provide discount at point of sale to provide immediate benefit for the individual	Principle of present bias in behavioural economics.
	Encourage voucher use at programs with a small gap for families to pay or ensure no out-of-pocket expenses.	Principle of reference points in behavioural economics. Parents reported wanting the best value from using the voucher in Virgonia, Foley et al.
Public Policy	Means testing to increase the financial value or frequency of voucher availability for socio-economically disadvantaged populations	Implemented in Australian programs but untested.
	Adjust guidelines for voucher use among specific population groups e.g., equipment for older students, or self-directed activities like gym.	Recommendation from Chapter 6.
	Advisory group composed of the intervention target group to identify contextually appropriate strategies for implementation and evaluation.	Recommendation from chapter 9.
	Mass media campaigns to increase program awareness and provide practical information about using the vouchers	Recommendation from chapter 9.

9.4.3 Transparent reporting

In Chapter 2, a weakness in the evidence base was a lack of reporting on program implementation. For instance, strategies in Table 12 may have been previously tested in large-scale financial incentive programs however, evaluation protocols or reports on their effectiveness were not identified. Among Australian programs, most appear to be collecting process evaluation data (Table 3). Some Australian financial incentives used public dashboards on voucher websites to report these routinely collected data(59-61). These dashboards display information about the program to help involved stakeholders (sports organisations, local councils, and other government departments) understand and improve the program throughout its delivery. This transparent approach appears to support continued implementation, with Western Australia, South Australia and New South Wales all adopting this approach(59-61). The Active Kids dashboard reported the annual number of vouchers created, reach to the eligible NSW Population, sex of registered children, and top male and female activities, and could be filtered by Postcode, Local Government Area, or Electorate(59). Although these data are available, no reports exist that explore the effect of intervention components on program reach, adoption or effects. Future interventions should test and report on which strategies work and which do not work in order to increase voucher use among disadvantaged populations.

9.4.4 Summary for decision-makers

The universal design of the Active Kids program, and other similar interventions, does not appear to influence population-level physical activity levels. Interventions should not take a one-size-fits-all approach to improve physical activity levels of the least active children and adolescents in society. Multiple options exist for designing financial incentives using proportionate universalism (Table 12). Governments should implement and evaluate complementary intervention strategies alongside financial incentives to inform best practices and address barriers to physical activity participation among less active children.

9.5 REFLECTION ON THE APPLICATION OF THE RE-AIM FRAMEWORK

The RE-AIM framework was developed by Glasgow et al. in 1999 to enhance the translation of research into practice. The RE-AIM framework has been found to be the most widely used framework in evaluating physical activity interventions(40). Compared to other evaluation frameworks, an advantage of the RE-AIM framework is that it includes both process and outcome measurement for participants and settings/organisations. The five dimensions of the RE-AIM framework guide assessment of individual and setting/organisation level intervention factors. In this thesis, the RE-AIM framework provided structure to the scoping review (Chapter 2), and five individual chapters addressed each dimension.

Systematic reviews exploring the application of the RE-AIM framework have demonstrated that few studies report on all dimensions of the framework, referred to as partial application(62, 63). D'Lima et al. report the dimension from greatest to least frequently applied were: reach, implementation, adoption, effectiveness, and maintenance(62). Studies that partially applied the RE-AIM framework report that it was not feasible to explore each dimension or provided no justification.

The approach adopted in this thesis allowed each RE-AIM dimension and its contribution to the overall evaluation to be explored. For instance, reach is the most reported RE-AIM dimension, but reporting often focuses on the absolute number of participants without exploring representativeness and the proportion of the eligible population reached. In Chapter 4, the absolute number and proportion of the eligible population reached were presented with

further consideration of the physical activity behaviours of this population, providing an in-depth understanding of the population reached and their baseline physical activity behaviours.

For public health interventions, measurement of intervention effects in the short and long term relative to a public health goal (such as increasing physical activity) is critical. Intervention effects are explored under the two less often reported dimensions of the RE-AIM framework - Effectiveness and Maintenance(62). The research protocol and its flexible application enabled the more challenging dimensions of the RE-AIM framework to be investigated in this thesis. Neither the short- or long-term effects of Australian financial incentive programs on physical activity or other public health outcomes had not been assessed prior to the studies here. In contrast, most peer-review studies of financial incentive interventions identified in the scoping review assessed the effects of their intervention without including implementation or adoption details of their intervention (Chapter 2). It is important to understand both the effects of an intervention and the contextual factors that influenced the delivery of an intervention to translate research into policy and practice. This thesis has begun to bridge this gap between policy and practice, by conducting a comprehensive evaluation of a financial incentive program in the real world, guided by the RE-AIM framework.

9.5.1 Challenges in applying the RE-AIM framework

Over the past 20 years, scholars have discussed the overarching issues and challenges in the practical application of the RE-AIM Framework(64, 65). The challenges most pertinent to our evaluation were the assessment of cost-effectiveness, awareness of the intervention, subgroup analysis, the definition of the RE-AIM dimensions, understanding of implementation processes, program adaptations, and the order of the dimensions in Glasgow's description of the framework(64, 65). These are discussed under the following subheadings.

9.5.1.1 Cost-effectiveness

The RE-AIM framework has recently updated its guidance and directions for future research to improve the application of the framework; assessment of intervention costs and cost-benefits were identified as an overarching issue(64). Among financial incentive intervention studies, none of the studies assessed the cost-benefit or cost-effectiveness of financial incentive interventions that address the cost barrier to participation in structured physical activity for school-aged children. In public health, resources available to create active people, environments, societies, and systems are limited. The investment in the Active Kids program was \$650 million over four years across Australia, and it is important to understand whether this money was well spent. Estimating the cost-effectiveness of physical activity interventions is challenging, as some of the measurable health benefits from increased physical activity in childhood and adolescence may not be realised until many years later. In NSW, economic modelling has been used to estimate cost savings from obesity prevention interventions in early childhood(66). The BMI data collected during Active Kids registration could provide data from which cost-effectiveness could be estimated, using epidemiological prediction models similar to those used in early-childhood cost-effectiveness studies(66). Whilst intervention costs were not considered within the candidate's research, the data collected has enabled the Office of Sport to explore this with a consultancy group in 2022.

9.5.1.2 Awareness of the intervention

Another aspect of the evaluation which didn't fit within the RE-AIM structure was population awareness of the intervention. Awareness is an important predictor of reach and adoption but is omitted from the RE-AIM framework. Owen, Foley et al. explored population-level awareness of the Active Kids program using data collected as part of the NSW Population Health Survey, a separate state-wide population surveillance system(41). This study showed that the Active Kids program achieved high population awareness – with most (65%) of the

eligible population aware of the program(39). Awareness was lower among children living in low socio-economic areas, which aligns with the lower proportion of this population who registered in the program(40). These results highlight the importance of targeted strategies to increase the program's awareness, reach, and adoption among low socio-economic populations. Drawing on alternative data sources, such as population surveillance surveys can strengthen understanding of the penetration of interventions into the general population.

9.5.1.3 Sub-group analysis

Sub-group analysis was not extensively reported within all RE-AIM dimensions due to the complexity of the Active Kids evaluation. Detailed results were presented for the whole population and a sub-sample of research participants, with sub-group analysis for specific socio-demographic groups receiving less attention. Some additional research was conducted to highlight the Active Kids program's reach among children living with overweight and obesity and among Aboriginal and Torres Strait Islander children(67, 68). Owen, Bellew, Foley et al. demonstrated the Active Kids program reached a substantial proportion of children who are overweight and obese from socio-economically disadvantaged areas(68). McNiven, Foley et al. investigated the reach of the Active Kids intervention among Aboriginal and Torres Strait Islander children(67). This study identified that Aboriginal and Torres Strait Islander children were well-represented in the Active Kids program and had higher physical activity levels than non-Indigenous children. This is significant because reaching Aboriginal and Torres Strait Islander children are often underserved by health promotion and prevention systems(69). In chapter 4, the effects of the intervention after six months were presented for sub-groups, demonstrating positive effects among most population sub-groups. Compared to other financial incentive interventions, the Active Kids evaluation provides extensive subgroup analysis, but more focus on reporting the effects of financial incentives on reducing inequalities in physical activity between sub-groups should be undertaken in future.

9.5.1.4 Definitions and their interpretation

One of the limitations of the RE-AIM framework is the varying interpretation of the definition of each dimension of the framework. This limitation was overcome by recognising this limitation early and establishing a clear definition for this thesis *a priori*. In Chapter 3, each dimension of the RE-AIM framework for this thesis was clearly defined using Glasgow's latest definitions and considering future directions for each dimension(64). These definitions were used consistently throughout the thesis however may not align with the interpretation in other studies. For instance, engagement in the Active Kids program involved multiple steps, 1) Registration, 2) Redemption and 3) Participation in the structured physical activity. When a child registered in the program, we considered this to be 'reach', but in other interventions, children may automatically be allocated a voucher, therefore reach may be defined as our next stage, which was redeeming a voucher. Both options define reach as the participant's first engagement in the program yet would have different impacts on behaviour. In the Active Kids evaluation, the redemption of a voucher was considered under the stage of 'adoption' in the RE-AIM framework. Due to the different possible intervention designs, a consistent definition of the RE-AIM dimensions may not be appropriate. The most important consideration is clearly defining the dimensions in the evaluation they are being applied to.

The definition of maintenance was also challenging, as it covers both the individual and the setting/organisational levels. These two foci presented a challenge when interpreting the maintenance of the Active Kids program. The complicated definition for this dimension may explain why it is infrequently applied. Both definitions add value to an evaluation yet address different aspects of an intervention. Chapter 8 focused on the maintenance of individual behaviour over time, following the effects of voucher use on children's physical activity levels. The institutionalisation of the Active Kids program beyond the initial three-year period

(maintenance at the setting/organisational level) is potentially an additional dimension rather than two aspects of the same. Nutbeam and Bauman described this challenge previously, highlighting the need to address the two different levels of Glasgow's 'Maintenance' separately(70).

9.5.1.5 Understanding implementation with multiple stakeholders

The definition for implementation focuses on the setting/organisational level; however, this definition does not include the multiple levels of stakeholders involved in implementation. The Implementation Chapter in this thesis (Chapter 7) focused on the main stakeholders in delivery at the setting/organisation level, i.e., structured physical activity providers. The qualitative study in Chapter 7 was innovative in exploring the impact of implementing a government-led financial incentive program on stakeholders. Whilst this is just one aspect of implementation, stakeholders were identified early in the evaluation planning as important for implementing the Active Kids program. Across NSW, over 10,000 structured physical activity providers were involved in redeeming children's Active Kids vouchers and providing opportunities for participants to be active. Providers' experience in implementing the program was acceptable and best when there was clear communication between the government and the stakeholders. Implementation from the perspective of the lead organisation (Office of Sport) rather than the main delivery partners (structured physical activity providers) would provide further insights for policymakers. Multiple stakeholders are often involved in delivering large-scale interventions, and RE-AIM does not consider implementation partnerships well. This is a large challenge as partnerships are a key factor contributing to an intervention's maintenance and sustainability. Previous research has highlighted the need for the RE-AIM framework to be modified to understand the role of multiple stakeholders in implementation however, this additional level of the evaluation was challenging to enact in practice, hence our focus just on structured physical activity providers.

9.5.1.6 Adaptations to implementation

During 2018–2020, the candidate observed several adaptations made to the Active Kids program. For instance, in 2018, only one voucher was available per child per year, which doubled to two vouchers per child per year in 2019. Such adaptations occur during natural experiment evaluations where the researchers do not control the intervention. When the adaptations occurred, the candidate and the research team assessed whether they would impact the changes in the evaluation and adjusted the tools accordingly, i.e., rephrasing of survey questions to reflect additional vouchers.

Another adaptation to implementation was the Office of Sport delivery team visiting low uptake areas to develop local responses to increase voucher use, social media campaigns targeting culturally and linguistically diverse populations, provision of information sheets for schools to promote voucher use, and promotional activities at community centres, fairs and shopping centres. These activities were not included in the project logic model and are considered external to this evaluation. The timing of these activities and their relationship to increased registrations and program adoption were not studied. The political and economic context and the COVID-19 pandemic also influenced the program adaptations during delivery (Figure 23). Adaptations to the implementation process require ongoing assessment in future evaluations, particularly for studies conducted in real-world conditions over multiple years.

9.5.1.7 Order of the RE-AIM evaluation framework dimensions

The order of each dimension within the thesis is consistent with Glasgow et al.'s sequence(65); however, due to the close relationship between Effects and Maintenance, these might be better explained directly after each other. Furthermore, grouping Implementation, Reach and Adoption together would improve understanding of how effects were achieved and

maintained. The usual reporting conventions led to presenting these studies in the RE-AIM order, but similar studies to Active Kids evaluation should consider re-organising these dimensions as IRA-EM to strengthen the interpretation of evaluation findings.

In summary, the RE-AIM framework provided a conceptual structure for this thesis. We completed a comprehensive and integrated evaluation of the Active Kids program by applying the framework.

9.6 STRENGTHS AND LIMITATIONS OF THE THESIS

The strengths and limitations of each study are presented in the individual Chapters 2-8. This section presents collective considerations of the strengths and limitations of the thesis.

