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Healthy eating and physical activity environments for out of school hours care settings

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Healthy eating and physical activity environments for out of school hours care settings

A thesis submitted in fulfilment of the requirements for the award of the degree:

Doctor of Philosophy

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By

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Bachelor of Science (Nutrition) Honours

Supervisors:

A/ Professor Yasmine Probst, Dr. Rebecca Stanley and Senior Professor Anthony Okely

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Abstract

Background

Out of school hours care (OSHC) is the second largest childcare setting in Australia. In OSHC, the types of foods and beverages offered, physical activity levels, and policy environments are relatively unknown. This thesis aimed to a) describe the current healthy eating and physical activity environments, b) examine the environmental factors associated with meeting dietary guidelines, c) investigate environmental factors associated with children achieving at least 30 minutes of moderate- to vigorous-intensity physical activity (MVPA), and d) examine how healthy eating and physical activity (HEPA) policies were associated with staff practices and child physical activity.

Methods

A cross-sectional, observation study was conducted to explore the HEPA environments within a sample of 89 OSHC services across two local health districts within New South Wales (NSW). Direct observation was used to document the food and beverages offered, kitchen facilities and weekly food menus. HEPA promotion and program practices were systematically captured using the System for Observing Staff Promotion of Physical Activity and Nutrition (SOSPAN). HEPA policy environments were explored using the Healthy Afterschool Activity and Nutrition Document (HAAND) tool. Physical activity and sedentary behaviours were assessed within 3,614 children using Actigraph accelerometers. Chi square/Fisher's exact tests were used to test the associations between setting-level factors and providing foods aligning with the Australian Dietary Guidelines and the relationship between healthy eating policy elements and staff promotion practices. ANCOVA with Bonferroni adjustments tested the associations between physical activity policy scores and child activity levels. A mixed effects logistic regression evaluated the association between program practices and children's achieving 30 minutes of MVPA.

Results

Fruit and water were the most frequently offered food and beverages observed of the two observation days. Discretionary foods (1.5±0.68/days) were offered more frequently than vegetables (0.82±0.80/days) (p<.001), dairy (0.97±0.81/days) (p=.013) and lean meats (0.22±0.54/days) (p<.001). The use of clearly worded menu planning templates and menu planning guidelines was positively associated with OSHC offering food groups aligning with Australian Dietary Guidelines for: fruit (p=.009), vegetables (p<.001), whole grains (p=.003) and lean meats (p=.002). Positive relationships were found between healthy eating policy and staff practices, for: a) promoting healthy knowledge (p=.027), b) consulting with families

regarding foods children liked/ disliked (p<.001), and c) engaging families in recipe selection and menu planning (p=.011). The most frequently observed healthy eating practices performed by OSHC staff were those aligning with National Regulations. Services with the highest scoring physical activity policy environments had children who spent more time in MVPA, total physical activity and less time sedentary compared to the lowest scoring services. Twenty-six percent of children (n=925) accumulated 30 minutes or more of MVPA. Factors associated with children accumulating at least 30 minutes of MVPA included: services scheduling greater amounts of child-led free play, (OR 6.4, 95%CI 3.90, 10.49), opportunities for staff-led organised play of ≥30minutes (OR 2.3, 95%CI 1.47, 3.83), and active games that engaged the majority of children (OR 1.7, 95%CI 1.11, 2.61). Children were less likely to meet MVPA recommendations if services played games with elimination components (OR 0.56, 95%CI 0.37, 0.86).

Discussion

Findings from this doctoral thesis demonstrate that there is a need for additional resources and guidelines to support OSHC services in NSW to create healthier food and physical activity environments. Most OSHC services are not meeting dietary recommendations for vegetables, dairy, wholegrains, lean meats and discretionary foods after school. Future research is needed to explore the efficacy of sector-specific menu planning resources, which are cost effective and easily administered, to aid the provision of foods aligning with the Australian Dietary Guidelines. Furthermore, there are limited physical activity promotion resources, guidelines and opportunities for staff development within the OSHC sector. Evidence from this thesis indicate that relatively small changes to practice, e.g. scheduling prolonged opportunities for child-led free play, ensuring organised activities engage the largest number of children and avoiding games that eliminate children from active play, could positively impact the levels of MVPA accumulated by children. Future interventions are needed to develop cost effective physical activity promotion training, specific to OSHC sector, to assist OSHC staff facilitate environments supportive to physical activity outcomes.

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First and foremost, I thank my wonderful parents, Peter and Jane Crowe, for your constant love and support. I would not be where I am today without your unconditional love, encouragement and your unwavering belief in me. I am forever grateful to call you my parents. To you, I dedicate this achievement.

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the craziness! You both have been my constant cheerleaders, emotional support and some of the best friends I have. Thank you!

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To my beautiful friends, family and support networks: Sarah, Carmen, Grace, Jane, Fish, Suanu, Natasha, Dave, Ryan, Jess & Chris, Anne, Jess, Laura, Shamus and Emily. Words cannot describe how grateful I am for each of you. Thank you for your unfailing friendships, for the messages, phone calls, emotional support, prayers, wines and meals. I am the most blessed girl to call you friends and family. A special shout out to my wonderful cousins Chris and Jess, thank you for taking me on so many adventures and reminding me life can be fun. And, to Jane, the best housemate in the whole world! Thank you for your unending kindness, your grace and understanding. You have all been my rock.

Certification

I, Ruth Crowe, declare that this thesis submitted in fulfilment of the requirements for the conferral of the degree Doctorate of Philosophy, from the University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

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Ruth K. Crowe
27th August 2021

List of Names or Abbreviations

ACECQA:	Australian Children's Education and Care Quality Authority
ADG:	Australian Dietary Guidelines
HAAND:	Healthy Afterschool Activity and Nutrition Document
HAPI – PA:	Healthy After-school Program Index for Physical Activity
HAPI -N:	Healthy After-school Program Index for Nutrition
HE:	Healthy eating
HEPA:	Healthy eating and physical activity
ISLHD:	Illawarra Shoalhaven Local Health District
LHD:	Local Health District
LPA:	Light physical activity
MVPA:	Moderate-to-vigorous physical activity
NQF:	National Quality Framework
NQS:	National Quality Standards
NSW:	New South Wales
OSHC:	Out of school hours care
OOSH:	Outside of school hours
PA:	Physical activity
QA:	Quality area
SEM:	Social ecological model
SOSPAN:	System for Observing Staff Promotion of Physical Activity and Nutrition
SWSLHD:	South Western Sydney Local Health District
US:	United States

Statement of this thesis

This thesis has been prepared in accordance with the journal article compilation style format and in support and agreement of my PhD supervisors. The journal article compilation style was deemed suitable for this thesis as it allowed for the findings within this thesis to be disseminated quickly and publicly with health promotion officers supporting from within the Local Health Districts who support out of school hours (OSHC) services, policy makers and researchers.

Each research chapter within this PhD thesis has been accepted for publication (*Chapter 3 , 4 and 7*) or is currently under review (*Chapter 5 and 6*) with peer-reviewed journals. Manuscripts have been presented as they were submitted. Vancouver referencing style has been used throughout this thesis.

Publications constituting this thesis

This thesis consists of five manuscripts. Four of which have been accepted or published within peer reviewed journals:

Chapter 3 (Appendix A)

Crowe, R, Probst, Y, Weaver, R, Beets, M, Stanley, R, Kemp, B, & Okely, A. 2021. Systematic observation of healthy eating environments in after school services: A cross-sectional study. *Public Health Nutrition,* 1-20. doi:10.1017/S1368980021003220

Chapter 4 (Appendix B)

Crowe, R, Probst, Y, Norman, J, Furber, S, Franco, L, Stanley, R, Vuong, C, Franco, L, Wardle, K, Davies, M, Innes-Hughes, Ryan S, Okely,, A. 2020. Healthy eating and physical activity environments in out of school hours care: an observational study protocol, *BMJ Open*, 10:e036397.doi:10.1136/bmjopen-2019-036397

Chapter 5

Crowe, R, Probst, Y, Norman, J, Stanley, R, Ryan S, Vuong, C, Hammersley, M, Wardle, K, Franco, L, Beets, M.W, Weaver R.G, Davies, M, Innes-Hughes, C, Okely, A. 2022. Foods and beverages provided in out-of-school-hours care services: an observational study. *BMC Public Health*. Accepted 25 January 2022.

Chapter 7

Crowe, R, Probst, Y, Stanley, R, Ryan S, Weaver, R, Beets, M, Norman, J, Furber, S, Vuong, C, Hammersley, M, Franco, L, Wardle, K, Davies, M, Innes-Hughes, C, Okely, A**.** 2021. Physical activity in out of school hours care: Findings from an observational study, *Int J Behav Nut Phys Act* DOI:10.1186/s12966-021-01197-6. (Accepted 30 August 2021).

One manuscripts are currently under review in peer reviewed journals:

Chapter 6

Crowe, R, Probst, Y, Norman, J, Furber, S, Stanley, R, Ryan S, Weaver, R, Beets, M, Vuong, C, Hammersley, M, Franco, L, Wardle, K, Davies, M, Innes-Hughes, C, Okely, A . 2021. Exploring healthy eating and physical activity policies and staff practices in out-of-school-hours services: a cross-sectional study. *Public Health Research and Practice* (under review).

Authors contributions to publications

The greater part of the work involved within this thesis is directly attributable to Ruth Crowe, the PhD candidate. Ruth's PhD was funded partly by the NSW Ministry of Health through the Prevention Research Support Program (PRSP) research funding. As such, a working party was developed to collaborate with members from the Local Health District (research partners), who appear as co-authors on four of the five chapters. However, all of the observations, data collection, training of data collectors, analysis, interpretation and reporting were conducted solely by Ruth Crowe, in keeping with the requirements of the PhD candidature. The statement of contribution for each peer-reviewed article in this thesis are as follows:

Article 1 (Chapter 3)

Crowe, R, Probst, Y, Weaver, R, *et .al*. 2021. Systematic observation of healthy eating environments in after school services: A cross-sectional study. *Public Health Nutrition,* 1-20.

Ruth Crowe was the PhD candidate who managed the day to day running of the study, data collection, data entry, data analysis, interpretation and write up of the manuscript. Yasmine Probst and Rebecca Stanley were PhD supervisors who contributed to the study design, provided research support, interpretation of the data, revised and edited the manuscript. Michael W. Beets and R. Glenn Weaver were investigators of the study. They contributed to the study design, provided data collection training, managed data, interpretation, revised and edited the manuscript. Byron Kemp provided statistical support in selecting appropriate statistical tests.. Anthony D. Okely was the chief investigator of this study. He contributed to the study design, provided research support, interpretation, revised and edited the manuscript. All co-authors read and approved the final version of the manuscript.

Article 2 (Chapter 4)

Crowe, R, Probst, Y, Norman, J, *et.al.* 2020. Healthy eating and physical activity environments in out of school hours care: an observational study protocol, *BMJ Open*, 10:e036397.

Ruth Crowe was the PhD candidate on this study, who worked with the research team to develop the study design and methodology. Ruth led the recruitment of participants, data collection and training of data collectors. Yasmine Probst and Rebecca Stanley were PhD supervisors, who contributed to the study

design and provided support through the development of this study. Jenny Norman, Susan Fusber, Lisa Franco, Cecilia Vuong, Karen Wardle, Christine Innes-Hughes, Marc Davis were part of the Prevention Research Support Program (PRSP) working committee, offering insight and context of Local Health Districts. They also revised and made editorial contributions to this manuscript. Sarah Ryan was the project manager who provided administrative support through the development of this study. Anthony Okely was the chief investigator and PhD supervisor on this project, contributing to the study design, methodologies and provided support through the development of this study. All co-authors read and approved the final version of the manuscript.