9.6.1 Strengths

The key strengths of the thesis include i) a scoping review at the outset to synthesise the evidence on this emerging field of research; ii) the rigorous yet pragmatic research design using an evaluation framework (RE-AIM) to conduct a comprehensive evaluation of the Active Kids program; iii) The use of the RE-AIM evaluation framework to provide a coherent structure to the thesis chapters; iv) The focus on a single government intervention across Chapters 4–8 ensures a strong connection between the studies in the thesis; v) The prospective cohort study design allowed a subsample of participants to be followed over time (24+ months) and included a baseline measurement of all participants physical activity; vi) a mixture of qualitative and quantitative data strengthened understanding, particularly regarding engagement of over 10,000 structured physical activity providers in the program vii) The scale of the evaluation including over 1.06 million school-aged children providing a detailed understanding of a large-scale intervention; and viii) the studies addressed a gap in knowledge regarding large-scale financial incentive interventions that address the cost barrier to participation.

9.6.2 Limitations

The limitations are primarily related to participant engagement, study design, and data collection aspects of the thesis.

9.6.2.1 Participant engagement

The limitations of participant engagement include i) There was limited involvement of children and adolescents directly throughout the evaluation process – surveys were completed by proxy and the children and adolescents themselves did not contribute to the study design, selection of measurement tools, or interpretation of the findings; ii) One aspect of the evaluation outlined in the evaluation protocol included qualitative research with children, adolescents and their families but this was not undertaken due to the political context which limited the time available for data collection. The Minister for Sport in NSW changed multiple times during the study period, and there was also a state government election which caused a hold on communications to voters for part of 2019. The lack of qualitative interviews reduced understanding of why some findings occurred and why effects were different among specific population groups; iii) participants in the research sub-study (Chapters 4 and 8) did not fully represent all children in NSW. Research sub-study participants were somewhat self-selected, as they were more likely to be already participating in sport, were more physically active, represented socio-economically advantaged groups of society, and were more engaged (used more vouchers) in the program compared to those not participating in research. These selection effects should be considered in the interpretation of the findings; improvements observed in research participants are not directly transferable to all participants or all children in NSW.

9.6.2.2 Study design

The limitations of the natural experiment include i) no comparison group was established, which limits the ability to understand causation; ii) only one pre-intervention measure of physical activity (primary outcome) — Multiple pre-intervention measures would have been a more rigorous study design however this was not possible within the timeframes; iii) Government-led changes in the intervention design and delivery during the study period; iv) socio-ecological influences on children's participation, including the COVID-19 pandemic and the closure of the sport and recreation sector during the study(71); v) other potential cofounders on school-aged children's physical activity were not assessed, such as changes to the school curriculum or education sector policies which could have influenced the effects of the intervention.

9.6.2.3 Data collection

The main data collection limitation is regarding the measurement of the primary outcome. Device-based measurement of physical activity was not included in the evaluation. The primary outcome (physical activity) was collected using Prochaska's single-item survey measure. This question has reasonable validity among adolescents and is used extensively in research, but we note it is not validated for proxy-report for children included in the evaluation (aged 4.5–18 years)(72, 73). It was not possible to identify a brief measure that was valid and reliable to assess physical activity for all children(74); this limitation is true for all other survey items assessing secondary outcomes. Validation studies are typically conducted within a smaller age range, such as primary school children only or adolescents only(74). We are not aware of valid and reliable survey items that assess physical activity throughout development.

Another limitation in our data collection was that all surveys and interviews could only be completed in English. Parents and caregivers were advised to seek the support from someone else to complete the survey if they were not fluent in English. This may have added to the selection bias limitations mentioned under participant engagement.

The mixed-methods evaluation of the Active Kids program was a strength, but each dimension was typically assessed with either a qualitative or quantitative method. For instance, the program's implementation by structured physical activity providers was mainly explored using semi-structured interviews with limited quantitative data about the total cohort of structured physical activity providers in the program. This approach enabled us to overcome the evaluation's practical challenges and resource limitations. However, the candidate acknowledges that including both qualitative and quantitative data for each dimension would have improved the evaluation. For example, the effects of the Active Kids voucher were strongest 6–12 months after children used their first voucher but, we did not collect qualitative data to understand the reasons why this was the case. Another financial incentive intervention identified in the scoping review applied the RE-AIM framework(2, 5). This provided a strong understanding of the ACTIVE program's effectiveness and the reasons behind why certain results were observed. To improve the application of the RE-AIM framework for the evaluation of the Active Kids program, particularly considering the natural experiment approach, additional qualitative data would have been beneficial.

9.7 CONCLUSIONS

This thesis has presented a scoping review, described the evaluation methodology, and presented five studies, evaluating the Active Kids program in NSW, Australia. The NSW Government initiated the Active Kids program as a policy-level intervention to address the cost barrier to participation in structured physical activity for school-aged children. By applying the RE-AIM framework and a theory-driven approach, this thesis provides detailed insights into the program's implementation process and the outcomes achieved in real-world conditions. Findings from the thesis are relevant to researchers and policy makers implementing large-scale initiatives to increase children's physical activity participation.

Chapter 1 set the scene for the thesis by defining 'school-aged children' and the many socio-ecological factors which influence their behaviour. The importance of enabling physical activity participation, particularly in a structured physical activity program, was highlighted, along with the many barriers that limit participation. Chapter 1 also presented the overarching objectives and research questions for each chapter of the thesis, which have been addressed.

Chapter 2 reviewed the international evidence for financial incentive interventions in peer-reviewed studies and then described Australian programs in a two-part scoping review. The scoping review utilised the RE-AIM framework to identify gaps in knowledge. Only one other intervention identified in the scoping review used an evaluation framework to comprehensively evaluate a financial incentive intervention (2, 5). Most financial incentives reported program reach or effect, with little detail provided regarding implementation processes and long-term (>12 months) effects on children's behaviours. There was a clear need to enhance the evidence base and understand the role of financial incentive interventions to address the cost barrier to structured physical activity participation in real-world conditions.

Chapter 3 presented the methodological approach for the Active Kids evaluation. Key aspects of the design included using the RE-AIM framework to guide the evaluation, adopting a theory-driven approach using a logic model, and publishing the evaluation protocol. The quasi-experimental mixed-method evaluation design with a nested prospective cohort study enabled timely and policy-relevant evaluation data collection.

Chapters 4 through 8 addressed individual dimensions of the RE-AIM framework. The reach of the Active Kids program into the eligible NSW population was substantial, engaging more than half of all school-aged children in NSW in the first year. The universal availability of the vouchers provided equal access for all; however, additional strategies are required to engage disadvantaged populations and children who did not regularly participate in structured physical activity programs.

Positive effects were observed in a research sub-study of children who used an Active Kids voucher to register in a structured physical activity program. The mean days per week children participated in at least 60 minutes of physical activity increased after voucher use from 4.0 days per week to 5.0 days per week. This positive trend was observed among all socio-demographic groups. The voucher was shown to subsidise less than a quarter of annual costs per voucher.

Chapter 6 explored program adoption, indicated by voucher use by participants. Most children that registered for an Active Kids voucher used at least one voucher to reduce the cost of registration or membership in a structured physical activity program (81.2% in 2018; 85.2% in 2019; 81.8% in 2020). Children with the lowest odds of redeeming a voucher after registration were those that had not participated in a structured physical activity outside of school in the past year.

Chapter 7 focused on program implementation from the perspective of the main stakeholders in delivery at the setting/organisation level i.e., structured physical activity providers. The qualitative study was the first to explore the impacts of implementing a government-led financial incentive program on stakeholders. Providers' experience in implementing the program was acceptable overall and best when there was clear communication between the government and the stakeholders. Future implementation planning should include strategies to support the organisational capacity of structured physical activity providers.

Chapter 8 extended from Chapter 5 to examine the maintenance of children's physical activity behaviours over time, after using a voucher. After more than two years, the improvements in physical activity observed in the research sub-sample were maintained, particularly among children that redeemed most available vouchers. Although improvements in a sub-sample of research participants were observed, there was no significant improvements in population physical activity levels among all children.

Altogether, the thesis presented a comprehensive evaluation of the Active Kids program during 2018–2020. The pragmatic and flexible approach to conducting the evaluation as a natural experiment was critical given the dynamic economic and political context in NSW during this period. The findings suggest that the universally designed Active Kids program achieved high population reach but was not effective at increasing population-levels of physical activity. Further investments in additional intervention components, and greater targeting of low-active children and adolescents are required to incentivise school-aged children to be active in all aspects of their daily lives.

9.8 REFERENCES

1. Foley BC, Owen KB, Bellew W, Wolfenden L, Reilly K, Bauman AE, et al. Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach? *International journal of environmental research and public health*. 2020;17(16).
2. Christian D, Todd C, Hill R, Rance J, Mackintosh K, Stratton G, et al. Active children through incentive vouchers - evaluation (ACTIVE): a mixed-method feasibility study. *BMC public health*. 2016;16:890.
3. Dunton G, Ebin VJ, Efrat MW, Efrat R, Lane CJ, Plunkett S. The Use of Refundable Tax Credits to Increase Low-Income Children's After-School Physical Activity Level. *J Phys Act Health*. 2015;12(6):840-53.
4. Fisher KLM, Amin; von Tigerstrom, Barbara; Larre, Tamara; Cameron, Christine; Chad, Karen E.; Reeder, Bruce; Tremblay, Mark S. Awareness and Use of Canada's Children's Fitness Tax Credit. *Canadian Tax Journal*. 2013;61(3):599-632.
5. James ML, Christian D, Scott SC, Todd CE, Stratton G, Demmler J, et al. Active Children Through Individual Vouchers Evaluation: A Mixed-Method RCT. *American journal of preventive medicine*. 2020;58(2):232-43.
6. Marcus JS, T; Ziebarth, N.R. The Long-Run Effects of Sports Club Vouchers for Primary School Children. *ZA Institute of Labor Economics*. 2021(14246).
7. Spence JC, Holt NL, Dutove JK, Carson V. Uptake and effectiveness of the Children's Fitness Tax Credit in Canada: the rich get richer. *BMC Public Health*. 2010;10(1):356.
8. Spence JC, Holt NL, Sprysak CJ, Spencer-Cavaliere N, Caulfield T. Non-refundable tax credits are an inequitable policy instrument for promoting physical activity among Canadian children. *Can J Public Health*. 2012;103(3):175-7.
9. Stearns JA, Veugelers PJ, McHugh T-L, Sprysak C, Spence JC. The Use of a Nonrefundable Tax Credit to Increase Children's Participation in Physical Activity in Alberta, Canada. *Journal of Physical Activity and Health*. 2021;18(9):1067-73.
10. von Tigerstrom B, Larre T, Sauder J. Using the tax system to promote physical activity: critical analysis of Canadian initiatives. *American journal of public health*. 2011;101(8):e10-6.
11. Foley BC, Owen KB, Bauman AE, Bellew W, Reece LJ. Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention. *BMC public health*. 2021;21(1):22.
12. Active Healthy Kids Australia. Active Healthy Kids Australia. Is Sport Enough? The 2014 Active Healthy Kids Australia Report Card on Physical Activity for Children and Young People. 2014.
13. Berk M, McGivern LM. Effects of a Facilitated Fee Waiver Program on Participation in Youth Sports Programs. *Journal of Park & Recreation Administration*. 2016;34(3):99-105.
14. Finkelstein EA, Lim RSM, Ward DS, Evenson KR. Leveraging family dynamics to increase the effectiveness of incentives for physical activity: the FIT-FAM randomized controlled trial. *The international journal of behavioral nutrition and physical activity*. 2020;17(1):113.

15. Finkelstein EA, Tan Y-T, Malhotra R, Lee C-F, Goh S-S, Saw S-M. A Cluster Randomized Controlled Trial of an Incentive-Based Outdoor Physical Activity Program. *The Journal of Pediatrics*. 2013;163(1):167-72.e1.
16. Suchert V, Isensee B, Sargent J, Weisser B, Hanewinkel R. Prospective effects of pedometer use and class competitions on physical activity in youth: A cluster-randomized controlled trial. *Preventive Medicine*. 2015;81:399-404.
17. Ginja S, Arnott B, Araujo-Soares V, Namdeo A, McColl E. Feasibility of an incentive scheme to promote active travel to school: a pilot cluster randomised trial. *Pilot and feasibility studies*. 2017;3:57.
18. Ngo CS, Pan C-W, Finkelstein EA, Lee C-F, Wong IB, Ong J, et al. A cluster randomised controlled trial evaluating an incentive-based outdoor physical activity programme to increase outdoor time and prevent myopia in children. *Ophthalmic & physiological optics : the journal of the British College of Ophthalmic Opticians (Optometrists)*. 2014;34(3):362-8.
19. Ogilvie D, Adams J, Bauman A, Gregg EW, Panter J, Siegel KR, et al. Using natural experimental studies to guide public health action: turning the evidence-based medicine paradigm on its head. *Journal of epidemiology and community health*. 2020;74(2):203-8.
20. Gelius P, Messing S, Goodwin L, Schow D, Abu-Omar K. What are effective policies for promoting physical activity? A systematic review of reviews. *Preventive Medicine Reports*. 2020;18:101095.
21. Messing S, Rütten A, Abu-Omar K, Ungerer-Röhrich U, Goodwin L, Burlacu I, et al. How Can Physical Activity Be Promoted Among Children and Adolescents? A Systematic Review of Reviews Across Settings. *Frontiers in Public Health*. 2019;7.
22. Vlaev I, King D, Darzi A, Dolan P. Changing health behaviors using financial incentives: a review from behavioral economics. *BMC Public Health*. 2019;19(1):1059.
23. Crane M, Bohn-Goldbaum E, Grunseit A, Bauman A. Using natural experiments to improve public health evidence: a review of context and utility for obesity prevention. *Health Research Policy and Systems*. 2020;18(1):48.
24. Bellew B, Young, S. Voucher schemes to promote increased participation in sport and active recreation: rapid evidence review for the NSW Office of Sport.: SPRINTER Group, The University of Sydney; 2017.
25. Williamson A, Tait H, El Jardali F, Wolfenden L, Thackway S, Stewart J, et al. How are evidence generation partnerships between researchers and policy-makers enacted in practice? A qualitative interview study. *Health Research Policy and Systems*. 2019;17(1):41.
26. Reece LJ, McInerney C, Blazek K, Foley BC, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.
27. Active Healthy Kids Australia. Reboot! Reimagining Physically Active Lives: 2022 Australian Report Card on Physical Activity for Children and Young People. Melbourne, Victoria: Active Healthy Kids Australia; 2022.
28. Reece LJ, Foley, B.C ., Bellew, B ., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.

29. Howie EK, Guagliano JM, Milton K, Vella SA, Gomersall SR, Kolbe-Alexander TL, et al. Ten Research Priorities Related to Youth Sport, Physical Activity, and Health. 2020;17(9):920.
30. Aubert S, Brazo-Sayavera J, González SA, Janssen I, Manyanga T, Oyeyemi AL, et al. Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: a narrative review. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):81.
31. NSW Population Health Surveys. 2018.
32. Australian Sports Commission. *AusPlay: Survey Questions*. Canberra: Australian Sports Commission; 2016.
33. Schutz Y, Weinsier RL, Hunter GR. Assessment of Free-Living Physical Activity in Humans: An Overview of Currently Available and Proposed New Measures. *Obesity Research*. 2001;9(6):368-79.
34. Reece LJ, FCB, BOKC, DSNHP, BAE. *Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport*. Public Health Research and Practice. 2020.
35. Reilly K, Bauman A, Reece L, Lecathelinais C, Sutherland R, Wolfenden L. Evaluation of a voucher scheme to increase child physical activity in participants of a school physical activity trial in the Hunter region of Australia. *BMC Public Health*. 2021;21(1):570.
36. De Silva MJ, Breuer E, Lee L, Asher L, Chowdhary N, Lund C, et al. Theory of Change: a theory-driven approach to enhance the Medical Research Council's framework for complex interventions. *Trials*. 2014;15(1):267.
37. Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*. 2021;374:n2061.
38. McGill B, O'Hara BJ, Bauman A, Grunseit AC, Phongsavan P. Are Financial Incentives for Lifestyle Behavior Change Informed or Inspired by Behavioral Economics? A Mapping Review. *Am J Health Promot*. 2019;33(1):131-41.
39. Owen KB, Smith J, Lubans DR, Ng JYY, Lonsdale C. Self-determined motivation and physical activity in children and adolescents: A systematic review and meta-analysis. *Preventive medicine*. 2014;67:270-9.
40. Fynn JF, Hardeman W, Milton K, Murphy J, Jones A. A systematic review of the use and reporting of evaluation frameworks within evaluations of physical activity interventions. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):107.
41. Owen KB, Foley BC, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *Journal of science and medicine in sport*. 2020.
42. Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *The Lancet Child & adolescent health*. 2020;4(1):23-35.
43. World Health Organization. *Global action plan on physical activity 2018–2030: more active people for a healthier world*. Geneva: World Health Organization; 2018.

44. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U. Global physical activity levels: surveillance progress, pitfalls, and prospects. *The Lancet*. 2012;380(9838):247-57.
45. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Global Health*. 2018;6: e1077–86.
46. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJF, Martin BW. Correlates of physical activity: why are some people physically active and others not? *The Lancet*. 2012;380(9838):258-71.
47. Kemp BJ, Cliff DP, Chong KH, Parrish A-M. Longitudinal changes in domains of physical activity during childhood and adolescence: A systematic review. *Journal of Science and Medicine in Sport*. 2019;22(6):695-701.
48. Eime R.M. HJT. *Sport Participation Across the Lifespan: Australian Trends and Policy Implications*. Palgrave Macmillan, London. 2018.
49. Westerbeek H, Eime R. The Physical Activity and Sport Participation Framework—A Policy Model Toward Being Physically Active Across the Lifespan. *Frontiers in Sports and Active Living*. 2021;3.
50. Foley BC, Rose C, Owen KB, Reece LJ. Linking sports registration information and player feedback to enhance netball participation. *BMC Sports Sci Med Rehabil*. 2021;13(1):59.
51. World Health Assembly. *Youth and health risks: report by the Secretariat*. Geneva: World Health Organization; 2011.
52. Patton GC, Sawyer SM, Santelli JS, Ross DA, Affi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. *Lancet*. 2016;387(10036):2423-78.
53. Virgona N, Foley BC, Ryan H, Nolan M, Reece L. 'One hundred dollars is a big help, but to continue, it's a challenge': A qualitative study exploring correlates and barriers to Active Kids voucher uptake in western Sydney. *Health Promotion Journal of Australia*. 2021;11:11.
54. Somerset S, Hoare DJ. Barriers to voluntary participation in sport for children: a systematic review. *BMC pediatrics*. 2018;18(1):47.
55. Foley BC, Turner N, Owen KB, Cushway D, Nguyen J, Reece LJ. "It Goes Hand in Hand with Us Trying to Get More Kids to Play" Stakeholder Experiences in a Sport and Active Recreation Voucher Program. *Int J Environ Res Public Health*. 2023;20(5):4081.
56. Bronfenbrenner U. *The Ecology of Human Development*: Harvard University Press; 1979.
57. James M, Todd C, Scott S, Stratton G, McCoubrey S, Christian D, et al. Teenage recommendations to improve physical activity for their age group: a qualitative study. *BMC Public Health*. 2018;18(1):372.
58. Clark AF, Campbell J, Tucker P, Wilk P, Gilliland JA. If You Make it Free, Will They Come? Using a Physical Activity Accessibility Model to Understand the Use of a Free Children's Recreation Pass. *J Phys Act Health*. 2019;16(7):493-503.
59. NSW Government Office of Sport. *Active Kids: NSW Government*; 2018 [Available from: <https://sport.nsw.gov.au/sectordevelopment/activekids>].

60. SA Government. Sports Vouchers 2015 [Available from: <https://www.sportsvouchers.sa.gov.au/>].
61. WA Government. KidSport 2011 [Available from: <https://www.wa.gov.au/service/sport-and-recreation/sport-and-fitness-development/kidsport>].
62. D'Lima D, Soukup T, Hull L. Evaluating the Application of the RE-AIM Planning and Evaluation Framework: An Updated Systematic Review and Exploration of Pragmatic Application. *Frontiers in Public Health*. 2022;9.
63. McGoey T, Root Z, Bruner MW, Law B. Evaluation of physical activity interventions in youth via the Reach, Efficacy/Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework: A systematic review of randomised and non-randomised trials. *Preventive Medicine*. 2015;76:58-67.
64. Glasgow RE, Harden SM, Gaglio B, Rabin B, Smith ML, Porter GC, et al. RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*. 2019;7.
65. Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health*. 1999;89(9):1322-7.
66. Hayes A, Tan EJ, Lung T, Brown V, Moodie M, Baur L. A New Model for Evaluation of Interventions to Prevent Obesity in Early Childhood. *Front Endocrinol (Lausanne)*. 2019;10:132.
67. Macniven R, Foley BC, Owen KB, Evans JR, Bauman AE, Reece LJ. Physical activity and sport participation characteristics of Indigenous children registered in the Active Kids voucher program in New South Wales. *Journal of Science and Medicine in Sport*. 2020;23(12):1178-84.
68. Owen KB, Bellew B, Foley BC, Bauman A, Reece LJ. Body mass Index of children and adolescent participants in a voucher program designed to incentivise participation in sport and physical activity: A cross-sectional study. *Preventive Medicine Reports*. 2021;22:101349.
69. Clifford A, Pulver LJ, Richmond R, Shakeshaft A, Ivers R. Smoking, nutrition, alcohol and physical activity interventions targeting Indigenous Australians: rigorous evaluations and new directions needed. *Australian and New Zealand Journal of Public Health*. 2011;35(1):38-46.
70. Bauman A, Nutbeam D. Planning and evaluating population interventions to reduce noncommunicable disease risk - reconciling complexity and scientific rigour? *Public Health Res Pract*. 2014;25(1).
71. Vella SA, Cliff DP, Okely AD. Socio-ecological predictors of participation and dropout in organised sports during childhood. *The international journal of behavioral nutrition and physical activity*. 2014;11:62.
72. Prochaska JJ, Sallis JF, Long B. A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med*. 2001;155(5):554-9.
73. Scott JJ, Morgan PJ, Plotnikoff RC, Lubans DR. Reliability and validity of a single-item physical activity measure for adolescents. *J Paediatr Child Health*. 2015;51(8):787-93.

74. Hidding LM, Chinapaw MJM, van Poppel MNM, Mokkink LB, Altenburg TM. An Updated Systematic Review of Childhood Physical Activity Questionnaires. *Sports Medicine*. 2018;48(12):2797-842.

APPENDIX 1: AUTHORSHIP ATTRIBUTION STATEMENTS

AUTHOR CONTRIBUTIONS TO CHAPTER 4

Publication: Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach?

Journal: International Journal of Environmental Research and Public Health 2020, 17, 5691.

Authors: Foley B.C., Owen K.B., Bellew W., Wolfenden L., Reilly K., Bauman A.E., Reece L.J.

DOI: 10.3390/ijerph17165691

Bridget's contribution to this publication:

- Conceptualised the research questions
- Designed the study methodologies
- Contributed to data curation
- Gained ethics approvals
- Developed the statistical analysis plan
- Performed the statistical analysis
- Led the interpretation of the results
- Led the preparation of the manuscript and is the corresponding author.

Co-author contributions to this publication:

- KBO, WB, AEB and LJR conceptualised the research questions
- WB, AEB and LJR designed the study methodologies
- KBO contributed to data curation
- KBO, WB, AEB and LJR contributed to the interpretation of the results
- KBO, WB, LW, KR, AEB and LJR reviewed draft manuscripts and provided feedback.

AUTHOR CONTRIBUTIONS TO CHAPTER 5

Publication: Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention.

Journal: BMC Public Health 21, 22 (2021).

Authors: Foley B.C., Owen K.B., Bauman A.E., Bellew W., Reece L.J.

DOI: 10.1186/s12889-020-10060-5

Bridget's contribution to this publication:

- Contributed to the evaluation design
- Led the development of the research questions
- Designed the study methodologies
- Led online survey data collection
- Contributed to data curation
- Gained ethics approvals
- Developed the statistical analysis plan
- Performed the statistical analysis

- Led the interpretation of the results
- Led the preparation of the manuscript and is the corresponding author.

Co-author contributions to this publication:

- KBO, AEB, WB, and LJR contributed to the evaluation design and research questions
- AEB, WB, and LJR designed the study methodologies
- KBO contributed to data curation
- KBO provided biostatistical advice
- KBO, AEB, WB, and LJR contributed to the interpretation of the results
- KBO, AEB, WB, and LJR reviewed draft manuscripts and provided feedback.

AUTHOR CONTRIBUTIONS TO CHAPTER 7

Publication: “It goes hand in hand with us trying to get more kids to play” Stakeholder experiences in the Active Kids program.

Journal: International Journal of Sport Politics and Policy (under review for publication).

Authors: Foley B.C., Turner N., Owen K.B., Cushway D., Nguyen J., Reece L.J.

Bridget’s contribution to this publication:

- Contributed to the evaluation design
- Led the development of the research questions
- Designed the study methodologies
- Gained ethics approvals
- Led qualitative data collection
- Led qualitative data analysis
- Led the interpretation of the results
- Led the preparation of the manuscript and is the corresponding author.

Co-author contributions to this publication:

- LJR contributed to the evaluation design, development of the research questions, and study methodologies
- NT contributed to data collection
- NT, KBO and LJR contributed to data analysis and interpretation of the results
- NT, KBO, DC, JN and LJR reviewed draft manuscripts and provided feedback.

As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statements above are correct.

Signature:

Date: 17/11/2022

Dr Lindsey J. Reece

Signature:

Date: 17/11/2022

Emeritus Professor Adrian E. Bauman

APPENDIX 2 ACADEMIC CONTRIBUTIONS

PUBLICATIONS DURING CANDIDATURE

Throughout my candidature, I contributed to 23 peer-reviewed publications and 18 commissioned research reports for the Government and sport and recreation organisations.

PEER-REVIEWED PUBLICATIONS INCLUDED WITHIN THESIS

Foley BC, Owen KB, Bellew W, Wolfenden L, Reilly K, Bauman AE, et al. Physical Activity Behaviors of Children Who Register for the Universal, State-Wide Active Kids Voucher: Who Did the Voucher Program Reach? *Int J Environ Res Public Health*. 2020;17(16).

Foley BC, Owen KB, Bauman AE, Bellew W, Reece LJ. Effects of the Active Kids voucher program on children and adolescents' physical activity: a natural experiment evaluating a state-wide intervention. *BMC public health*. 2021;21(1):22.