Article 3 (Chapter 5)

Crowe, R, Probst, Y, Norman, J, *et. al*. 2021. Factors associated with providing healthy foods and beverages in out-of-school-hours services: an observational study. *BMC Public Health*.

Ruth Crowe was the PhD candidate on this study, she has worked with the research team to develop the study design and methodology, led data collection, trained data collectors, conducted data analysis, data management, data cleaning, interpretation and write up of the manuscript. Yasmine Probst and Rebecca Stanley wer PhD supervisors on this project. They contributed to the study design, methodologies, coding of the data and interpretation of the findings. Michael Beets and Glenn Weaver contributed to the study design and training in data collection protocols. Jennifer Norman, Susan Furber, Lisa Franco, Megan Hammersley, Cecilia Vuong, Karen Wardle, Christine Innes-Hughes, and Marc Davis were a part of the Prevention Research Support Program (PRSP) working committee, offering valuable insight and context of Local Health Districts. Sarah Ryan was the project manager who provided administrative support through the development of this study. Anthony Okely was the chief investigator and PhD supervisor on this project, contributing to the study design, methodologies and provided support through the development of this study. All co-authors read and approved the final version of the manuscript.

Article 4 (Chapter 6)

Crowe, R, Probst, Y, Norman, J, *et.al*. 2021. Exploring healthy eating and physical activity policies and staff practices in out-of-school-hours services: a cross-sectional study. *Public Health Research and Practice*.

Ruth Crowe was a PhD candidate of this study and worked with the research team to develop the study design and methodology, led data collection, trained data collectors, conducted all data analysis, interpretation and write up of this manuscript. Yasmine Probst and Rebecca Stanley were PhD supervisors on this project. They have contributed to the study design, methodologies, coding of the data and interpretation of the findings. Michael Beets and Glenn Weaver contributed to the study design, methodology and training in data collection protocols. Jennifer Norman, Susan Furber, Lisa Franco, Megan Hammersley, Cecilia Vuong, Karen Wardle, Christine Innes-Hughes, and Marc Davis were a part of the Prevention Research Support Program working committee, offering valuable insight and context of Local Health Districts. Sarah Ryan was the project manager who provided administrative support through the development of this study. Anthony Okely was the chief investigator and PhD supervisor on this project, contributing to the study design, methodologies and provided support through the development of this study. All authors have read and approved the final manuscript.

Article 5 (Chapter 7)

Crowe, R, Probst, Y, Stanley, R, *et.al.* 2021. Physical activity in out of school hours care: Findings from an observational study, *Int J Behav Nut Phys Act*.

Ruth Crowe was a PhD candidate within this study and has worked with the research team to develop the study design and methodology, led data collection, training, analysis, interpretation and write up of this manuscript. Yasmine Probst and Rebecca Stanley were PhD supervisors and co-investigators on this project. They contributed to the funding support, study design, provided expertise on physical activity specific measurements, interpretation of the data and provided support through the development and revised the manuscript. Sarah Ryan is the project manager who has provided administrative including assisting with data management and revision of the manuscript. Jennifer Norman, Susan Furber, Lisa Franco, Megan Hammersley, Cecilia Vuong, Karen Wardle, Christine Innes-Hughes, and Marc Davis were a part of the Prevention Research Support Program (PRSP) working committee, offering valuable insight and context of Local Health Districts. Professor Anthony Okely is the chief investigator of this study, contributing to the funding support, study design, methodologies and was a PhD supervisor on this project. All co-authors read and approved the final version of the manuscript.

The candidate and all co-authors hereby agree with the author contributions statement

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Chapter 1: Introduction

Out of school hours care (OSHC) services cater for primary (elementary) school children, aged 5 to 12 years, during the hours before (approx. 06:30 – 08:30) and after school (15:00 -18:00) on weekdays through the school year; as well as pupil-free days and school holidays (also known as vacation care) (approx. 07:00 – 18:00).[1] During this time period OSHC provides children with several meals and mid-meal (e.g. breakfast, morning tea and afternoon tea);[2] as well as opportunities for indoor play (e.g. craft, board games, reading, recreational screen-time or dress-ups) and physical activity both indoors and outdoors, which could include child-led free play (e.g. physically active play that is directed by child choices and imagination) or staff-led organised play (e.g. physical activity that is organised and lead by an adult/ staff member and often has several rules and specific objectives). The need for care beyond the school hours (09:00 -15:00) has increased over the last 15 years, with the number of child enrolments expanding from 162,000 in 2002,[1] to 456,850 children in 2018. OSHC is the second largest childcare setting in Australia, with children spending an average of 11 hours per week at OSHC services. New South Wales (NSW), Australia has the largest proportion of children (144,140, 32%) enrolled in OSHC services[3] and the greatest number of staff employed (over 9,000, 33%).[4] Within NSW, there are no minimum qualifications required to be employed as a childcare provider within an OSHC service,[5] and almost 70% of staff are employed on a casual or part-time basis. [4]

The hours outside of school, especially the after school period, have been referred to as a "critical window" in a child's day for promoting healthy eating and physical activity (HEPA) practices.[6-8] Children often consume a mid-meal (i.e. snack) to sustain them between lunch and the evening meal and have free time to play and be physically active. The after school period (15:00 -18:00) has been considered to be crucial as snacking has the potential to increase servings eaten from essential food groups (fruit, vegetables and dairy)[9] and children have been found to accumulate up to half of their daily steps in the hours after school.[10,13] Research has found that snack foods commonly consumed by Australian children are often highly processed and contain large amounts of added sugars and saturated fats (sweet biscuits (cookies), potato chips (crisps) and sugar sweetened beverages).[14] Similarly, physical activity behaviours during these hours are mostly sedentary, with studies reporting children accrue 84% of their daily screen time and more than 80% of their daily sedentary time in the after school period.[15] This is concerning as Australian children consume less than half of the recommended serves of vegetables, as well as under consume meat, dairy and their alternatives.[16] Only one-quarter (26%) of children (5-12years) achieve the daily physical

activity recommendation of 60 minutes of moderate to vigorous physical activity, and one third (36%) meet the daily sedentary screen time guidelines of no more than 2 hours per day.[17] This is concerning as low levels of physical activity and sub-optimal diets are widely recognised as the most modifiable risk factors of non-communicable diseases such as overweight and obesity.[18]

In 2015, one in four Australian children (5-17 years) were reported to be overweight or obese.[19] Overweight and obesity is a serious public health concern, leading to the increased risk of many chronic diseases that costs the Australian population more than $8.6 billion annually.[19] Globally, sub-optimal diets, including insufficient intakes of whole grain, fruit, vegetables and increased intakes of sodium rich foods, are the leading dietary risk factors;[18] with poor diets accounting for 10% of total mortality rates and disease burden. Energy-dense foods (high in sugar and total fat) and low levels of physical activity can contribute to an energy imbalance, leading to excess weight gain; while the consumption of nutrient dense foods such as vegetables and engaging in daily physical activity can assist in maintaining a healthy body weight and protect against many chronic diseases. National dietary and physical activity guidelines exist to provide Australians with evidence-based recommendations for achieving and maintaining optimal health and wellbeing through every stage of life.

A set of recommendation have been developed to help guide families, educators, and health promoters in supporting children to lead healthy lifestyles and minimise the risk of non-communicable diseases. The Australian Dietary Guidelines (ADG) provide recommendations on eating patterns and serving size of foods and food groups to provide sufficient nutrients required for a healthy and active life.[20] The ADG recommends Australians eat a wide variety of nutritious foods from the five food groups (fruits, vegetables, whole grains, lean meats, dairy and their alternatives); drink plenty of water; and limit intake of discretionary food items (high in added sugar, salt and saturated fats).[20] The Australian 24-hour Movement Guidelines for Children and Young People (5 -17 Years) recommends children accumulate a minimum of 60 minutes of moderate- to vigorous-intensity physical activity (MVPA), break up long periods of sitting and limit sedentary recreational screen time to no more than two hours each day.[21] As after school programs do not have a strict academic focus as is seen in the schools environment but still provide care to a large number of children, programs may be a critical platform to support children in meeting their daily healthy eating and physical activity recommendations. The quality of care provided to children, including the healthy eating and physical activity environments, within OSHC is overseen by the Australian Children's Education and Care Quality Authority (ACECQA).[22]

ACECQA is an independent body that support States and Territory governments to administer the National Quality Framework (NQF) within their area. The NQF was intended to streamline a national accreditation system, quality standard and a national quality rating system across the Australian early childhood and care sector, under which sits OSHC.[23] The NQF was implemented in 2012, and is comprised of several Education and Care Services National Laws and Regulations and a set of National Quality Standards (NQS).[24] The NQS, are made up of several best practice benchmarks including seven quality areas (QA).[25] Healthy eating and physical activity (HEPA) sit under QA 2, Element 2.1.3, which describes potential practices that may be implemented within a service to meet the standards (**Figure 1.1**). For example, healthy eating might be promoted via: staff sitting with children or role modelling positive behaviour during mealtimes. Physical activity may be promoted via scheduling opportunities for planned and spontaneous physical activity and staff role modelling enjoyment in active play.[24] However, these practices are not prescriptive, and rather they provide suggestions on how a service may promote HEPA behaviours while providing a level of autonomy to the service provider. Although written nutrition policies are mandatory within OSHC, there are no specific requirements for what should be included in them. Further to this, there is a lack of clarity surrounding the type, quality, or frequency food groups and beverages are to be offered to children. The NQS require services to "*provide foods consistent with the Australian Dietary Guidelines*", however, it provides no additional information on how a service might achieve these whole of day guidelines within the constraints of a single mid-meal (e.g. afternoon tea) offered at a service.[24] In fact, the only mandatory practices required within the OSHC setting are those dictated by the Education and Care Services National Regulations, which state all services must provide: a) reliable access to drinking water; b) food and beverages must be nutritious and adequate, and account for children's growth and development needs and specific cultural, religious or health requirements; and c) display weekly menus for parents that accurately describe the food and beverages offered by the service.[26] Conversely, there are no minimum best practice benchmarks for physical activity, sedentary or screen-time behaviours mentioned within the OSHC setting, the Education and Care Services National Regulations, nor within NQS. Furthermore, service-level physical activity policies are encouraged, however they are not compulsory.