Foley BC, Turner N, Owen KB, Cushway D, Nguyen J, Reece LJ. "It Goes Hand in Hand with Us Trying to Get More Kids to Play" Stakeholder Experiences in a Sport and Active Recreation Voucher Program. *International Journal of Environmental Research and Public Health* 2023;20:4081.

PEER-REVIEWED PUBLICATIONS RELATED TO THE THESIS

Reece LJ, **Foley, B.C** ., Bellew, B ., Owen, K., Cushway, D., Srinivasan, N., Hamdorf, P., Bauman, A.E. Active Kids; evaluation protocol for a universal voucher program to increase children's participation in organised physical activity and sport. *Public Health Research and Practice*. 2021;31(2):e30122006.

Reece LJ, McInerney C, Blazek K, **Foley BC**, Schmutz L, Bellew B, et al. Reducing financial barriers through the implementation of voucher incentives to promote children's participation in community sport in Australia. *BMC public health*. 2020;20(1):19.

Owen KB, **Foley BC**, Bauman A, Bellew B, Reece LJ. Parental awareness and engagement in the Active Kids program across socioeconomic groups. *Journal of science and medicine in sport*. 2020.

Macniven R, **Foley BC**, Owen KB, Evans JR, Bauman AE, Reece LJ. Physical activity and sport participation characteristics of Indigenous children registered in the Active Kids voucher program in New South Wales. *Journal of Science and Medicine in Sport*. 2020;23(12):1178-84.

Owen KB, Bellew B, **Foley BC**, Bauman A, Reece LJ. Body mass Index of children and adolescent participants in a voucher program designed to incentivise participation in sport and physical activity: A cross-sectional study. *Preventive Medicine Reports*. 2021;22:101349.

Reece LJ, Owen KB, **Foley BC**, Rose C, Bellew W, Bauman AE. Understanding the impact of COVID19 on children's physical activity levels in NSW, Australia. *Health Promotion Journal of Australia*. 2020.

Virgona N, **Foley BC**, Ryan H, Nolan M, Reece L. 'One hundred dollars is a big help, but to continue, it's a challenge': A qualitative study exploring correlates and barriers to Active Kids voucher uptake in western Sydney. *Health Promotion Journal of Australia*. 2021;11:11.

ADDITIONAL PEER-REVIEWED PUBLICATIONS DURING CANDIDATURE

Foley BC, Rose C, Owen KB, Reece LJ. Linking sports registration information and player feedback to enhance netball participation. *BMC Sports Sci Med Rehabil.* 2021;13(1):59.

Rose CL, Owen KB, **Foley BC**, Reece LJ. "We Don't Have to Do Things the Way They've Been Done Before"; Mixed-Method Evaluation of a National Grant Program Tackling Physical Inactivity through Sport. *Int J Environ Res Public Health.* 2022;19(13).

Owen KB, **Foley BC**, Eime R, Rose C, Reece LJ. Participation and dropout of Hockey New South Wales participants in 2017 and 2018: a longitudinal study. *BMC SPORTS SCIENCE MEDICINE AND REHABILITATION.* 2022;14(1).

Owen KB, **Foley BC**, Wilhite K, Booker B, Lonsdale C, Reece LJ. Sport Participation and Academic Performance in Children and Adolescents: A Systematic Review and Meta-analysis. *MEDICINE & SCIENCE IN SPORTS & EXERCISE.* 2022;54(2):299-306.

Brown W, Pappas E, **Foley BC**, Zadro JR, Edwards K, Mackey M, et al. Do different sit-stand workstations influence lumbar kinematics, lumbar muscle activity and musculoskeletal pain in office workers? A secondary analysis of a randomized controlled trial. *INTERNATIONAL JOURNAL OF OCCUPATIONAL SAFETY AND ERGONOMICS.* 2022;28(1):536-43.

Foley BC, McLaughlin M, Edney S, Islam SMS, Seymour J, Peralta LR, et al. "A 15% Reduction in Physical Inactivity Will Be Achieved in Australasia by 2030"-Audience Votes Negative in Online Debate. *JOURNAL OF PHYSICAL ACTIVITY & HEALTH.* 2021;18(11):1321-4.

Eime R, Charity M, **Foley BC**, Fowlie J, Reece LJ. Gender inclusive sporting environments: the proportion of women in non-player roles over recent years. *BMC SPORTS SCIENCE MEDICINE AND REHABILITATION.* 2021;13(1).

Gugusheff J, **Foley BC**, Owen KB, Drayton B, Ding D, Stamatakis E, et al. Trends in Walking, Moderate, and Vigorous Physical Activity Participation Across the Socioeconomic Gradient in New South Wales, Australia From 2002 to 2015. *JOURNAL OF PHYSICAL ACTIVITY & HEALTH.* 2020;17(11):1125-33.

Bravo A, **Foley BC**, Innes-Hughes C, O'Hara BJ, McGill B, Rissel C. The equitable reach of a universal, multisector childhood obesity prevention program (Live Life Well @ School) in Australian primary schools. *Public Health Res Pract.* 2020;30(1).

Foley BC, Vassallo AJ, Reece LJ. Lights out, let's dance! An investigation into participation in No Lights, No Lycra and its association with health and wellbeing. *BMC SPORTS SCIENCE MEDICINE AND REHABILITATION.* 2019;11.

Shrewsbury VA, Venchiarutti RL, Hardy LL, **Foley BC**, Bonnefin A, Byth K, et al. Impact and cost of the peer-led Students As LifeStyle Activists programme in high schools. *HEALTH EDUCATION JOURNAL.* 2020;79(1):3-20.

Mihrshahi S, **Foley BC**, Nguyen B, Gander K, Tan N, Hudson N, et al. Evaluation of the Cancer Council NSW Eat It To Beat It Healthy Lunch Box Sessions: A short intervention to promote the intake of fruit and vegetables among families of primary school children in NSW Australia. *HEALTH PROMOTION JOURNAL OF AUSTRALIA.* 2019;30(1):102-7.

Bellew W, Bauman A, Kite J, **Foley BC**, Reece L, Thomas M, et al. Obesity prevention in children and young people: what policy actions are needed? *Public Health Res Pract.* 2019;29(1).

COMMISSIONED RESEARCH REPORT PUBLICATIONS

Reece LJ, Rose CL, **Foley BC**, Owen K. Move it AUS Participation Grant: A national evaluation report. University of Sydney; 2021. DOI: doi.org/10.25910/3k45-fe26

Reece LJ, Rose CL, **Foley BC**, Owen K. Move it AUS Better Ageing Grant: A national evaluation report. University of Sydney; 2021.

Reece LJ, Rose CL, **Foley BC**, Owen K. Experiences of engaging inactive populations through the Move It AUS Grant Program; Sport Sector Insights. University of Sydney; 2021.

Rose C, Reece L.J, **Foley BC**, Owen K. parkrun Generations: An independent evaluation. SPRINTER Group. The University of Sydney, 2021.

Foley BC, Owen K.B., Rose C. Netball NSW Membership Study report. SPRINTER group, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney. January 2022.

Foley BC, Owen KB, Reece LJ. Netball NSW Membership Study report. SPRINTER group, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney. January 2021.

Foley BC, Reece LJ. Netball NSW Membership Study report. SPRINTER group, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney. January 2020.

Foley BC, Owen KB, Reece LJ. Basketball SW Membership Study report. SPRINTER group, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney. September 2021.

Reece LJ, Grunseit A, **Foley BC**, Mathieu E. junior parkrun pilot evaluation report. Sydney School of Public Health, Faculty of Medicine and Health, The University of Sydney. March 2020.

Foley BC, Rose, C. The benefits of dance: A rapid scoping review, prepared for the NSW Government Office of Sport. SPRINTER group, The University of Sydney. March 2022.

Reece L, Owen K, **Foley BC**, Bellew W, Bauman A. Active Kids Evaluation Report (2018-2020) – Full Report. SPRINTER Group, Prevention Research Collaboration, Sydney School of Public Health, Faculty of Medicine and Health, Charles Perkins Centre, The University of Sydney, 2022.

Reece LJ, **Foley BC**, Owen KB, Bellew W, and Bauman A. Active Kids Evaluation Report 2018-2019. SPRINTER group. Prevention Research Collaboration. Charles Perkins Centre, The University of Sydney. 2021. DOI: doi.org/10.25910/qzfb-rp22.

Reece LJ, Owen KO, **Foley BC**. AusPlay NSW: Participation analysis in structured sport and physical activity amongst Adults. SPRINTER group, The University of Sydney 2020.

Owen KO, Reece LJ, **Foley BC**. AusPlay NSW: Participation in organised sport and physical activity amongst children 0-14 years. SPRINTER group, The University of Sydney. 2020.

Foley BC, Rose C, Reece LJ. Her Sport Her Way Grant Program Evaluation report: First round 2020-2021. June 2021.

Bellew B, Nau T, Smith B, Bauman A (Eds.) Getting Australia Active III: A systems approach to physical activity for policy makers. Sydney, Australia. The Australian Prevention Partnership Centre and The University of Sydney. April 2020

Foley BC, Reece LJ. Regional Sport and Active Recreation Plans Snapshot. SPRINTER group, The University of Sydney. 2019

Reece LJ, **Foley BC**, Lees D, Owen KO, Bauman AE. Major Events Impact and Legacy: RunWest 6-Month Post-event Report. SPRINTER group, The University of Sydney. 2019

AWARDS

I have received multiple awards during my candidature recognising my research and creative contributions to the promotion of physical activity. These include:

2021 — International Society for Physical Activity and Health 8th Congress (Online) – Best presentation (Trainee).

2021 — Makers and Shapers Award - Research Performance (Team) – Faculty of Medicine and Health, the University of Sydney.

2020 — University of Sydney - 3-Minute Thesis Finalist.

2020 — Faculty of Medicine and Health - 3-Minute Thesis Winner.

2020 — Public Health Research & Practice Excellence Award — Best In Practice Paper.

2020 — Parks and Leisure Australia NSW/ACT Awards of Excellence (Research Award): Evaluation of the NSW Governments Active Kids Program.

2019 — Charles Perkins Centre Exception Contribution Award: Energy, enthusiasm and drive for positive change through physical activity.

2019 — Public Health Research and Practice – Highly Commended, Research and perspective paper award.

2019 — Public Health Association of Australia – Picturing Public Health Art Prize winner.

THESIS STUDIES IN THE MEDIA

My thesis publications were featured on multiple media platforms:

January 11, 2021 — “NSW children get active and cash in extra day of exercise”, Mary Ward, Sydney Morning Herald. Access article: <https://www.smh.com.au/national/nsw/nsw-children-get-active-and-cash-in-extra-day-of-exercise-20210110-p56t0o.html>

January 11, 2021 — ABC Radio Evenings with Laura Tchilinguirian – Live interview discussing the findings from the 2021 paper ‘Effects of the Active Kids voucher program on children and adolescents’ physical activity: a natural experiment evaluating a state-wide intervention.’

January 13, 2021 — Interviewed on “The Project” television program regarding the findings from the 2021 paper ‘Effects of the Active Kids voucher program on children and adolescents’ physical activity: a natural experiment evaluating a state-wide intervention.’ Access segment: <https://twitter.com/theprojecttv/status/1349264854587203584>

PROFESSIONAL SOCIETIES

During my candidature, I volunteered on committees of the International Society for Physical Activity and Health (ISPAH) and the Asia-Pacific Society for Physical Activity (ASPA).

2019-Present —Communications Committee, ISPAH.

2021-Present — Chair, Early Career Network, ASPA.

2021-Present — Executive Committee, ASPA.

Whilst undertaking these roles I contributed to the following activities:

Social Media Interaction across ISPAH's Twitter, LinkedIn, Instagram and Facebook.

2020 ISPAH Congress Session Char.

ASPA Southeast Asia Committee research seminar 2022, Host.

Online event: The Great Physical Activity Debate 2021

ASPA Conference Field Guide 2022

Physical Activity Field Guide 2021

Webinar: Addressing Mental Health and Wellbeing for Early Career Professionals

ISPAH Newsletter and CRM Mailer (from Oct 2022).

Chair monthly meetings with the ASPA Early Career Network.

SUPPLEMENTARY MATERIAL 1. ACTIVE KIDS EVALUATION

SURVEY QUESTION ITEMS

What is your relationship to the child registered in the Active Kids program?

Parent	Grandparent	Sibling (Brother/sister)
Carer	The child	Other

Who is completing this survey?

Adult alone
Adult and Child together (recommended)
Child alone

Tell us your main reasons for registering the child in the Active Kids program?

Tick all that apply

Money/financial support for activity	Support participation in a current activity	Join activity the child's friend does
Try a new activity, in addition to usual activity	Try a new activity, instead of usual activity	Improve social skills through activity
Improve the child's health	Improve skill and performance	Improve the child's fitness
Manage the child's overweight or obesity	Build friendships outside of school	Other

In the past 12 months, how much did you pay in total for the child's structured physical activity and sport?

This includes all paid activities in the last 12 months, including any additional amount paid when you used your Active Kids voucher- does not include the \$100 subsidised by the voucher.



\$

For what activity did you redeem the child's Active Kids voucher?

If other activity, please specify


Did the child participate in the activity that the voucher was redeemed for?