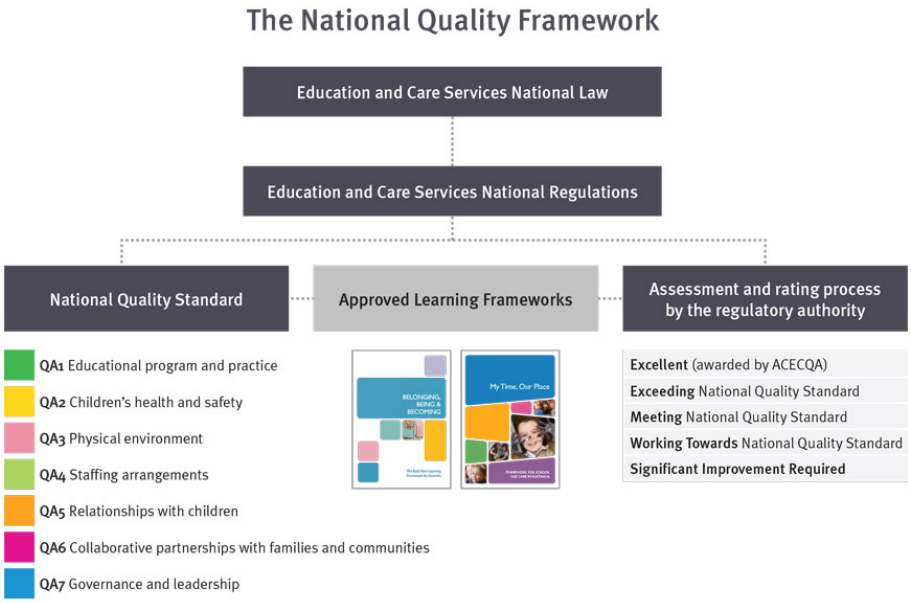

Figure 1. 1 A visual representation of the hierarchical structure and components within the National Quality Framework.[22]

To the author's knowledge, there is limited research on the HEPA environments within the Australian OSHC sector; with most research conducted prior to the introduction of the NQF in 2012. OSHC services have a unique opportunity and substantial reach in providing healthy settings to a large proportion of Australian children, however, the current foods provided and physical activity levels of children attending such services are largely unknown. This thesis examined the HEPA environments within a sample of OSHC services providing care in the hours after school across two diverse local health districts in NSW, Australia. The Illawarra Shoalhaven and South Western Sydney local health districts expand over 6,367.3 square kilometres of vast and diverse landscapes comprising of metropolitan, suburban, regional and rural communities.[27,28] Both local health districts have a varied range of socioeconomic areas throughout their regions, with Illawarra Shoalhaven containing some of the most disadvantaged local government areas, based on Socio-Economic Index, throughout NSW.[27,28] More than 60% of residents within these local health districts are classified as either overweight and obese, with almost a third (28%) of children reported to be overweight and obese.[27,28]

1.1 THESIS AIMS AND RESEARCH QUESTIONS:

Aim 1: *To describe the healthy eating environments within OSHC services.*

Research Question 1:

i. What types of foods and beverages are offered as a part of the afternoon snack?

ii. How do the provided foods and beverages align with the Australian Dietary Guideline recommendations?

iii. How are staff promoting healthy eating practices?

Aim 2: *To investigate the sector-level and setting-level factors associated with OSHC providing foods aligning with the Australian Dietary Guidelines*.

Research Question 2:

i. What environmental factors (social, cost, staff training, facilities, or menu planning) are associated with OSHC providing foods and beverages consistent with Australian Dietary Guidelines?

Aim 3: *To investigate the relationship between healthy eating and physical activity policy environments and staff practices within OSHC services.*

Research Question 3:

i) What is the association between healthy eating policy elements and staff healthy eating practices?

ii) What is the association between the quality of physical activity policies and child physical activity levels?

Aim 4: *To objectively measure physical activity levels of children attending OSHC in the after school period.*

Research Question 4:

i. How active are children who attend OSHC in the after school period?

ii. What proportion of time is spent in sedentary, light, moderate, vigorous and total physical activity?

iii. What proportion of children meet the 30 minutes or more of moderate- to vigorous-intensity physical activity in the afternoon?

iv. What factors are associated with children meeting 30 minutes of MVPA while attending OSHC services?

1.2 OVERVIEW OF THE THESIS

This thesis contains five manuscripts of which three have been accepted and two published in peer-reviewed journals, while two are currently under review. Each manuscript is presented as a separate chapter within this thesis.

Chapter two: Commences with an overview of the theoretical framework of this thesis. This chapter consists of a review of the current literature to provide the context to the after school setting and highlight research gaps within the field.

Chapter three: Addressed *Aim 1* by exploring the healthy eating environments within 12 OSHC services in the Illawarra region of NSW. No known studies had explored the health eating environments since the introduction of NQF in 2012. Therefore, this study answered *Research Question 1* by capturing information about both the foods and beverages offered and staff practices within a sample of OSHC services operating during the after school period. This study also informed the methodology applied in Chapter five.

Chapter four: Presents the methodological approach used within this thesis, consisting of; the study design, recruitment process, eligibility criteria, training, data collection methods, outcome measures, and data analysis.

Chapter five: also addressed part of *Aim 1* and *Research Question 1*, *"What types of foods and beverages are offered as a part of the afternoon snack?"* and described the foods and beverages provided within a larger sample of 89 OSHC services across two Local Health Districts in NSW, Australia. As stipulated by the NQS, OSHC are to provide foods and beverages that align with the Australian Dietary Guidelines. Therefore, this study also addressed *Aim 2* and *Research Question 2*, by investigating the environmental factors that may be associated with OSHC services providing foods and beverages that align with the dietary guidelines. Understanding potential barriers and facilitators to offering healthy food environments within care services is vital for supporting OSHC to improve their practices and create healthier environments for the children attending OSHC in NSW.

Chapter six: This study addressed *Aim 3* and *Research Question 3* by exploring HEPA policies. No known studies had reviewed the association between policy and practices within the OSHC setting in

Australia. This chapter examined if relationships exist between written healthy eating policies and staff practices and investigated the relationship between the quality of physical activity policies and child physical activity levels, consisting of MVPA, total physical activity and sedentary time within OSHC services.

Chapter seven: Addressed *Aim 4 and Research Question 4* by exploring the physical activity environments. Little is known about the current physical activity practices, environments and child activity levels within OSHC services in NSW. Evidence suggests that children can accumulate up to half of the MVPA in the hours after school which can assist in meeting daily MVPA requirements. This chapter investigates the environmental factors associated with children meeting 30 minutes of MVPA while attending OSHC services.

*Chapter eight: C*onsists of a general discussion, key findings, and conclusion of this thesis. This chapter also contains the strengths and limitations and future recommendations for the OSHC setting in NSW, Australia.

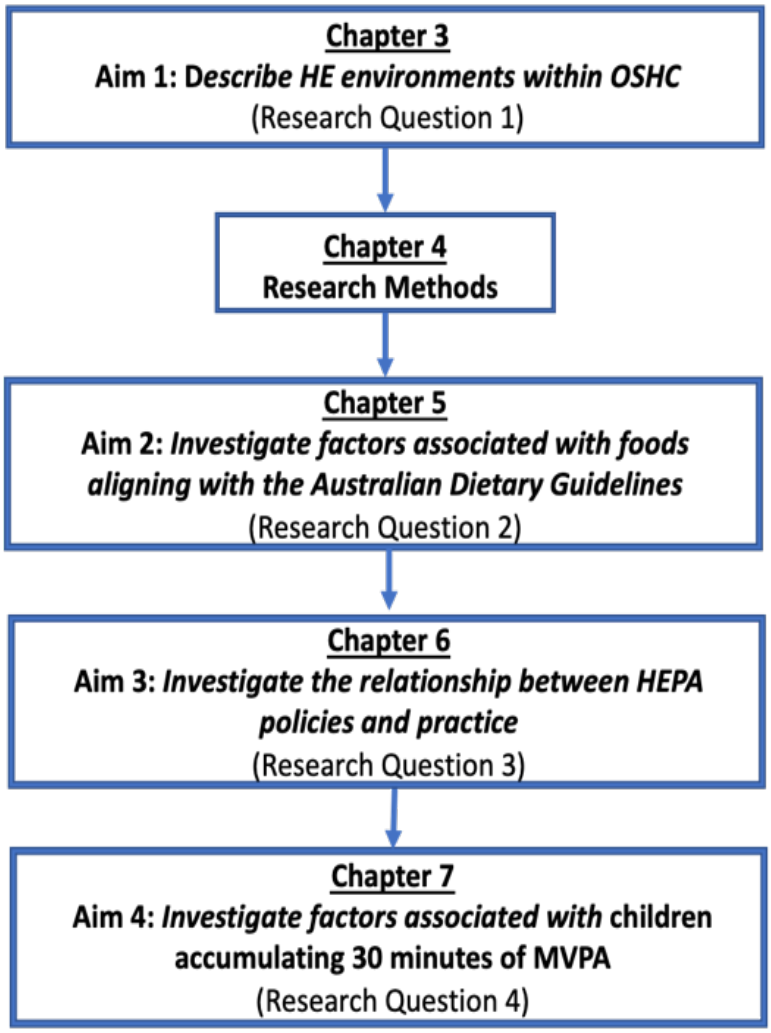

Figure 1. 2 Visual overview of the research study chapters within this thesis.

HE: Healthy eating
OSHC: Out of School Hours Care
HEPA: Healthy eating and physical activity
MVPA: Moderate-to vigorous physical activity

1.3 SIGNIFICANCE OF THE RESEARCH

The after school period has been recognised as an ideal setting to support children's access to healthy foods and beverages and environments which promote physical activity. By creating such environments, OSHC can support children achieve national recommendations by increasing their exposure to essential and under-consumed food groups (vegetables, whole grains and dairy); increasing physical activity levels and reducing time spent sedentary. Although the OSHC sector is the second largest childcare setting in Australia, little research has been conducted in the past 15 years. Therefore, the findings of this thesis will provide valuable insights to inform future practices and policies within a relatively under-reported setting. Furthermore, this research has been conducted in partnership with NSW Ministry of Health and funded through the PRSP. A research team was established consisting of academics from the University of Wollongong and representatives from the research partners (the Illawarra Shoalhaven Local Health District, South Western Sydney Local Health District and the Centre for Population Health). Through this partnership, the PhD candidate has worked alongside the Local Health Districts to ensure that relevant and essential areas have been investigated. This partnership has also provided the opportunity to directly disseminate the research findings to the Local Health Districts (through monthly meetings, seminars and published research) which can improve the practices of health promotion officers, inform policy and resource allocation, development and enhancement throughout these two Local Health Districts.

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Chapter 2: Literature Review

The previous chapter has presented the background to this doctoral thesis and provided an overview consisting of the research that will be addressed throughout this body of work. This next chapter builds upon what was previously presented by providing a review of the literature to establish this thesis within the context of previously published works.

This literature review is guided by the initial phases of the *Behavioural Epidemiological Framework* (Sallis, Owens, & Fotheringham, 2000),[1] as it relates to healthy eating and physical activity (HEPA) in out of school hours care (OSHC), operating in the hours after school (15:00 - 18:00). The Social Ecological Model, as described by McLeroy and colleagues, has likewise been used to further explore a variety of factors that might be associated with HEPA behaviours within the OSHC childcare setting (Figures 2.1 and 2.2).

The Behavioural Epidemiological Framework is a multi-step, structured system of research designed to establish understanding of health-related behaviours in order to develop strategies that can influence positive change.[1,2] This review explores what is known of HEPA environments within OSHC services both within Australia and internationally, b) identifying methods of measurement, c) exploring what influences HEPA behaviours, and d) examining interventions addressing healthy eating and physical activity within OSHC services. This thesis predominately focuses on phase three of the behavioural epidemiological framework, exploring correlates of healthy eating and physical activity in children attending OSHC which will support the future development of evidence based interventions.