If you did not redeem the child's voucher, please indicate 'No' here.

 Yes No

In your opinion, how has the Active Kids program influenced the child's total time being physically active?

Increased a lot Increased a little Stayed about the same Decreased a little Decreased a lot

During the last week, was the registration fee you used the Active Kids voucher on still valid for the child to participate in the activity? 

 Yes No

There are national recommendations for how much activity children aged up to 18 years old should achieve for health benefits in a typical day.

How many minutes of physical activity is recommended each day?

 Don't know

On a scale from very easy to very difficult, how easy is it for the child to find and participate in a sport or physical activity, if they want to?

If the child is too young to find sports or activities by themselves, please answer with how easy is it for the adult to do this.

 Very difficult Difficult Easy Very easy

In a typical week, on how many days is the child physically active for at least 60 minutes?

This could be made up of different activities accumulated throughout the day including walking quickly, cycling to school, organised sport and physical activities at school or an exercise class.

0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

In a typical week, on which days does the child participate in organised sports or physical activities?

Select all that apply



Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Sunday

Does not typically participate

In a typical week, how many sessions in total, of organised sports or physical activities does the child participate in, outside of school hours?

This should include all sessions of organised activity or sport delivered through a club or organisation. Include the activity where you used the voucher (if still involved) and all other sessions as well.

0 sessions 1 session 2 sessions 3 sessions 4 sessions 5 sessions 6 sessions 7 sessions 8 or more sessions

In a typical session, how many minutes/hours does the child spend in the activity?

If zero minutes/hours, please enter the number '0'.



Minutes

Hours

On which days in the last week did the child attend the activity where the voucher was redeemed?

This may involve exercise and training sessions only for the voucher activity.

Select all that apply



Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Sunday

Did not attend

In the last week, how many sessions did the child attend the activity where the voucher was redeemed?

0 sessions 1 session 2 sessions 3 sessions 4 sessions 5 sessions 6 sessions 7 sessions 8 or more sessions

In a typical session, how many minutes/hours did the child spend participating in the activity where the voucher was redeemed?

If zero minutes/hours, please enter the number '0'.



Minutes

Hours

These questions ask the child's thoughts and feelings about being physically active.

Indicate the child's degree of agreement to the following statements. ⓘ

	Disagree a lot	Somewhat disagree	Neither agree not disagree	Somewhat agree	Agree a lot
The child finds being physically active <u>fun</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child feels they can be physically active <u>during their free time</u> on most days	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child feels they can <u>ask an adult</u> (parent, carer, teacher) to be physically active with them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The child feels they can <u>ask a friend</u> to be physically active with them during their free time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thinking about the last week, how often has the child felt: ⓘ

	Never	Rarely	Quite often	Always
Full of energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unable to concentrate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

On the whole, how happy does the child feel? ⓘ




In the last week, which of the following best represents the child's activity, outside of school hours?

Please select all that apply

Active:

<input type="checkbox"/> with whole family together	<input type="checkbox"/> with male adult carer	<input type="checkbox"/> with female adult carer
<input type="checkbox"/> with grandparent/s	<input type="checkbox"/> with sibling/s	<input type="checkbox"/> with friend/s
<input type="checkbox"/> with relatives (e.g. cousins)	<input type="checkbox"/> The child was not active	<input type="checkbox"/> by them-self /alone
<input type="checkbox"/> with team mates		


These questions ask about your (the adult's) physical activity behaviours.

In the past week, on how many days have you (the adult) done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate? 

0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days

In the last week, how many session of structured physical activity or sport have you (the adult) participated in?

0 sessions 1 session 2 sessions 3 sessions 4 sessions 5 sessions 6 sessions 7 sessions 8 or more sessions

What is the child's height and weight? 

Height in centimetres (without shoes)

Weight in kilograms (without shoes)

END OF QUESTIONS – THANK YOU

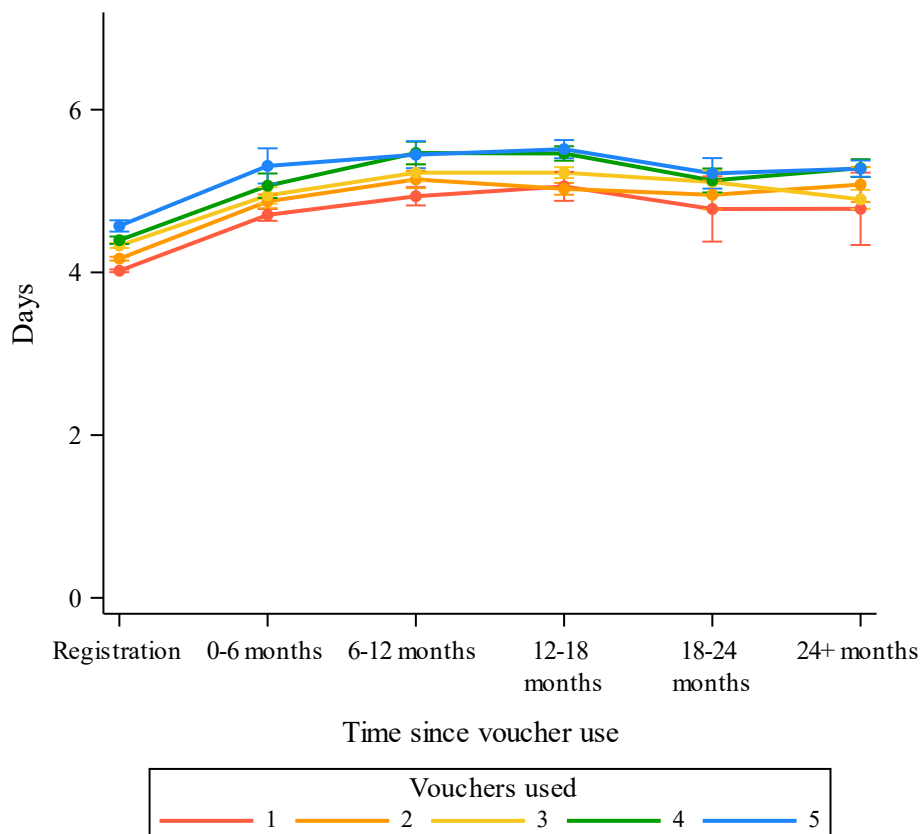
To submit the survey and your answers, please click on the 'Finalise' button below

SUPPLEMENTARY MATERIAL 2. SEMI-STRUCTURED INTERVIEW TOPIC GUIDE

Could you tell me about [Organization name] and your role in this organization?
What has been your role in the implementation of the NSW Government's Active Kids program?
How did you hear about the program?
What motivated you and [Organization name] to register and participate in the NSW Government's Active Kids program?
Can you provide detail regarding the approved activity which children can use their Active Kids voucher for?
Can you provide an approximation to what proportion of kids who registered at [Organization Name] used an Active Kids voucher?
What do you think the NSW government is aiming to achieve through the program?
Tell us about your overall experiences of the Active Kids program over the last 12 months? <i>What has worked well?</i> <i>What are the positives to being a registered Active Kids provider and why?</i> <i>What has not worked well?</i> <i>Challenges of being a registered Active Kids provider?</i>
What has been the impact of the Active Kids program on.... <i>Membership – numbers, ages/ nationality, gender and disability inclusion</i> <i>Staff and volunteers</i> <i>Partnerships</i> <i>Resource/Finance</i> <i>Marketing and promotion</i>
Has being involved with the Active Kids program influenced the way your organisation operates?
Has the Active Kids program positively impacted linkage and compliance of your affiliate or underpinning programs/organisations/providers?
What would help [Organization Name] to increase the reach and develop new tailored initiatives.
Will you continue to be part of the Active Kids program over the next 12 months?
Additional Comments

SUPPLEMENTARY MATERIAL 3. SUB-GROUP ANALYSIS OUTPUT FOR RESEARCH SUB-STUDY PARTICIPANTS PHYSICAL ACTIVITY

3.1 Changes in days participating in 60 minutes of physical activity for 15-18 year olds

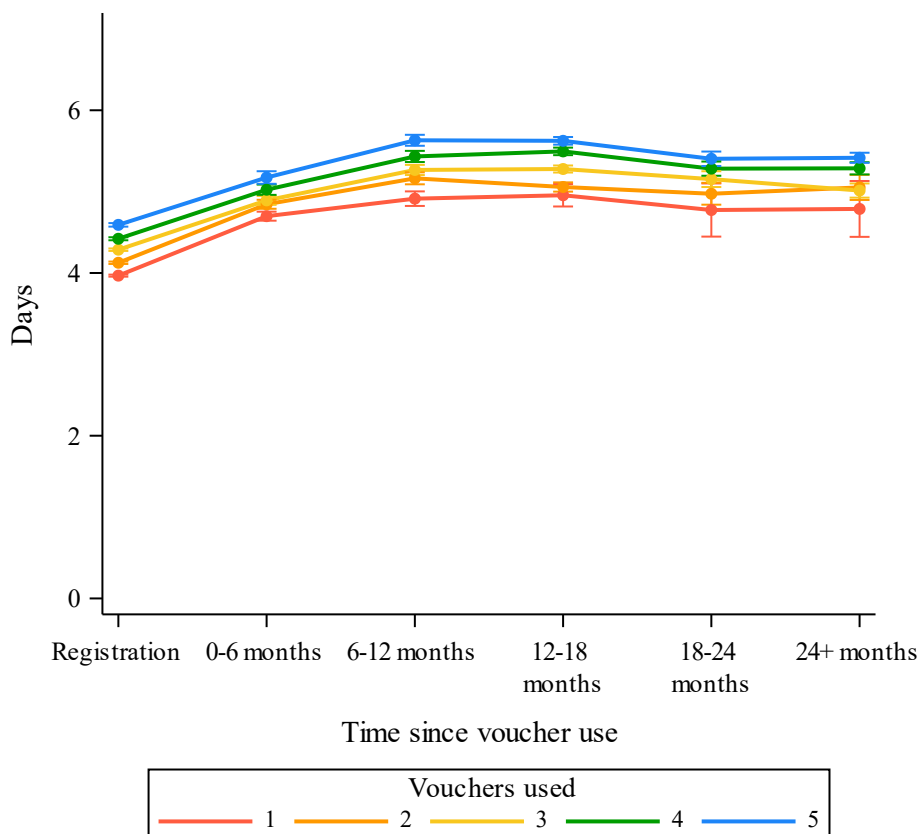


Note. Model adjusts for sex1 aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	4.02	4	4.04
Registration	2	4.17	4.15	4.19
Registration	3	4.33	4.3	4.36
Registration	4	4.4	4.35	4.44
Registration	5	4.57	4.5	4.64

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
0-6 months	1	4.71	4.63	4.78
0-6 months	2	4.87	4.79	4.96
0-6 months	3	4.95	4.84	5.05
0-6 months	4	5.07	4.92	5.22
0-6 months	5	5.31	5.09	5.53
6-12 months	1	4.94	4.82	5.05
6-12 months	2	5.14	5.04	5.25
6-12 months	3	5.23	5.12	5.33
6-12 months	4	5.47	5.33	5.61
6-12 months	5	5.45	5.28	5.61
12-18 months	1	5.06	4.88	5.24
12-18 months	2	5.03	4.95	5.1
12-18 months	3	5.23	5.16	5.29
12-18 months	4	5.46	5.37	5.55
12-18 months	5	5.51	5.4	5.63
18-24 months	1	4.78	4.38	5.18
18-24 months	2	4.95	4.78	5.13
18-24 months	3	5.11	4.97	5.25
18-24 months	4	5.13	4.98	5.28
18-24 months	5	5.22	5.03	5.4
24+ months	1	4.78	4.34	5.23
24+ months	2	5.08	4.86	5.3
24+ months	3	4.9	4.78	5.01
24+ months	4	5.28	5.17	5.39
24+ months	5	5.28	5.18	5.38

Changes in days participating in 60 minutes of physical activity for 12-18 year olds

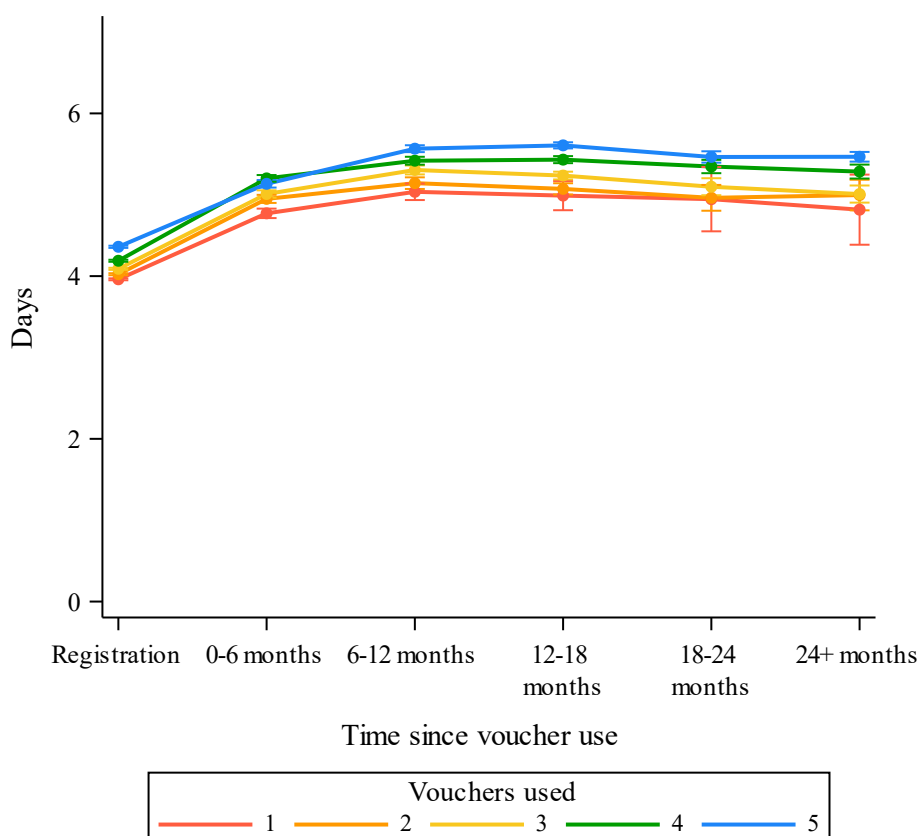


Note. Model adjusts for sex1 aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.97	3.95	3.98
Registration	2	4.13	4.11	4.14
Registration	3	4.29	4.27	4.3
Registration	4	4.42	4.4	4.44
Registration	5	4.59	4.57	4.61
0-6 months	1	4.7	4.64	4.75
0-6 months	2	4.84	4.79	4.9

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
0-6 months	3	4.89	4.84	4.95
0-6 months	4	5.02	4.96	5.09
0-6 months	5	5.17	5.1	5.25
6-12 months	1	4.91	4.82	5
6-12 months	2	5.16	5.09	5.24
6-12 months	3	5.27	5.2	5.33
6-12 months	4	5.43	5.36	5.5
6-12 months	5	5.63	5.56	5.7
12-18 months	1	4.96	4.82	5.09
12-18 months	2	5.06	5	5.11
12-18 months	3	5.28	5.23	5.32
12-18 months	4	5.49	5.45	5.54
12-18 months	5	5.62	5.58	5.67
18-24 months	1	4.77	4.45	5.1
18-24 months	2	4.97	4.84	5.11
18-24 months	3	5.15	5.06	5.25
18-24 months	4	5.28	5.2	5.37
18-24 months	5	5.4	5.31	5.49
24+ months	1	4.79	4.44	5.13
24+ months	2	5.05	4.9	5.21
24+ months	3	5.01	4.93	5.1
24+ months	4	5.29	5.21	5.36
24+ months	5	5.42	5.35	5.48

Changes in days participating in 60 minutes of physical activity for girls

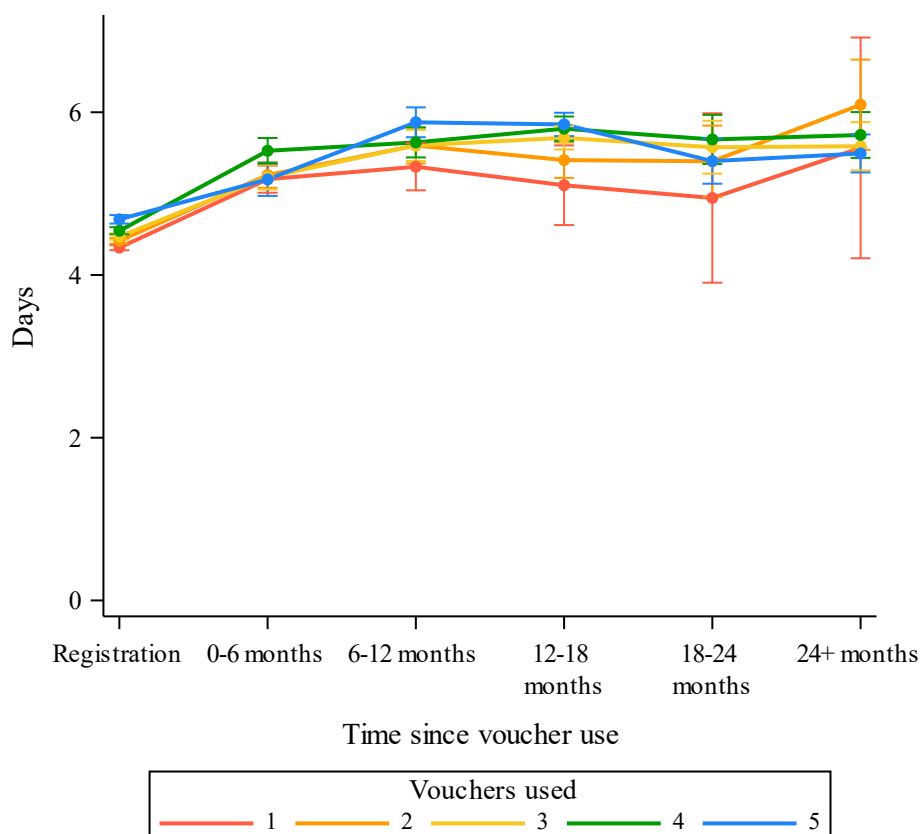


Note. Model adjusts for agecat aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.96	3.95	3.97
Registration	2	4.02	4.01	4.04
Registration	3	4.09	4.08	4.1
Registration	4	4.19	4.18	4.2
Registration	5	4.36	4.35	4.37
0-6 months	1	4.77	4.71	4.83
0-6 months	2	4.95	4.9	5
0-6 months	3	5.01	4.96	5.05
0-6 months	4	5.2	5.16	5.24
0-6 months	5	5.13	5.09	5.18
6-12 months	1	5.04	4.94	5.14
6-12 months	2	5.14	5.07	5.21

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	3	5.3	5.25	5.36
6-12 months	4	5.42	5.37	5.47
6-12 months	5	5.57	5.52	5.61
12-18 months	1	4.99	4.81	5.17
12-18 months	2	5.07	5	5.14
12-18 months	3	5.24	5.19	5.28
12-18 months	4	5.43	5.39	5.48
12-18 months	5	5.61	5.57	5.64
18-24 months	1	4.95	4.55	5.34
18-24 months	2	4.96	4.8	5.12
18-24 months	3	5.1	4.99	5.2
18-24 months	4	5.35	5.27	5.43
18-24 months	5	5.46	5.39	5.53
24+ months	1	4.82	4.39	5.25
24+ months	2	5	4.81	5.18
24+ months	3	5.01	4.9	5.11
24+ months	4	5.29	5.2	5.37
24+ months	5	5.47	5.41	5.53

Changes in days participating in 60 minutes of physical activity for children who identified as Aboriginal and/or Torres Strait Islander

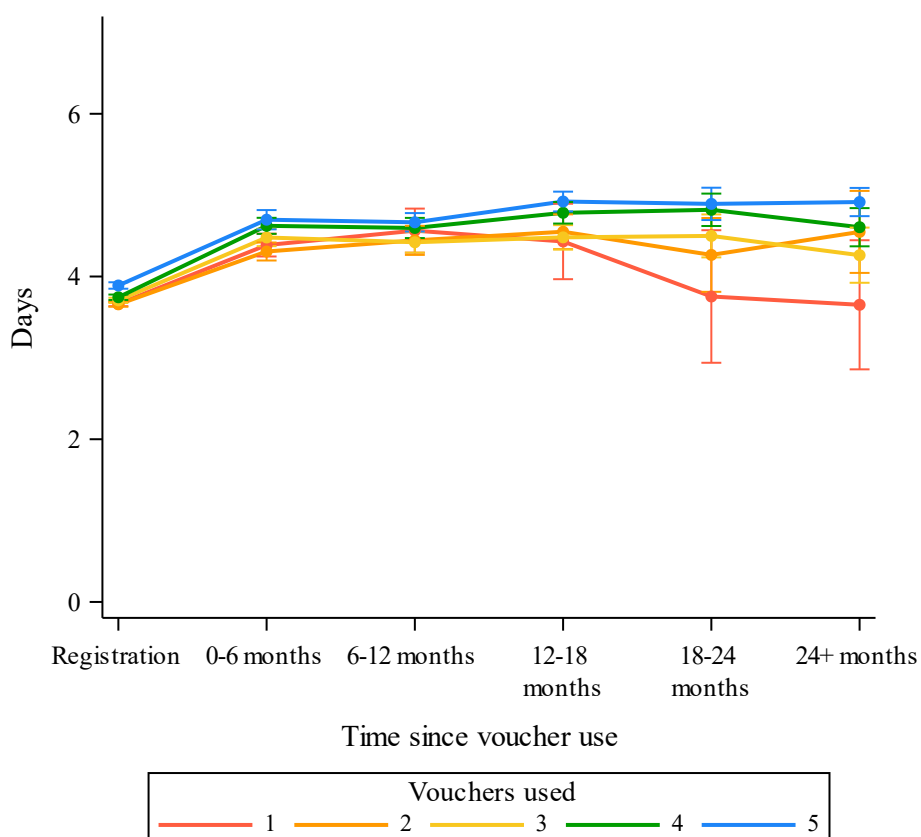


Note. Model adjusts for agecat sex1 lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	4.34	4.3	4.37
Registration	2	4.42	4.38	4.46
Registration	3	4.47	4.43	4.51
Registration	4	4.54	4.5	4.59
Registration	5	4.68	4.63	4.74
0-6 months	1	5.18	5.01	5.34
0-6 months	2	5.23	5.07	5.39
0-6 months	3	5.2	5.05	5.35

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
0-6 months	4	5.53	5.37	5.68
0-6 months	5	5.18	4.97	5.38
6-12 months	1	5.33	5.04	5.62
6-12 months	2	5.59	5.37	5.81
6-12 months	3	5.59	5.4	5.78
6-12 months	4	5.63	5.45	5.81
6-12 months	5	5.88	5.69	6.06
12-18 months	1	5.1	4.61	5.59
12-18 months	2	5.41	5.19	5.63
12-18 months	3	5.69	5.54	5.83
12-18 months	4	5.8	5.65	5.95
12-18 months	5	5.85	5.71	5.99
18-24 months	1	4.95	3.91	5.99
18-24 months	2	5.4	4.96	5.84
18-24 months	3	5.57	5.25	5.9
18-24 months	4	5.67	5.36	5.97
18-24 months	5	5.4	5.12	5.68
24+ months	1	5.56	4.21	6.92
24+ months	2	6.09	5.54	6.65
24+ months	3	5.58	5.29	5.88
24+ months	4	5.72	5.44	6
24+ months	5	5.49	5.26	5.73

Changes in days participating in 60 minutes of physical activity for children who spoke another language

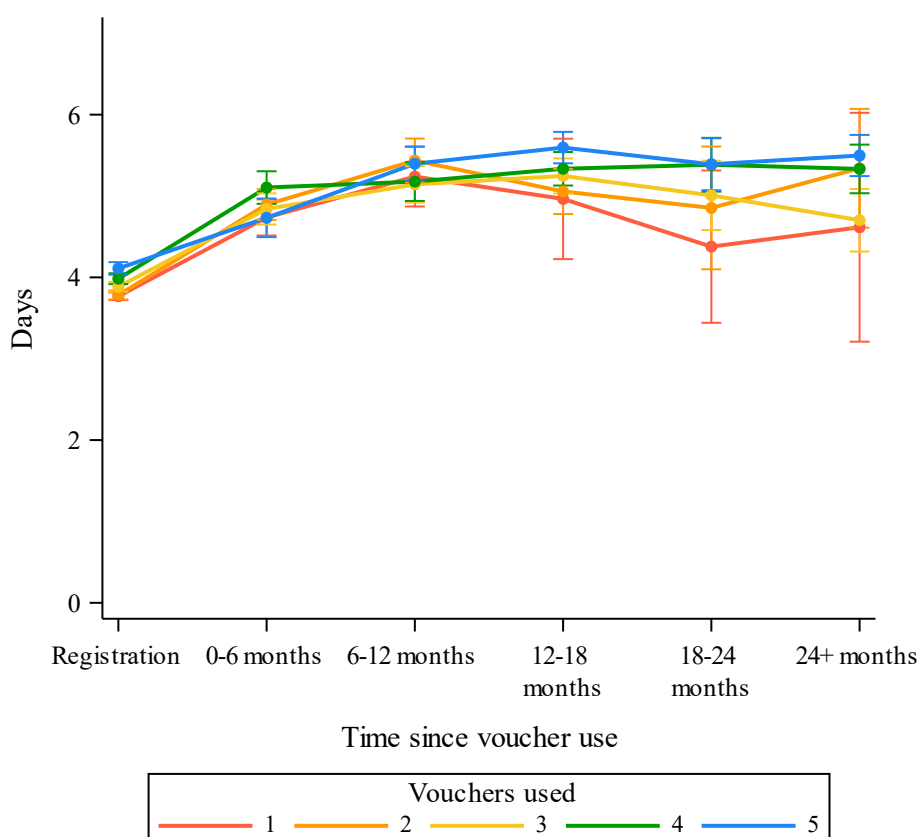


Note. Model adjusts for agecat sex1 aborig dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.66	3.64	3.69
Registration	2	3.66	3.63	3.69
Registration	3	3.71	3.67	3.74
Registration	4	3.74	3.71	3.78
Registration	5	3.89	3.85	3.93
0-6 months	1	4.39	4.25	4.53
0-6 months	2	4.31	4.2	4.42
0-6 months	3	4.48	4.37	4.59
0-6 months	4	4.62	4.52	4.72
0-6 months	5	4.7	4.58	4.82