2.1 HEALTHY EATING AND PHYSICAL ACTIVITY IN OUT OF SCHOOL HOURS CARE

Childcare settings have been widely recognised as valuable health promotion platforms to provide healthy environments and role model positive health behaviours to children.[2] Although a considerable amount of research has targeted the Australian early childhood education and care (ECEC) (birth to 5 years) and school settings, out of school hours care (OSHC) has largely been overlooked. OSHC provides care to primary aged children (5 -12 years old), it is the second largest childcare setting within Australia, providing care to over 450,000 children.[3]

In Australia, few studies have reported on the healthy eating environments within OSHC service, and none within the last 15 years. Several studies have been conducted within after school programs internationally, most of which have occurred in the United States (US) and suggest that the quality of food and beverages provided is often highly processed and low in fruits and vegetables.[4–9] Numerous US studies have reported the most frequently provided foods offered within after school programs consisted of: desserts (cookies, cakes, candy, frozen desserts), salty snacks (chips/crisps, pretzels) and sugar sweetened cereal (fruit loops); while, fruits and vegetables were seldom offered.[4–9] Similarly, beverages provided often included flavoured milk or juice (fruit juice, fruit drink) while water was rarely offered;[4–6,9] and few services possessed written nutrition policies.[5,6,9] These findings are similar to early Australian studies conducted in OSHC services across NSW and Victoria.[10–12] Despite OSHC services reporting offering bread and cereal, fruit, milk and cheese and yoghurt each week, discretionary foods (cakes, chips, pastries and lollies) and drinks (cordial/ soft drinks and juice) were reported more frequently than vegetables and water.[10,11] Similar to US after school programs, few Australian services possessed nutrition policies, used written food menus, or provided opportunities for staff professional development training.[10,11] In an observational study conducted by Sangster et al. (2004)[10] OSHC staff did not discuss healthy eating, engage children in food preparation activities (e.g. cooking) or role model healthy eating behaviours (e.g. sitting and eating with children) during meal times.[14] These studies demonstrate that the healthy eating environments within OSHC might be less than optimal and may require additional support.

Similarly to healthy eating, studies have found physical activity environments within after school programs are not meeting national benchmarks, especially for MVPA.[13–19] Australia recently adopted 24-hour movement guidelines which recommend, for optimal health and development, that children should accumulate a minimum of 60 minutes of MVPA each day for optimal health and development.[20] However meeting these guidelines within school hours has proven difficult, due to relatively short recess breaks and limited opportunities for physical education classes, highlighting the vital role after school programs can have on promoting physical activity in children.[21] In the US, the National Afterschool Association called upon all after school programs to provide enough physical activity for all children to accumulate up to half (30 minutes) of their daily MVPA requirements.[22] The introduction of this policy led to numerous research studies assessing child physical activity levels and environments within after school programs throughout the US.[13–19] However, a systematic literature review and meta-analysis consisting of 14 studies exploring accelerometer-derived physical activity levels in after school programs,

reported that these programs were falling short of achieving physical activity policy benchmarks, with children spending an average of 23.5 minutes in MVPA and 25.9 minutes sedentary.[15] Only two studies have explored physical activity environments within Australian OSHC and none of which used accelerometry data. A survey study targeting OSHC services HEPA practices was conducted within the state of Victoria, in 2002. Just over half of the services (62%) provided opportunities for outdoor play, 46% offered organised activities (e.g. sport), 37% allowed recreational screen time (e.g. movies/computer games) and 30% provided staff with physical activity related training.[11] More recently, a cross-sectional observation study conducted within 23 OSHC services in Adelaide, South Australia,[23] reported opportunities for MVPA fluctuated considerably across the study sample. Children spent an average of 18% of program time in MVPA (ranging from 4 to 49%), of session time while an average of 61% of program time was spent sedentary (ranging from 31 to 79%) across all services. The study reported that during physical activity sessions, staff were most commonly participating in "other duties" and were not observed to engage in physical play with children (16%), verbally promote physical activity (12%) or lead games (11%). Recreational screen-time was regularly permitted (TV, movies or computer games) during program time, accounting for 17% of program time (ranging from 0 to 41%) and physical activity policies were not common within either study. While surveys and observational data are useful for gathering important contextual information, they are not without their limitations. There is a need for additional physical activity data, captured at the child-level, to further investigate the physical activity environments within OSHC services in NSW. Accelerometry data could be used to investigate possible relationships between environmental factors and children accumulating at least 30 minutes of MVPA while in OSHC. Such evidence can be used to support and inform future policies, interventions as well as resource distribution within this important childcare setting.

2.2 PREVALENCE AND PATTERNS OF HEALTHY EATING

The Australian Dietary Guidelines recommend that Australians eat a wide variety of foods from the five food groups (vegetables, fruits, grains, lean meats and milk, yoghurt and cheese), drink plenty of water and limit discretionary foods and beverages, which are often high in salt, saturated fats and added sugars.[24] However, most Australians are not meeting these guidelines. Children (4-13 years) also fall short of meeting dietary recommendations, with a very small proportion consuming adequate amounts of essential food groups, including: vegetables (4%), lean meats (0.2%), and milk, yoghurt and cheese (6.4%).[25] In contrast, children receive up to 40% of their daily energy intake from discretionary

foods.[25] Research has identified that the main contributors of discretionary foods to energy in children's diets consist of: cakes, sweet biscuits (cookies), potato crisps, processed meats and sugar sweetened soft drinks.[26,27] The overconsumption of energy dense foods can lead to an energy imbalance resulting in the development of overweight or obesity.

Overweight and obesity in children is one of the most serious public health issues of the 21st century.[28] In 2018, one quarter (27%) of Australian children (5 -17 years) were classified as either overweight (17%) or obese (8%). Although these numbers have plateaued somewhat in last two decades, these high proportions remain concerning as overweight and obesity during childhood can lead to an increased risk of serious health conditions including hypertension and insulin resistance[29,30] as well as psychological issues such as depression, anxiety and low-self-confidence.[30,31] The adequate consumption of vegetables and fruit has been recognised as essential for preventing the risk of overweight and obesity.[32] As childhood dietary habits often progress into adulthood, it is imperative that children are provided regular access to a wide variety of fruit and vegetables early in life.

The consumption of snack foods throughout a child's day is prevalent within Australia. More than 96% of Australian children were recorded to consume approximately two to three snack occasions per day, with the proportion of children consuming more than four snack occasions increasing from 7% in 1995 to 30% in 2012.[33] Snacks between meals can positively improve the quality of a child's diet, increasing exposure to fruit, vegetable and whole grains. However, snacking has been linked to an increase in total dietary energy and weight gain in children. [34–36] Snack foods consumed by Australian children are found to be high in added sugars and saturated fats, frequently consisting of cookies, brownies and savoury snacks, and contributing to almost 34% of a child's total daily energy intake.[37,38] Further to this, snacking in the afternoon period (14:30 -17:30) has also increased, with snack foods contributions to total energy increasing from 22.8% in 1995 to 30% in 2012.[33]

2.3 MEASURING HEALTHY EATING IN OSHC

Several measures have been used to capture healthy eating practices and behaviours. Due to the multi-dimensional and complex nature of healthy eating environments, studies have employed several different methods to capture numerous aspects in the healthy eating environments within OSHC. Direct observation has been the most used method in the literature. Ten studies have employed direct

observation methods to recorded the types of foods and beverages provided to children by documenting brands, food packaging, as well as additional information (e.g. fresh, frozen or canned), and serving styles (individually portioned or family/ platter style).[5,6,9,10,12,39–43] Other studies have used direct observation methods to estimate the proportion of food and beverages consumed (e.g. none, 25%, 50%, 75%, 100%) within small samples of children attending OSHC (e.g. five boys and five girls).[5,43] Although this method can be useful for estimating the amounts of foods consumed, it also requires extensive data collection training to ensure a high level of accuracy.[44]

Further to capturing food data, direct observation has also been used to record staff and child behaviours during meal-times, documenting child involvement in food preparation activities (e.g. cooking, cleaning up after the meal or distributing food to peers).[41,45] Staff interaction with children during meal times, including positive interactions, including staff sitting and eating with children, discussing healthy eating and educating children in food choices/nutrition education, and negative interactions, including rewarding children with sweets/candy/lollies, discouraging healthy eating (i.e. speaking negatively about healthy food) and role modelling poor food and beverage choices (consuming discretionary foods and beverages) in front of children were also observed.[10,41,45] In addition, observations often captured and recorded kitchen facilities and equipment available for food preparation (e.g. oven, sink, bench space, storage),[10,12,40,41] the use of food menus, if they were displayed and consistent with what was offered.[10,12] Unlike self-reported methods or menu reviews, direct observation can provide an accurate depiction of foods offered and behaviours practiced,[5] and they have a reasonably low participant burden.[44]

Other methods for capturing healthy eating environments within OSHC have included policy reviews, most commonly assessed with the Healthy Afterschool Activity and Nutrition Document (HAAND) tool.[9,43,46] HAAND is a validated instrument which uses a combination of direct observation, written review of the policy document and short structured interview to capture normal practices, including the quality of food and beverages, child involvement, staff training, assess to vending machines, healthy eating curricula employed and healthy eating evaluation methods (e.g. nutrition calculator). Each field has an associated value that is summed to generate an overall “score”, with higher scores indicating strong policy environments.[46]

The System of Observing Staff Promotion of Activity and Nutrition (SOSPAN) is another observation tool used within the OSHC setting to capture staff HEPA promotion behaviours.[41,47–49] SOSPAN is a validated tool which uses momentary time sampling to systematically capture health promotion behaviours and practices of staff by continuously scanning the physical environment throughout the duration of the after school care program.[50] Healthy eating behaviours captured during the eating context (afternoon tea) of the program by SOSPAN consists of number of staff present, staff nutrition promotion (verbal encouragement of healthy food choices), nutrition discouragement (verbal discouragement of healthy food choices), nutrition education and staff eating/ drinking (inclusive of healthy and unhealthy food and beverage choices).

The use of a widely distributed survey was the least observed method used in the literature. Although surveys can be useful for collecting large amounts of data across a broad audience, to the author's knowledge, only one study used a survey to explore healthy eating environments within OSHC.[11] Surveys are typically not as costly to administer as other methods, however due to self-reported bias they can be less accurate than direct observation methods.[44]

Other dietary assessment methods employed to capture food data in primary aged children (5 -12 years) have consisted of: food frequency questionary, food recalls, weighed food records, and digital photography. Similar to survey, food frequency questionnaires and dietary recalls can be useful in capturing a broad range of dietary data. Traditionally, these methods are completed by parents/ caregivers, however, this method may be unsuitable within the OSHC setting as parents/ caregivers are not commonly present during the mealtime nor do they provide the food children will consume during these hours. Weighed food records are one of the most accurate observation methods, especially when foods are weighed by a trained data collector. However, this method can be expensive, labour intensive and impractical for studies with large sample sizes such as those within a school or childcare setting. Digital photography has often been used in conjunction with other observation methods to capture dietary data.[51] Digital photographs are useful for capturing foods before and after they are consumed and allow for foods to be coded and categorised later in the analysis process. Although this method is inexpensive and easily administered, there is the risk of missing foods which may been spilled, discarded or hidden due to incorrect angles.[44]

2.5 FACTORS THAT INFLUENCE HEALTHY EATING IN OSHC

The socio-ecological model is a useful framework for exploring the healthy eating environments within childcare settings, as it considers the complex relationships between the social, physical and policy environment on behaviours.[52,53] Within this section the social ecological model has been used to consider the multiple factors that may influence a child's access to healthful food and beverages while in care (Figure 2.2).