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	1	4.56	4.29	4.83
6-12 months	2	4.44	4.27	4.62
6-12 months	3	4.42	4.29	4.55
6-12 months	4	4.6	4.47	4.72
6-12 months	5	4.67	4.55	4.78
12-18 months	1	4.43	3.97	4.89
12-18 months	2	4.55	4.34	4.76
12-18 months	3	4.48	4.33	4.63
12-18 months	4	4.78	4.65	4.92
12-18 months	5	4.92	4.8	5.04
18-24 months	1	3.75	2.94	4.57
18-24 months	2	4.27	3.81	4.72
18-24 months	3	4.5	4.24	4.76
18-24 months	4	4.82	4.62	5.02
18-24 months	5	4.89	4.69	5.09
24+ months	1	3.65	2.86	4.45
24+ months	2	4.55	4.04	5.05
24+ months	3	4.26	3.92	4.6
24+ months	4	4.61	4.37	4.84
24+ months	5	4.92	4.74	5.09

Changes in days participating in 60 minutes of physical activity for children who identified having a disability

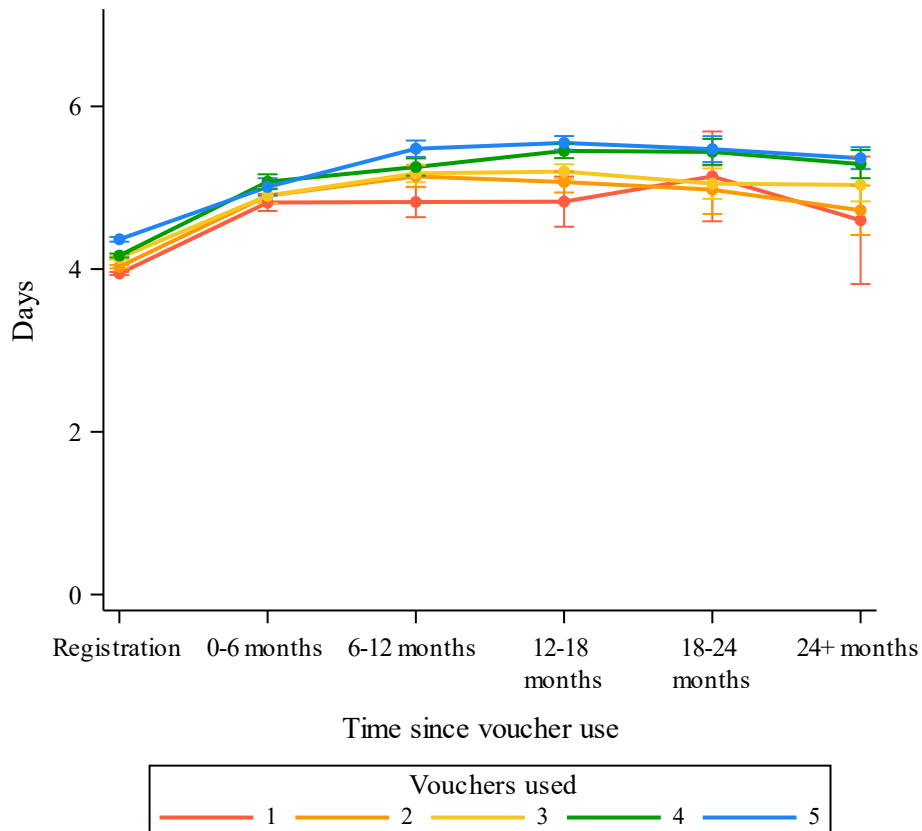


Note. Model adjusts for agecat sex1 aborig lang1 seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.77	3.72	3.81
Registration	2	3.78	3.73	3.84
Registration	3	3.88	3.82	3.95
Registration	4	3.98	3.92	4.05
Registration	5	4.11	4.03	4.19
0-6 months	1	4.74	4.52	4.96
0-6 months	2	4.9	4.71	5.08
0-6 months	3	4.84	4.65	5.03
0-6 months	4	5.1	4.9	5.3
0-6 months	5	4.73	4.5	4.97
6-12 months	1	5.24	4.87	5.61

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	2	5.44	5.17	5.71
6-12 months	3	5.14	4.92	5.37
6-12 months	4	5.18	4.94	5.41
6-12 months	5	5.4	5.19	5.61
12-18 months	1	4.96	4.22	5.7
12-18 months	2	5.06	4.78	5.33
12-18 months	3	5.25	5.03	5.46
12-18 months	4	5.33	5.13	5.54
12-18 months	5	5.6	5.4	5.79
18-24 months	1	4.38	3.44	5.31
18-24 months	2	4.85	4.1	5.61
18-24 months	3	5.01	4.58	5.43
18-24 months	4	5.38	5.05	5.72
18-24 months	5	5.39	5.07	5.71
24+ months	1	4.62	3.21	6.02
24+ months	2	5.34	4.61	6.07
24+ months	3	4.7	4.32	5.09
24+ months	4	5.33	5.03	5.63
24+ months	5	5.5	5.24	5.75

Changes in days participating in 60 minutes of physical activity for the most disadvantaged

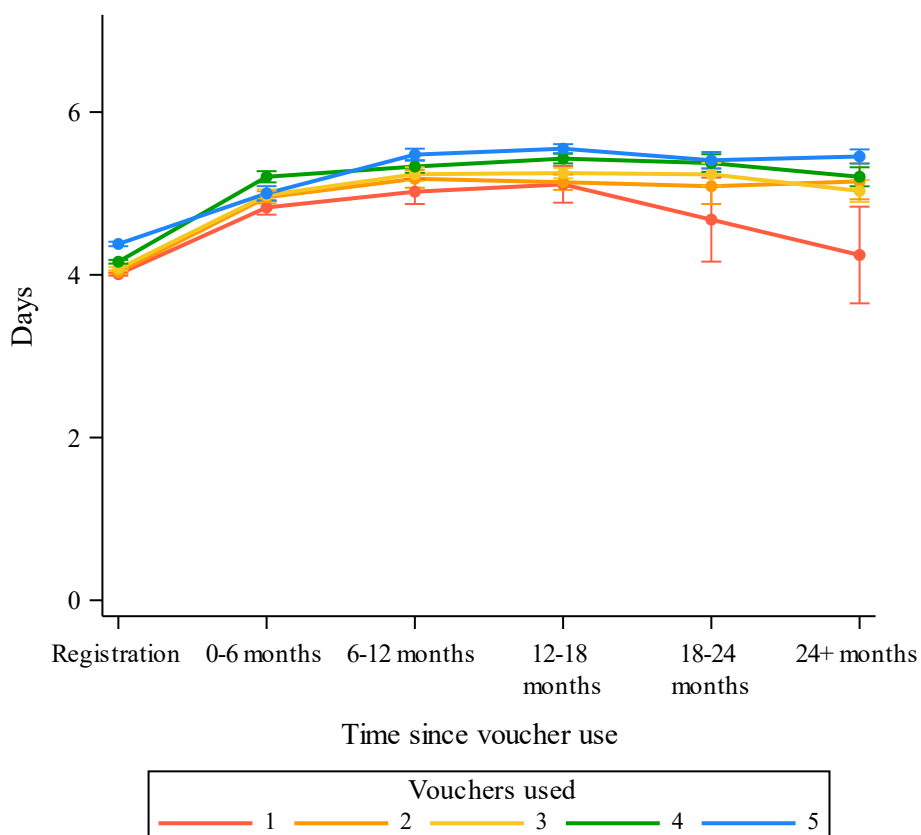


Note. Model adjusts for agecat sex1 aborig lang1 dis bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.95	3.93	3.97
Registration	2	4.03	4.01	4.05
Registration	3	4.14	4.12	4.16
Registration	4	4.17	4.14	4.19
Registration	5	4.37	4.34	4.4
0-6 months	1	4.82	4.71	4.92
0-6 months	2	4.9	4.81	4.99

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
0-6 months	3	4.9	4.81	4.99
0-6 months	4	5.07	4.98	5.17
0-6 months	5	5.01	4.9	5.12
6-12 months	1	4.82	4.64	5.01
6-12 months	2	5.14	5.01	5.27
6-12 months	3	5.18	5.07	5.29
6-12 months	4	5.25	5.15	5.36
6-12 months	5	5.48	5.38	5.58
12-18 months	1	4.83	4.52	5.14
12-18 months	2	5.07	4.94	5.2
12-18 months	3	5.2	5.11	5.29
12-18 months	4	5.45	5.36	5.54
12-18 months	5	5.55	5.47	5.64
18-24 months	1	5.14	4.59	5.69
18-24 months	2	4.98	4.68	5.27
18-24 months	3	5.05	4.86	5.24
18-24 months	4	5.44	5.28	5.6
18-24 months	5	5.47	5.32	5.63
24+ months	1	4.6	3.82	5.38
24+ months	2	4.72	4.42	5.03
24+ months	3	5.03	4.83	5.24
24+ months	4	5.29	5.12	5.46
24+ months	5	5.36	5.23	5.5

Changes in days participating in 60 minutes of physical activity for overweight and obese

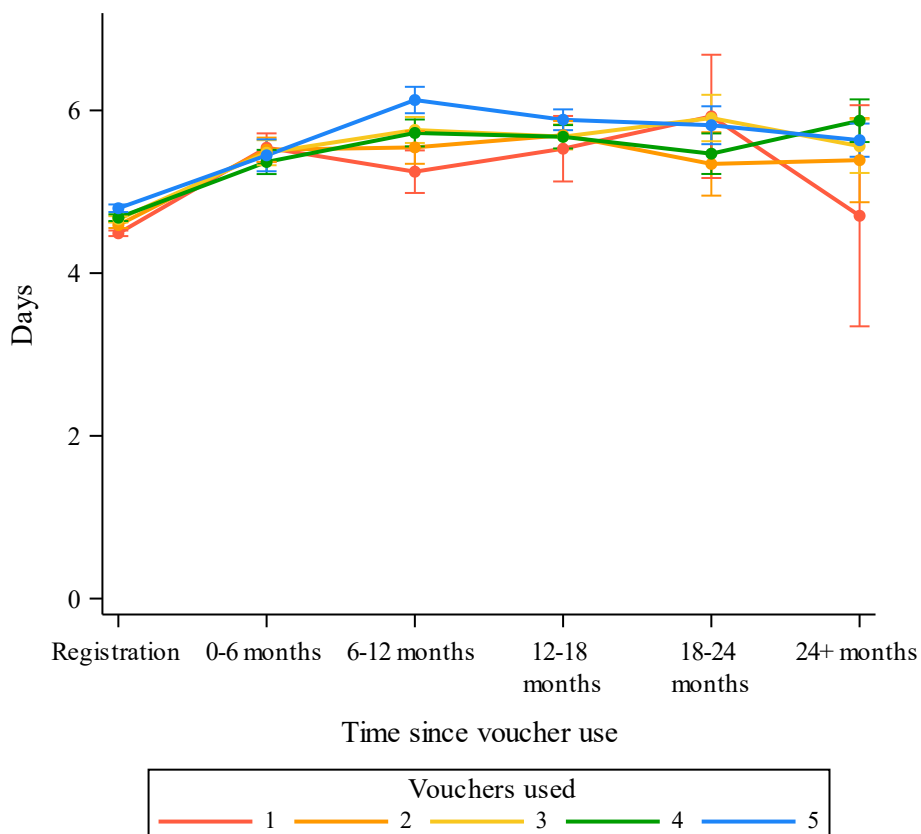


Note. Model adjusts for agecat sex1 aborig lang1 dis seifa_quartile .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	4.01	3.99	4.03
Registration	2	4.03	4.01	4.05
Registration	3	4.07	4.05	4.1
Registration	4	4.16	4.14	4.18
Registration	5	4.38	4.35	4.41
0-6 months	1	4.83	4.74	4.92
0-6 months	2	4.95	4.88	5.03
0-6 months	3	4.98	4.91	5.05
0-6 months	4	5.21	5.14	5.27
0-6 months	5	5	4.91	5.09
6-12 months	1	5.02	4.87	5.17

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	2	5.18	5.07	5.29
6-12 months	3	5.24	5.15	5.32
6-12 months	4	5.33	5.25	5.41
6-12 months	5	5.48	5.4	5.55
12-18 months	1	5.11	4.89	5.34
12-18 months	2	5.14	5.04	5.23
12-18 months	3	5.25	5.19	5.31
12-18 months	4	5.43	5.37	5.49
12-18 months	5	5.55	5.5	5.61
18-24 months	1	4.68	4.16	5.19
18-24 months	2	5.09	4.87	5.31
18-24 months	3	5.23	5.09	5.38
18-24 months	4	5.37	5.27	5.48
18-24 months	5	5.41	5.31	5.51
24+ months	1	4.24	3.65	4.84
24+ months	2	5.15	4.93	5.37
24+ months	3	5.03	4.9	5.17
24+ months	4	5.2	5.09	5.32
24+ months	5	5.45	5.37	5.54

Changes in days participating in 60 minutes of physical activity for outer regional or remote