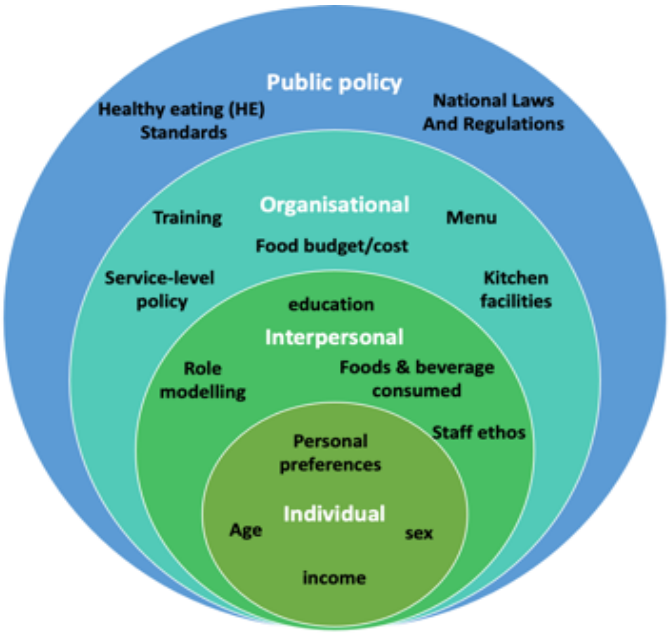


Figure 2. 1 Social-ecological model exploring factors associated to healthy eating environments within Out of School Hours care (OSHC) adapted from the work of McLeroy and colleagues (1988).

In the US, the National Afterschool Association, introduced a set of HEPA standards in 2011. A number of studies have since examined facilitators and barriers that may enable OSHC (e.g. after school programs) to meet the standards. Healthy eating standards call upon services to include a fruit or vegetable and water each day, while eliminating sugar sweetened beverages and foods with trans-fat; as well as staff role-modelling healthy eating to children.[56] Interventions aiming to improve the quality of food and beverages offered within these services primarily targeted service level policy. Four intervention studies worked with after school programs to modify their service level policy to reflect healthy eating standards. Policy changes incorporated clearly worded policy objectives such as "*serve a fruit or vegetable every day*" and "*eliminate sugar sweetened beverages*". Through policy changes the interventions observed a significant increase in the provision of fruits,[57] vegetables and water and a decrease in salty snack foods, desserts, foods containing trans-fats and the elimination of sugar sweetened

beverages. A study by Helmick et al (2019)[43] observed the implementation of the healthy eating standards in a sample of after school programs without the researchers providing any additional intervention to the services. Although the study did find a significant reduction in sugar sweetened beverages, there were no improvements in the servings of fruits, vegetables, water, dairy or whole grain foods at post assessment. The main differences between the findings of these studies could be attributed to the aim of Helmick et al. (2019), which was to observe the natural implementation of healthy eating standards into practice. This is in comparison to other studies, which explored the more active role researchers played, in, working alongside organisations to assist the services to meet the standards.[6,54,57] These findings indicate a voluntary public health policy may not be adequate enough to operationalise sufficient changes to food quality without additional support. This is further seen through a number of successful policy interventions that were supported by additional professional development opportunities (i.e training/ workshops for stuff) upskilling staff with appropriate tools and knowledge to effectively meet the healthy eating standards.[7,55,58] Several studies reported that additional support in the form of professional development or training may be essential for the successful implementation of the healthy eating standards into everyday practices within US OSHC services[41,43] Conversely, intervention studies using only professional development strategies did not increase the offerings of fruit and vegetables between intervention and control groups.[42,59] These findings continue to highlight the complex nature between social, physical and policy environments, reenforcing the importance of clearly stated policy environments (national and at a service-level) coupled with professional development opportunities and on-going support to effectively change the healthy eating environments within OSHC.

A number of studies have targeted environmental factors to create positive healthy eating environments that meet the National Afterschool Association healthy eating standards.[22] The cost of healthful foods has been widely recognised as a barrier to after school programs providing regular access to fruits and vegetables, and meeting the requirements of the healthy eating standards.[5,6,43,54,59] Several studies addressed food costs through partnerships with local food providers or wholesalers who supplied after school programs with discounted or at-cost foods allowing services to meet the requirements of the healthy eating standards within budget.[6,39,54] These studies observed an increase in the servings of dairy, fruits, vegetables and whole grains and the reduction of desserts, salty snacks and sugar sweetened beverages.[6,54] Further to this, a multicomponent, adaptive intervention was developed to integrate HEPA into the daily routine of after school programs, known as “Strategies to Enhance Practice” (STEPs). The healthy eating component of STEPs targets: a) the development of menus that reflect food and beverages

within the standard (i.e. serving a fruit or vegetable, and water), b) the accurate following of the menu, c) budgeting for healthy foods, d) feedback and assistance on how services can make additional improvements, and e) professional development training (role modelling and nutrition education).[48] Four studies reported the impact of STEPs on the quality of the foods offered and staff behaviour. Findings suggest that planning a menu that aligned with healthy eating standards, receiving feedback on healthy eating practices, budgeting for healthful snacks and reducing cost barriers via partnering with local suppliers, significantly increased the frequency services were able to provide fruit, vegetables and water, and reduced the provision of dessert-based foods and sugar sweetened beverages during the afternoon snack.[9,40,47,48,60]

2.6 LEVELS AND PATTERNS OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOURS

Regular physical activity and reducing time sedentary is essential for physical health and disease prevention at every stage of life. Being physically active every day has shown to be especially important in school aged children as it supports physical, social and cognitive health outcomes.[61–64] Systematic reviews have shown strong evidence for a dose response relationship between activities of higher intensity (MVPA) and cardio-metric biomarkers (insulin resistance, blood pressure and cholesterol), aerobic fitness and bone health in children aged 5-17years.[62,63] Based on these reviews, it is recommended that children accumulate a minimum of 60 minutes of MVPA each day for optimal health and disease prevention.[62,63] These findings have assisted in shaping the Australian 24-hour Movement Guidelines for Children and Young People (5-17 years), which recommend that children accumulate 60 minutes of MVPA, break up long periods of sedentary activities and not exceed two hours of sedentary based recreational screen time per day.[65] Only one-quarter (26%) of Australian children (27% boys and 25% girls) achieved the physical activity recommendation and a third (36%) met screen time guidelines (30% boys and 40% girls), with children spending an average of two hours a day in recreational screen time.[66] This is concerning as low levels of physical activity and high amounts of sedentary behaviours (such as TV viewing) are associated with cardiovascular disease risk factors, poor body composition and low self-esteem in primary aged children.[67]

The after school setting, characterised between 15:00-18:00, has been recognised as an important time in a child's day to accumulate up to half (a minimum of 30 minutes) of their recommended MVPA.[68] However, when at home during these hours, children are able to make discretionary behaviour choices

and can accrue more than 80% of their recommended sedentary based screen time activities;[21,69,70] identifying just how critical these hours are. Centre based care is widely recognised for its role in health promotion and are ideal settings for offering physical activity opportunities and reducing time spent sedentary. Systematic reviews have reported children attending after school programs accumulate an average of 23.5 minutes in MVPA and spend less than 45% of the time sedentary; substantially lower than the 60% of sedentary based activates observed within the school settings.[15]

2.7 MEASURING PHYSICAL ACTIVITY IN OUT OF SCHOOL HOURS CARE

A number of studies have used various direct measures (e.g. accelerometers, pedometers or direct observation) to capture the different intensity levels (sedentary, light, moderate and vigorous activity) of children's physical activity and sedentary behaviours in after school care settings. Of these, accelerometers, have been the most frequently observed within 17 studies.[18,71,80–86,72–79] These studies used a range of epochs from one second to 30 seconds cut-points to convert the outputs into estimates of physical activity intensity. The Evenson cut point (SED: ≤ 100; LPA > 100; MPA: ≥ 2296; VPA≥ 4012 counts per/minute),[87] was the most frequently used in 11 of the 16 studies.[18,60,77,83–85,88–90] Evenson cut points have been recognised as the most accurate for all four intensity levels (sedentary, light, moderate and vigorous activity) for primary aged children.[91]

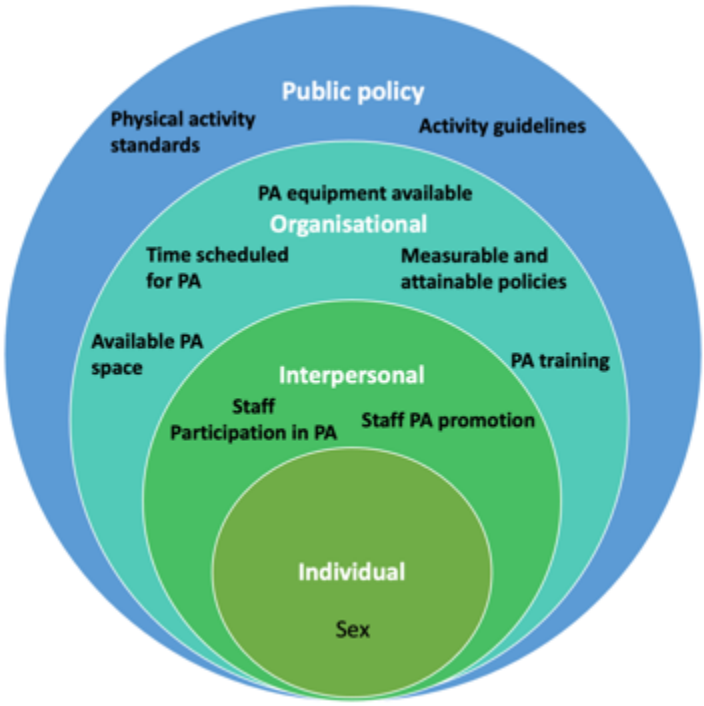
Other direct measures used within the after school setting include observational tools which consist of the System for Observing Play and Leisure (SOPLAY)[4,86,92–94] and the System for Observing Fitness Instruction Time (SOFIT).[4,42,94] These tools use momentary time sampling methods to capture physical activity levels, scanning an area from left to right and coding children's behaviours into predefined categories, such as sitting, standing, walking or very active. Observational tools are able to capture several environmental variables, which can provide additional context to physical activity environments (e.g. activity types, staff behaviour, equipment available) which other objective measures (e.g. accelerometers) are unable to capture.

The most frequently used systematic observation tool, designed to capture a variety of behavioural and environmental factors relating to physical activity promotion within the out of school hours care setting, is the System of Observing Staff Promotion of Activity and Nutrition (SOSPAN), observed within ten studies.[16,48,97,50,75,77,80,83,92,95,96] SOSPAN is a validated tool, which uses momentary time sampling to

systematically rotate through designated areas of the OSHC, continuously scanning for the duration of the program, to capture physical activity promotion practices of staff and environmental contexts.[50] SOSPAN captures a number of behavioural and environmental indicators, including the types of activities in which children and staff are engaged in (i.e. soccer, dodgeball or dance), equipment available (i.e. balls, bats, music or jump ropes), total amount of equipment available (total sum of equipment available), activity contexts (organised activity or free play) and staff involvement (i.e. supervising, actively engaging or instructing/ leading activity). SOSPAN allows the proportion of time spent in different activities to be calculated, providing insight into how OSHC designates time to different activities (physical activity, homework, or nutrition education) and how frequently promotion/ discouraging behaviours are practiced. Studies have used SOSPAN in conjunction with activity devices (e.g. accelerometers) to ensure both child activity levels and environmental contexts are captured.[16,48,97,50,75,77,80,83,92,95,96]

2.8 FACTORS THAT INFLUENCE PHYSICAL ACTIVITY IN OUT OF SCHOOL HOURS CARE

Within this section the social ecological model was used to review the broader literature to explore known factors associated with physical activity levels of children attending OSHC services, e.g. after school programs. Several studies have reported various behavioural, social and environmental factors that may be associated with children's physical activity practices, as shown within Figure 2.3.



PA, physical activity

Figure 2. 2 Social-ecological model exploring factors associated to physical activity within Out of School Hours care (OSHC) adapted from the work of McLeroy and colleagues (1988).

Studies have found scheduling time for physical activity within the daily program is essential for children to be active, and has been positively associated with children accumulating higher levels of MVPA and reduced sedentary time.[16,98,99] A study by Brazendale et al (2015)[78] investigated the optimal amount of time after school programs should designate to physical activity. They found that allocating 60 minutes of program time to physical activity was sufficient to achieve the maximum amount of MVPA; while longer periods of time (e.g. 75 min or 105 min) were unable to yield any higher amounts of MVPA.[78] The availability of outdoor space has been associated with child physical activity levels.[18,83,86] One study reported that every 5000ft square (464.52 m^2) of indoor space was associated with an additional 2-3 minute increase in sedentary activities, while every acre (4046.86 m^2) of outdoor space available was associated with an addition 2.7min of MVPA.[83]

The type of activities scheduled have been found to directly impact on child activity levels. Five studies reported that children accumulate significantly more minutes in MVPA and spent less time sedentary when programs scheduled time for child-led free play compared to service only offering staff-led organised activities.[4,13,16,72,83] Such findings could be due to the structured approach adults have towards active games, which can result in children spending longer periods of time idle, due to activity set-up, time required for instructions or lining up to wait their turn to play, all of which reduces the time children have to be active.[95] However, some studies have maintained the importance of using a combination of staff-led organised activities along with free-play, as staff-led organised games has been suggested to increase physical activity levels particularly for girls.[93,100] This is important as sex has been strongly associated with physical activity differences in the hours after school, with numerous studies reporting girls accumulate significantly less moderate and vigorous active minutes compared to boys.[17,18,71,73,101,102]

Additionally, staff involvement in active play can positively impact child physical activity levels. Numerous studies have recognised the impact that staff, when trained in physical activity promotion practices, can have on supporting children to increase their physical activity while in OSHC.[60,90,93,98,103] Staff involvement in physical games and the use of verbal encouragement during activity sessions has resulted in children engaging in significantly more minutes of MVPA.[93,97] Moreover, professional development training has increased child physical activity intensity levels by significantly increasing

minutes spent in vigorous physical activity, without extending the time allocated to the activity post-intervention.[103] In addition to staff professional development, a number of successful interventions have used multi-level strategies to increase physical activity outcomes in after school programs. Six intervention studies reported to work alongside after school programs to increase the scheduling of physical activity opportunities, conduct staff training and assist services to write clear, measurable service-level policies. Such strategies were successful in increasing MVPA and reducing sedentary behaviours in children.[74,77,79,81,104,105]

2.9 Gaps in the literature:

OSHC is a fast-growing childcare setting which has been recognised for its critical role in the promotion of heathy eating and physical activity among children. As identified throughout this review of the literature, a number of studies have been conducted internationally, while limited research exists from within the Australian context.

OSHC services commonly provide children with an afternoon snack or mid-meal. As highlighted throughout the literature, these mid-meals often consist of energy-dense food and beverages with an absence of fruit or vegetables. Although a number of studies have explored healthy eating environments in afterschool care programs, these findings are largely based on research conducted in childcare services across the USA, with no Australian study reporting on the types of foods or the promotion practices of staff in more than 15 years. Further to this, the hours afterschool (15:00 – 18:00) have been identified throughout the literature as an important time in a child's day to accumulate up to half (30 minutes) of the recommended amount of moderate-to-vigorous physical activity. While evidence from a systematic literature review found children attending afterschool programs spent an average of 23.5 minutes active while in care, this data was predominantly based on studies conducted outside of Australia. Although one Australian study was recently published, it only captured observational data to estimate the time spent in moderate to vigorous physical activity, demonstrating the need for further research using objectively measured physical activity within OSHC services across NSW.

Finally, there was substantial evidence to suggest the power policy has in making changes to the quality of foods and activity levels within childcare facilities. However, the current relationship between policy elements and healthy eating or physical activity outcomes within Australian OSHC services is virtually unknown. Therefore, there is a need for further exploration of the current healthy eating, physical activity and policy environments within NSW OSHC services which may be extremely useful in the development of evidence based training modules, resources and policy requirements.

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Chapter 3: Systematic observation of healthy eating environments in after school programs: a cross-sectional study

The previous chapter has provided an overview of the current literature related to this thesis. The following chapter contains a published cross-sectional study, which sought to explore the healthy eating environments within a sample of OSHC services in the Illawarra region of NSW.

The following aim and research questions have been addressed in this chapter:

Aim 1: *To describe the healthy eating environments within OSHC services operating in the hours after school*.

Research Question 1:

i. What types of foods and beverages are offered as a part of the afternoon snack?
ii. How do provided food and beverages align with the Australian Dietary Guideline recommendations?
iii. How are staff promoting healthy eating practices?

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3.1 INTRODUCTION

Australian children, aged 5 -12 years, are consuming inadequate amounts of vegetables, whole grains, dairy, and lean meats,[1] yet they far exceed the recommended amounts of discretionary foods; which are energy dense and often high in added sugars, saturated fats or sodium. Creating supportive environments within education and care settings may be critical for establishing and promoting positive health behaviours in children. In Australia, more than 450,000 children, aged 5 - 12 years, attend out of school hours care (OSHC) each year;[2] it is the second largest childcare setting, which increased in enrolments by 28% between 2014 and 2018.[3] OSHC provides care on weekdays before (06:30 -08:30) and after school (15:00 -18:00) and vacation care programs (07:00 -18:00) during school holidays. OSHC offers breakfast and an afternoon snack as part of their services. Healthy eating environments and the quality of the foods and beverages offered within OSHC, is regulated by the Australian Children's Education and Care Quality Authority under the National Quality Framework.[4]

The National Quality Framework (NQF) and its seven National Quality Standards (NQS) exist to improve the quality and consistency of care provided in childcare services nationally.[4] NQS comprise of a set of best practice standards that Early Childhood Education and Care services must work towards in order to meet the requirements of the NQF. As described within Quality Area 2, Element 2.1.3 of the NQS,[5] OSHC services might promote healthy eating environments via a number of ways which may consist of: providing foods and beverages consistent with the Australian Dietary Guidelines; engaging children in experiences and conversations that promote healthy and balanced lifestyles; using cooking experiences to educate children in nutrition; sitting with children during meal times and modelling healthy eating and nutrition practices; and providing regular drinking water.

Few studies have reported on the foods and beverages provided to children or the staff promotion practices within the Australian OSHC, and none have been published since the implementation of the NQF in 2012. Studies conducted prior to 2004, described OSHC to regularly offer discretionary food and beverages (e.g. cakes, biscuits, chips, pastries, cordial and soft drink), limited opportunities for fruit or vegetables and few opportunities for staff nutrition training.[6,7] Despite the limited Australian research, numerous studies conducted in after school programs in the United States (US) also reported less than optimal food environments during the after school time period.[8–12] These studies found that after school programs frequently offered discretionary foods (e.g. desserts, salty snacks and sugar-sweetened

beverageages), limited access to fruit or vegetables and rarley observed staff engaging in healthy eating promotion practices.[8–10,12]

The frequent availablity of energy dense snacks within this setting is concerning due to their associated risk with weight gain.[13] The quality of foods available to children after school is important as they are often hungry during the afternoon[14,15] and are more likely to choose palatable food options.[16] As snacks between meals can contribute up to 25% of a child's daily energy intake,[17] understanding the types of foods and beverages offered within OSHC is important, especially in the after school time period.

OSHC is a fast growing childcare setting. As OSHC continues to grow, it has the potential to reach a large number of children. As limited research has been published within OSHC environments since the implementation of the National Quality Framework, it is essential to understand the current food environments within this setting. This study, therefore, aimed to describe the healthy eating environments within a sample of OSHC services operating in the hours after school in NSW, Australia by observing if: a) provided foods and beverages were consistent with the Australian Dietary Guidelines; b) healthy eating was promoted to children; c) cooking was used to educate children in nutrition; d) staff role modelled healthy eating practices and; e) water was regularly offered to children.

3.2 METHODS

3.2.1 Study design, sampling and ethics

A cross-sectional study was undertaken in partnership with a not-for-profit community-owned, child education care and recreation provider. The total number of OSHC programs operated by the organisation operating between 15:00 and 18:00hr, which provided care to primary school aged children (5-12years), led by employed carers, and offering afternoon tea (herein referred to as a "snack") to attending children were eligible to participate in this study. The STROBE checklist[8] was used to guide the reporting of this observational study.

Written informed consent was obtained from the Director of each participating OSHC service (Appendix C). Due to the observational nature of the research an opt-out approach was applied for staff and children (Appendix D). All parents, guardians and staff were notified of the study internally by their OSHC director. Further to this, the study was advertised via posters, information sheets and opt-out forms, that

were situated at all entries, exits, sign-in/out stations and notice boards, within each service for a minimum of two-weeks prior to the data collection period. All parents, guardians, children and staff had the opportunity to opt-out at any point of the research. Ethical approval was received from the University of Wollongong Ethics Committee (2016/268).

3.2.2 Data collection procedures

Each OSHC was visited on four occasions by two data collectors. To reduce the risk of changes to usual practice, visits were unscheduled and completed over non-consecutive weeks[8,9] between April and August 2017.

The physical locations in which the programs operated were coded as school, community centre, fitness centre, church, long-day care facility or other.[18] Food preparation areas (i.e. kitchens) available to the services were inductively coded as a small kitchenette (a sink and refrigerator with limited bench space and food storage), medium (sink, refrigerator, microwave, bench space and food storage), large (full kitchen: sink, refrigerator, microwave, oven, stove, dishwasher, bench space and food storage) or as a school canteen (a large, industrial kitchen area with facilities to support food preparation for a primary school).

Food and beverages offered by the OSHC, were recorded each day via direct observation by a trained data collectors. The observations provided an estimation of the food groups *offered* to children, rather than the amount of foods *consumed* by the children. Labels, branding, packaging and serving style were systematically observed and recorded following a standardised protocol (Appendix E).[8],[10] If cups of water or water stations were available to the children, then it was noted that water was available.[10,12] Foods and beverages were categorised as discretionary items according to the Australian Health Survey food classification system,[19] the Australian Dietary Guidelines[20] and the discretionary food flags supporting the AUSNUT 2011-13 food composition database. In brief, discretionary foods have been defined by the Australian Dietary Guidelines as those foods "*not necessary for a healthy diet*" and may be consumed "*sometimes and in small amounts*" as they are often high in salt, added sugars and saturated fats. Examples of discretionary foods consist of sweet biscuits (cookies), cakes, desserts (ice-cream), processed meats, chocolate, savoury pastries and pies, fried foods, potato chips/crisps and/or salty/ fatty snack foods, butter and spreads, soft drinks (soda) and cordials, sports and energy drinks.[20,21]

Staff healthy eating-promotion behaviours were observed and documented during meal-times. Behaviours documented consisted of: a) promoting healthy eating (via the use of positive language of healthy food choices, encouraging children to taste and try fruit and vegetables), b) discouraging healthy eating (via the use of negative language of healthy food choices, discouraging children to taste and try fruit and vegetables), c) nutrition education (leading interactive food games, cooking experiences or conversation and activities that promote a deeper understanding of how to make healthier food choices, d) staff sitting and eating with the children (during the snack times) and d) providing children with opportunities to distribute the food (serving food) and giving children the responsibility to clean-up after their snack time. Serving styles were coded as a) individual portions (set portions for each child, usually served by the staff) or b) family-style (children serving themselves from a common bowl or platter).