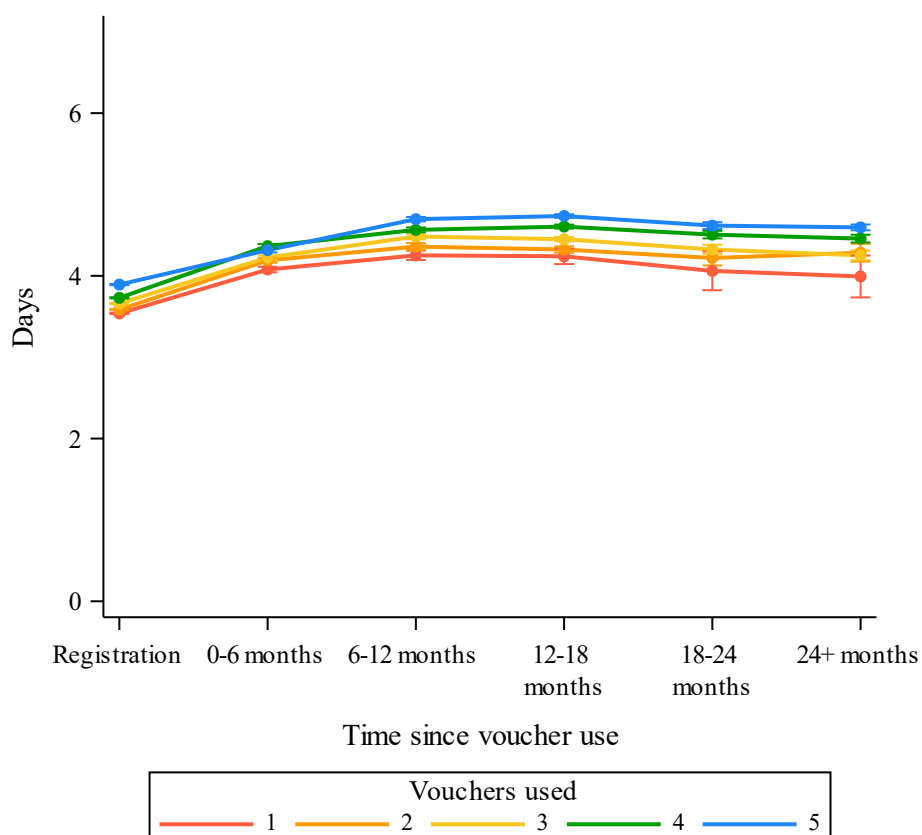


Note. Model adjusts for agecat sex1 aborig lang1 dis bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	4.49	4.46	4.52
Registration	2	4.59	4.55	4.63
Registration	3	4.66	4.62	4.7
Registration	4	4.68	4.64	4.72
Registration	5	4.8	4.75	4.84
0-6 months	1	5.54	5.37	5.72
0-6 months	2	5.52	5.37	5.67
0-6 months	3	5.48	5.33	5.63
0-6 months	4	5.37	5.22	5.52
0-6 months	5	5.45	5.25	5.64

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	1	5.25	4.99	5.51
6-12 months	2	5.55	5.34	5.75
6-12 months	3	5.76	5.6	5.92
6-12 months	4	5.72	5.56	5.89
6-12 months	5	6.13	5.97	6.29
12-18 months	1	5.53	5.13	5.93
12-18 months	2	5.7	5.52	5.87
12-18 months	3	5.68	5.53	5.83
12-18 months	4	5.68	5.53	5.82
12-18 months	5	5.88	5.76	6.01
18-24 months	1	5.93	5.17	6.68
18-24 months	2	5.34	4.95	5.73
18-24 months	3	5.91	5.62	6.19
18-24 months	4	5.47	5.22	5.72
18-24 months	5	5.82	5.58	6.05
24+ months	1	4.71	3.35	6.06
24+ months	2	5.39	4.87	5.91
24+ months	3	5.56	5.23	5.89
24+ months	4	5.87	5.61	6.14
24+ months	5	5.63	5.43	5.84

Changes in days participating in 60 minutes of physical activity for inactive

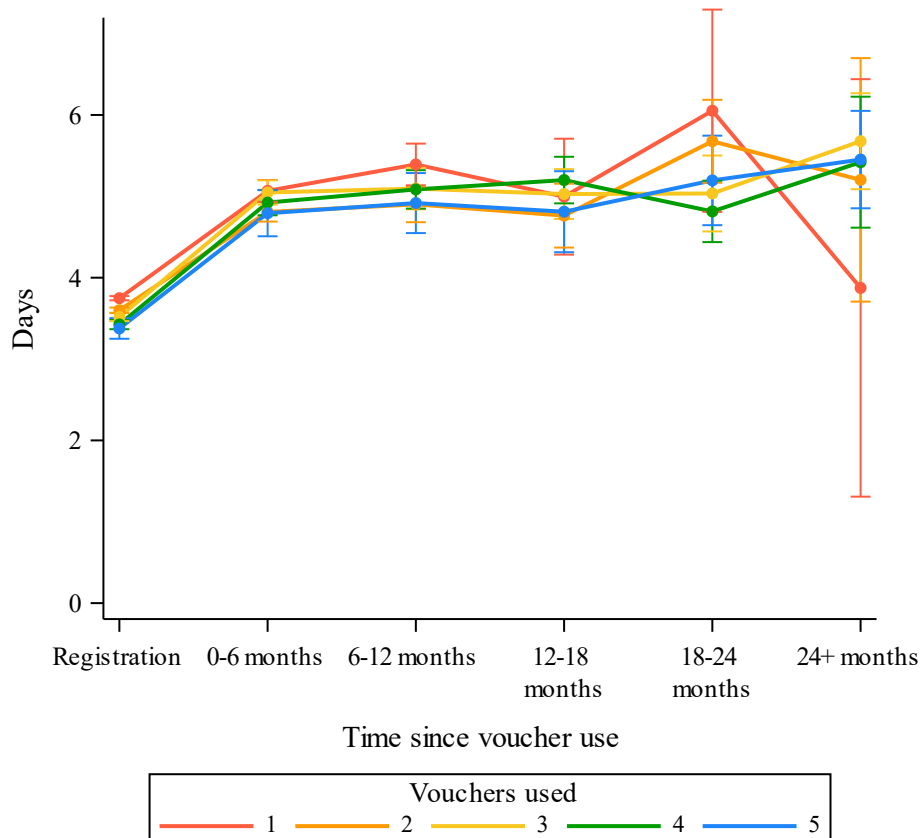


Note. Model adjusts for agecat sex1 aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.54	3.53	3.54
Registration	2	3.58	3.58	3.59
Registration	3	3.66	3.65	3.67
Registration	4	3.73	3.72	3.74
Registration	5	3.89	3.88	3.9
0-6 months	1	4.08	4.04	4.11
0-6 months	2	4.19	4.16	4.22
0-6 months	3	4.22	4.2	4.25
0-6 months	4	4.37	4.34	4.39
0-6 months	5	4.32	4.29	4.34

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	1	4.25	4.19	4.31
6-12 months	2	4.36	4.32	4.4
6-12 months	3	4.48	4.45	4.52
6-12 months	4	4.57	4.54	4.59
6-12 months	5	4.7	4.67	4.72
12-18 months	1	4.24	4.14	4.34
12-18 months	2	4.32	4.28	4.36
12-18 months	3	4.45	4.42	4.48
12-18 months	4	4.61	4.58	4.63
12-18 months	5	4.74	4.71	4.76
18-24 months	1	4.06	3.82	4.3
18-24 months	2	4.22	4.13	4.31
18-24 months	3	4.32	4.26	4.38
18-24 months	4	4.51	4.46	4.55
18-24 months	5	4.62	4.58	4.66
24+ months	1	3.99	3.74	4.25
24+ months	2	4.28	4.18	4.39
24+ months	3	4.25	4.19	4.31
24+ months	4	4.46	4.41	4.51
24+ months	5	4.6	4.56	4.63

Changes in days participating in 60 minutes of physical activity for 'not sporty' children

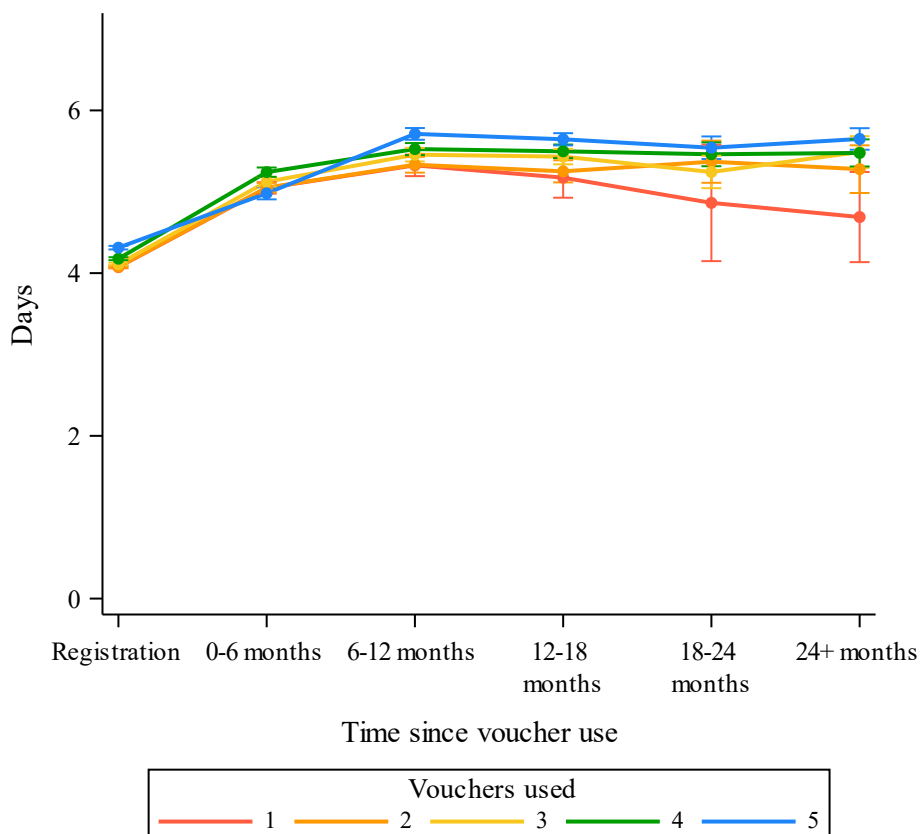


Note. Model adjusts for agecat sex1 aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvoucher	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	3.75	3.72	3.77
Registration	2	3.6	3.57	3.63
Registration	3	3.52	3.47	3.57
Registration	4	3.43	3.37	3.48
Registration	5	3.38	3.25	3.5
0-6 months	1	5.07	4.93	5.2
0-6 months	2	4.81	4.69	4.93
0-6 months	3	5.05	4.9	5.2
0-6 months	4	4.92	4.77	5.08
0-6 months	5	4.79	4.51	5.08
6-12 months	1	5.39	5.14	5.65

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
6-12 months	2	4.9	4.68	5.12
6-12 months	3	5.1	4.84	5.35
6-12 months	4	5.09	4.85	5.32
6-12 months	5	4.92	4.55	5.29
12-18 months	1	5	4.28	5.71
12-18 months	2	4.76	4.37	5.16
12-18 months	3	5.03	4.72	5.33
12-18 months	4	5.2	4.91	5.49
12-18 months	5	4.81	4.31	5.31
18-24 months	1	6.05	4.81	7.3
18-24 months	2	5.68	5.17	6.19
18-24 months	3	5.04	4.57	5.5
18-24 months	4	4.81	4.44	5.19
18-24 months	5	5.2	4.65	5.75
24+ months	1	3.87	1.31	6.44
24+ months	2	5.2	3.71	6.7
24+ months	3	5.68	5.09	6.27
24+ months	4	5.42	4.61	6.22
24+ months	5	5.45	4.85	6.05

Changes in days participating in 60 minutes of physical activity for children intending a new activity



Note. Model adjusts for agecat sex1 aborig lang1 dis seifa_quartile bmicat .

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
Registration	1	4.07	4.06	4.09
Registration	2	4.08	4.06	4.09
Registration	3	4.11	4.09	4.13
Registration	4	4.18	4.16	4.2
Registration	5	4.31	4.29	4.33
0-6 months	1	5.05	4.98	5.12
0-6 months	2	5.05	4.99	5.11
0-6 months	3	5.12	5.06	5.18
0-6 months	4	5.24	5.18	5.3

time_to_survey_firstvouch	number_vouchers	Estimate	LowerCL	UpperCL
0-6 months	5	4.98	4.91	5.06
6-12 months	1	5.32	5.19	5.46
6-12 months	2	5.33	5.24	5.43
6-12 months	3	5.46	5.37	5.54
6-12 months	4	5.52	5.45	5.6
6-12 months	5	5.71	5.64	5.78
12-18 months	1	5.17	4.93	5.42
12-18 months	2	5.25	5.11	5.39
12-18 months	3	5.43	5.34	5.53
12-18 months	4	5.5	5.41	5.58
12-18 months	5	5.65	5.57	5.72
18-24 months	1	4.86	4.15	5.58
18-24 months	2	5.37	5.11	5.63
18-24 months	3	5.24	5.04	5.44
18-24 months	4	5.46	5.31	5.61
18-24 months	5	5.54	5.4	5.68
24+ months	1	4.69	4.14	5.24
24+ months	2	5.28	4.99	5.57
24+ months	3	5.49	5.29	5.68
24+ months	4	5.48	5.31	5.64
24+ months	5	5.65	5.52	5.78