Activities and staff promotion behaviours that occurred outside of the designated snack times were captured using the System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) tool (Appendix F).[8,22] SOSPAN is a systematic observation tool which captures contextual program information and time allocations to different activities. Two data collectors systematically rotated through all areas of the service that were actively used by children and staff, completing five SOSPAN scans before rotating to the next area.[9,23] Systematic observations were continuously completed throughout the afternoon between 15:00-18:00hr, or until there were less than five children attending the OSHC.[9]

Activities were coded as enrichment, academic, snack, nutrition education or physical activity. For the purpose of this study, only nutrition-related activities are presented. Activities were coded as “snack” when children were allowed to consume foods provided by the program. Nutrition education was coded as moments dedicated to discussing, teaching or playing games associated with educating children about nutrition or the benefits of healthy eating.

The SOSPAN tool systematically captured staff role modelling behaviours including the occurrences of food and beverage consumption during the program. Foods consumed by the staff were coded as: provided (if staff consumed program provided foods), fruit/ vegetables, sweets (sugar based processed foods i.e. cakes, lollies (candy), chocolates), salty foods (chips, savoury biscuits), dairy (yoghurt, cheese), dips (hummus), fast foods (McDonalds or KFC) and other (homemade foods, not able to distinguish). Beverages consumed by the staff were coded as: coloured drinks, fast food cups (branded labels such as

McDonalds or Coca-Cola), water, coffee/ tea and indistinguishable (coded if the container was non-transparent and the beverage could not be identified).

3.2.3 Observation training and SOSPAN reliability

Five trained data collectors completed all observations. Data collectors were trained over a three day period, using a combination of classroom simulation and field practice by experienced senior personnel [GW], prior to the study commencement. All food, packaging, labels, and food preparation areas were photographed for validity checking during analysis. Data collectors were required to meet >80% interrater-reliability via an interval-by-interval agreement on two consecutive days prior to data collection. Reliability scans were collected on each data collection day, with a minimum of 30% of scans used to calculate reliability.[24] Interrater-reliability was calculated using percentage agreement and Cohen's Kappa.[25] The median percentage agreement was 93% and a Kappa of 0.93 (ranging from 0.80 to 0.97).

3.2.4 Data analysis

Data analysis was conducted using SPSS software (version 24, IBM Corporation, Armonk, NY, USA). Foods offered were categorised into the five food groups of the Australian Dietary Guidelines: fruit, vegetables, lean meats, dairy and whole grains as well as additional sub-categories for all grains (refined inclusive) and discretionary food items. Descriptive statistics were conducted for the number of observation days each of the food groups were observed at each OSHC. Shapiro-Wilk tests indicated that the food data were not normally distributed. The Wilcoxon Signed Rank Test was used to explore if discretionary food items were offered more frequently than the five food groups. Staff healthy eating promotion behaviours were presented as frequency, percentage, mean(SD), median(IQR) of days observed.

3.3 RESULTS

Across the 12 OSHC services and 48 observation days, children (1,549) and staff members (151) were observed. OSHC services were located within metropolitan (n = 11) and semi-rural (n = 1) areas and had approved places for an average of 64 children at each service (ranging from 48 – 120 children). A total of 4,688 SOSPAN scans were completed across the observation period. Children and staff may have been

observed on more than one occasion. All OSHC served an afternoon snack as a part of their daily program and each OSHC, except one, had access to an onsite food preparation area, including a small kitchenette (n = 4), full kitchen (n = 4) or school canteen (n = 3).

3.3.1 Food and beverages

Discretionary items and fruit were the most frequently offered food groups with six of 12 OSHC services offering these on all four observation days. Grains were offered, on all four observation days, by four services, and dairy by two services. No OSHC offered vegetables, whole grain options or lean meats and their alternatives on all four observation days. There were significant differences between the number of days that discretionary foods were offered compared to foods from the five food groups; vegetables (+1.9/d, p= 0.009), lean meats (+2.7/d, p=0.004) and whole grain options (+2.8/d, p=0.002) (Table 3.1).

Table 3. 1 Food provided for afternoon snack, categorised into food groups aligned with the Australian Dietary Guidelines, as observed across four observation days in 12 Out of School Hours Care services (OSHC).

Food group	Mean	SD	Median	Mode	% of days program offerings (n)[h]	Wilcoxon signed rank*
Fruit[a]	2.9	1.4	3.5	4.0	50% (6)	*p* = .733
Vegetables[b]	1.2	0.8	1.0	2.0	0% (0)	***p* = .009**
Lean meats[c]	0.4	0.7	0.0	0.0	0% (0)	***p* = .004**
Dairy[d]	2.1	1.2	2.0	1.0	17% (2)	*p* = .062
Whole grains[e]	0.3	0.5	0.0	0.0	0% (0)	***p* = *.002***
Grains[f]	2.3	1.4	2.5	1.0	33% (4)	*p* = .242
Discretionary[g]	3.1	1.1	3.5	4.0	50% (6)	(ref)

*Wilcoxon signed-rank tests the mean number of observed days each food group was offered, compared to discretionary food group.

[a] Includes all fresh, frozen, canned in natural juice (not syrup). Excludes dried fruit and fruit juices.

[b] Includes vegetables that are fresh, frozen, cooked or canned.

[c] Includes fish, eggs, lean meat and poultry, nuts, seeds, legumes and beans.

[d] Includes milk, cheese, yoghurt, milk alternatives (calcium fortified alternatives). Excludes cream, sour cream, dairy desserts or iced confectionary,

[e] Includes grains that are categorised as whole grain (rye, barley, bulgur, spelt, millet, quinoa and corn).

[f] Includes all grains, bread, cereals, rice, pasta, noodles, including whole grain options.

[g] Includes butter, cream, sweet biscuits, cakes, pastries, pies, processed meat, pizza, fried foods, potato chips or savoury crackers >1800kJ/100g, jam/honey, sugar-sweetened beverages and lollies/ candy.

[h] food groups on all 4 observation days

The most frequently observed foods offered, from each of the five food groups consisted of; (a) Fruit: apples (67%), oranges (40%) and pears (29%); (b) Dairy: cheese (40%), milk (10%), yoghurt (4%); (c) Grains: white bread (23%), pasta (9%), rice crackers (4%); (d) Vegetables: carrot (10%), celery (4%), cucumber (4%); and (e) Lean meats and their alternatives: Baked beans (2%), beef strips (2%), hummus (2%). The most frequently observed discretionary foods, included: salty crackers/biscuits (31%), processed meats (27%) confectionary foods (17%) (e.g. honey/jam/sprinkles).

Fruit platters were the most commonly observed snack option, often served alongside cooked foods (pasta), cooked discretionary foods (e.g. chicken nuggets, sausages sandwiches, hot dogs or sausage rolls) or sandwiches (primarily a sugar-based topping such as honey/jam/sprinkles or processed meat with cheese and cucumber and grated carrot). Other foods that were frequently observed included savoury platters (e.g. salty crackers/biscuits, cheese and/or dips) or fruit served with dairy products such as yoghurt or custard. Generally, the snacks were most commonly served in a family style (platter) manner on 69% of observation days.

Water was provided on all observation days; no sugar-sweetened beverages (cordial, soft drinks, or energy drinks) were observed and flavoured milk (Milo, an iron-fortified chocolate powder) was offered on 4% of observation days.

Table 3. 2 Healthy eating promotion practices of staff and children observed across four observation days at 12 Out of School Hours Care (OSHC) services.

Healthy eating promotion practice	Days behaviour was observed, n(%) (n = 48)	Services behaviour was observed on all four observation days (n =12)	Services behaviour was observed on at least one observation day (n =12)	Days behaviour was Observed, mean(SD) (n = 4)	Days behaviour was Observed, median(IQR) (n = 4)
Fruit available	36 (75)	6	12	2.9 (1.4)	3.5 (2)
Vegetables available	14 (29)	0	9	1.2 (0.8)	1 (1)
Water available	48 (100)	12	12	4.0 (0)	4 (0)
Served whole grain options (when grains were offered)	4 (8)	0	4	0.1 (0.3)	0 (0)
No sugar-sweetened beverages offered	48 (100)	12	12	4.0 (0)	4 (0)
Days at least one staff verbally promoted healthy eating	7 (15)	0	5	0.6 (0.8)	0 (1)
Days at least one staff verbally discouraged healthy eating	0 (0)	0	0	0 (0)	0 (0)
Days at least one staff sat with children during the mealtimes	25 (52)	0	11	2.1 (0.9)	2 (1)
Days at least one staff ate discretionary foods	10 (21)	0	6	0.8 (1.0)	0.5 (1.3)
Days at least one staff drank discretionary beverages	7 (15)	0	5	0.6 (0.9)	0 (1)
Days at least one staff delivered healthy eating education	0 (0)	0	0	0 (0)	0 (0)
Days at least one staff engaged children in cooking experiences	0 (0)	0	0	0 (0)	0 (0)
Days snack was served family-style (platters)	16 (33)	1	7	1.3 (1.4)	1 (2)
Days children helped to prepare food	3 (6)	0	3	0.3 (0.6)	0 (0)

Days children distributed food	14 (29)	1	8	1.2 (1.3)	1 (1)
Days children were asked to clean up after the meal	11 (23)	0	7	0.9 (0.9)	1 (2)

3.3.2 Staff promotion behaviour

Table 3.2 reports the healthy eating promotion practices of staff and children that were observed by the data collectors. At least one staff member was observed to sit with the children on 25 (52%) observation days, across eleven OSHC services. No service had a staff member sitting with children on all four observation days. The staff verbally promoted healthy eating (encouraging children to wash their hands or select healthy snack foods) on seven (15%) observation days, across five OSHC services. No staff verbally discouraged children of healthy eating practices or choices. There were no instances of nutrition education activities provided by staff or engaging children in conversations about healthy eating. During snack times, at least one staff member consumed the provided food on 14 (29%) observation days, across 10 OSHC services. Staff were observed to consume discretionary foods (cakes, chips or fast foods) in front of the children on ten (21%) observation days, across five OSHC services. At least one staff member consumed discretionary drinks (cordial, Coke-a-cola, Redbull, Fanta) in front of the children on seven (15%) observation days, across four OSHC services.

Children had opportunities in food-based learning activities, such as food preparation (washing, chopping or preparing food) on three (6%) observtaion days at two services, food distribution (allowing children to serve their peers) on 14 (29%) observation days at eight services and cleaning up after their snack (taking plates to the sink or having designated washing up buckets) on 11 (23%) observtaion days across seven OSHC services.

3.4 DISCUSSION

This study observed that foods provided to children during OSHC after school are partly consistent with the Australian Dietary Guidelines. Fruit, discretionary items and grain options were the most commonly observed food groups offered as part of the afternoon snack. Discretionary food items were provided on more observation days than vegetables, lean meats and whole grains options. Water was the main beverage provided on all observation days, and no service offered children sugar sweetened beverages. Instances of staff healthy eating promotion behaviours (e.g. food preparation and cooking) were limited, and staff were not observed to provide nutrition education to children. On occasion, staff modelled less than appropriate food choices by consuming discretionary food items and beverages.

OSHC in Australia are guided by the NQF to provide healthy environments for children. As stated within the NQS (Quality Area 2, Element 2.1.3), food and beverages provided by OSHC services should be consistent with the Australian Dietary Guidelines.[5] Although fruit and water were observed to be offered almost daily, vegetables were less frequently observed. These findings align with the Australian Health Survey (2017-18 results), which indicate that almost 78% of children (aged 4-8 years) met their daily recommended serves of fruit, while only 4% met their recommended vegetable intakes.[26] Consuming a wide variety of vegetables is vital for optimal health, growth and development of children. Vegetables provide essential dietary fibre, vitamins, minerals and are protective against weight gain and many chronic diseases (e.g. cardiovascular disease and some cancers).[27] Furthermore, the Australian Dietary Guidelines recommend that discretionary foods be limited, only eaten sometimes and in small quantities.[27] We expected to see a portion of foods offered within the discretionary foods category, however, discretionary items were offered on more than half of the observation days. This is concerning as Australian children (5 -12 years) already receive more than one-third (38%) of their total daily energy from discretionary foods.[28]

Our findings differ from those in a similar study conducted in the US. OSHC services in our current study served fruits, vegetables, dairy products and water more frequently than those in the US.[8] The current study also observed fewer instances of salty snacks, dessert foods and sugar-sweetened beverages than in the US. In a recent study by Helmick et al. (2019),[29] After school programs in the US identified daily barriers to serving perishable foods, such as fruits and vegetables, were attributed to cost, food preparation and food storage availability. In the current sample, all but one service had on-site access to at least basic food preparation areas, including refrigeration, bench space and storage units that aided in safely storing fresh foods. Conversely, after school programs in the US served more whole grain foods, unflavoured milk, and fewer sugar-sweetened cereals[8] than in our sample. Differences in the whole grain offerings may be attributed to recommendations in healthy eating standards on packaged snack foods between Australia and the US. Helmick et al. (2019)[29] reported regularly observing highly processed pre-packaged ‘muesli bar’ type foods that met healthy eating standards in the US (with added whole grains and controlled portion sizes),[29] however, in Australia, these same products are often categorised as discretionary foods based on their added sugar and fat content.[30]

Similarily, in an earlier study conducted in south-eastern Sydney (Australia), Sangster et al. (2004)[7] reported the afternoon snack observed from fourty-one programs. The most notable difference in foods

and beverages offered between these two studies was the reduction of sugar-sweetened beverages (cordial or soft drinks) recorded. Sangster et al. reported that 46% of programs offered a sugar-sweetened beverages on at least one observation day, whereas, no such beverages were reported within this study, with the primary beverage being water and occasionally milk. Further, the proportion of programs offering fruit daily increased from 44% to 50%. These positive findings could be attributed to a variety of national and state changes that have been implemented since the aforementioned study was published, such as the National Quality Framework in 2012. Additional healthy eating campaigns implemented in NSW schools since this time, consist of Crunch & Sip[31] or the NSW Healthy School Canteens Strategy[32] (both of which promote the daily consumption of whole fruit, vegetables and water within primary schools), as well as the State wide sugar sweetened drink ban in all NSW Department of Education Schools[32] implemented in 2007. However, there was not an overall increase in the five core food groups seen between these two NSW studies. There appears to be no changes in the proportion of services that offered dairy foods, with both Sangster et al.[7] and the current findings reporting only 17% of services offering dairy foods or their alternatives on all observation days. As only 21% of children (4 - 8 years) and almost 50% (9 -12 years) under consume the recommended serves of dairy each day, OSHC may play an important role in assisting children meet their recommended daily intakes.[1]

Our findings indicate that the proporton of services who offered grains (cereal based) and moderate sources of iron every day reduced from 39% to 25% and from 20% to 0%, respectively. Reasons for these differences may be related to changes in the types of foods offered for afternoon tea within these programs. Sandwiches or crackers were the most frequently observed foods reported by Sangster et al.[7] in comparison to fruit platters within this study. Moreover, the criteria used to establish *"moderate sources of iron"* were broad in the Sangster et al.[7] study with no specific mention of *lean meats* as well as the inclusion of Milo (an iron-fortified chocolate powder) and dried fruits. Although meats were not infrequently observed within this study, they were often highly processed (chicken nuggets, sausages, hot dogs or sausage rolls) and categorised overall as discretionary items.[33] No services within the current study offered lean meats or alternatives on all observation days. Positive healthy eating environments, including the foods available to children and the behaviours modelled by staff, play an important role in the types of foods children chose to eat.[16,34] Establishing good food behaviours and healthy eating knowledge in childhood is important as food practices developed in childhood flow into adolescence and adulthood.[35]

Staff have the opportunity to model positive food behaviours through sitting with children during meal times, discussing and promoting healthy eating, consuming healthy foods in front of children and providing food in a family-style manner (allowing children to choose foods according to their hunger cues).[36] Our findings indicate that, although staff were sitting with the children and providing snacks in a family-style manner, there was limited discussion about healthy eating and on no occasion were staff seen to educate the children about nutrition or healthy foods. Staff occasionally consumed less appropriate foods and drinks in front of the children during the snack times or while they were supervising activities. These results highlight an important gap in providing positive, healthy eating environments for children. These findings differed from the Sangster et al. (2004) study which observed staff sitting less with children during mealtimes yet reported more instances of healthy eating promotion and engaging children in the food preparation activities.[7] It is, however, unclear what criteria were used in their categorisation of healthy eating promotion and food preparation activities and, therefore, these findings should be compared with caution. Staff within our study were observed to sit and eat with children nearly twice as frequently than in a similar US study.[8] The reasons for this might be related to standards found within the NQS (Quality Area 2, Element 2.1.3), stating that staff might be observed "sitting with children and modelling, implementing and reinforcing healthy eating and nutrition practices with children during mealtimes".[5] Moreover, the NQS address the importance of children learning about healthy lifestyles (including nutrition), by complimenting children's understanding of nutrition with experiences of cooking.[5] Experiential learning strategies, such as cooking, have been associated with increased fruit and vegetable consumption and energy intake reduction in primary school aged children[37] making cooking a powerful option for improving healthy eating patterns throughout a child's life. Although there were some instances of small groups (2 or 3 children) involved in food preparation (washing food or displaying prepared food on platters), food distribution and clean-up activities, there were no observed instances of cooking experiences nor nutrition education. Potential reasons for this may be due to the staff preparing all foods prior to children's arrival and commencing each days' programs with the afternoon snack, between 15:00 and 15:15 and the potential risks (health and safety) associated with children preparing foods. This may explain why the children were more frequently observed engaging in food distribution (serving food) or cleaning up after the meal, as these were the only food preparation activities available to engage children. Further investigation should be conducted to better understand the reasons for the lack of nutrition education or cooking experiences and how these could be better incorporated within Australian OSHC services.

This study has a number of limitations. The foods observed can only provide an estimation of the food groups offered, rather than foods consumed by the children. The Australian Dietary Guidelines recommend the types of foods Australians should be consuming over an entire day; however, this study only captured foods provided at a single mid-meal occasion during a portion of the day. Regardless, services need to be consistent with the Dietary Guidelines and, therefore, the food provided should be reflective of the recommendations found within the Guidelines. Only 12 services from one organisation located in the Illawarra region of NSW were invited to participate in this study. While this does demonstrate feasibility of the observational methods used, all services had similar programs, including access to the same nutrition policy. Results cannot be extrapolated to the wider OSHC sector within NSW. Although this is not a representative sample of current services in NSW these findings show consistent trends with previous studies conducted in both the US and in NSW. Further investigation should be conducted into the healthy eating environments within the larger OSHC environment in NSW and Australia.

These exploratory findings suggest that services may need to offer more vegetables and whole grain food options and fewer discretionary items, engage children in conversations about nutrition and healthy eating, implement specific policies around the types of foods and beverages to be consumed by staff, and engage children in hands on food preparation and cooking opportunities. As the demand for care increases, promoting compliance with the Australian Dietary Guideline and NQF in OSHC has the potential to promote healthier lifestyles and equip young children to make better food choices in later life.

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Chapter 4: Healthy eating and physical activity environments in out of school hours care: an observational study protocol

The previous chapter explored the healthy eating environments within 12 OSHC services in the Illawarra region of NSW. The findings provided some evidence to indicate that healthy eating environments were less than optimal. Due to the relatively small sample and all participating services belonging to one organisation, further investigation was warranted. The following chapter describes the methods of a larger investigation to explore both the healthy eating *and* physical activity environments within OSHC across two Local Health Districts in NSW.

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4.1 INTRODUCTION

Healthy body weight in childhood supports optimal bone development, cognition and concentration at school, improved sleep patterns and reduced anxiety and depression in later life.[1] Healthy eating and physical activity (HEPA) are important in maintaining a healthy weight status.[2,3] National data indicate that no Australian children (aged 4-8 years) currently meet the vegetable intake recommendations, while most exceed discretionary food intake guidelines.[4] Nearly half of Australian children are not meeting physical activity guidelines and nearly three quarters exceed the recommendations for recreational screen-time.[3] The out-of-school hours' time period may be a critical window in a child's day to intervene as studies have shown children consume large amounts of snack foods[5,6] and participate in long periods of screen-based sedentary activities[7,8] during out-of-school hours.

In Australia, out-of-school hours care (OSHC) programs operate before school (6:00-9:00), after school (15:00-18:00) and during school holidays (vacation care) (9:00–18:00). OSHC programs are of growing importance for many Australian parents whose employment requires them to work outside school hours.[9,10] In 2018, 36% of Australian children in care attended OSHC programs (458,750 children), spending an average of 12 hours per week in these programs.[9] OSHC programs have the opportunity to provide positive physical and social environments that can promote healthy eating and active play to children who attend.

Within an OSHC setting, staff can create supportive physical environments through; 1) the foods and beverages available to children (provided meals, vending machines, food rewards), 2) health promoting messages[11,12] (via posters, nutrition education and cooking), and 3) opportunities and equipment for active play. The social environment can influence behaviour via staff role-modelling[12] (e.g. consumption of healthy foods and beverages and engagement in physical activity opportunities) and establishing HEPA practices as a social norm within these settings through the presence of strong and supportive policies.

While limited studies have reported on HEPA within before school care and Australian OSHC programs,[13–15] international research has found that foods and beverages served and children's physical activity levels within after school programs fell well below national recommendations.[16–18] This research aims to describe the HEPA environments related to the foods and beverages served, staff behaviours and child physical activity levels across two Local Health Districts within New South Wales (NSW), Australia.

4.2 METHODS

A cross-sectional, observation study will be conducted to 1) observe the foods and beverages offered to children; 2) assess the level of physical activity of children; and 3) observe staff behaviours on promotion and role-modelling of HEPA within OSHC programs. Data will be collected during unannounced (non-specified) visits on non-consecutive weekdays to ensure usual behaviour of staff is captured. In the occurrence of unfavourable weather patterns (e.g. heavy rainfall), which may lead to irregular practices or changes to the usual program, observations will be rescheduled. Data collection methods are outlined in Figure 4.1. Data are scheduled to be completed within the after school programs between March 2018 and April 2019.

4.2.1 Study Sample

In 2018, there were 243 OSHC providers in operation across the South Western Sydney and Illawarra Shoalhaven Local Health Districts,[19] which will act as the sampling frame. Of these 204 OSHC programs are eligible to participate based on the following criteria: five or more primary school-aged children (5-12 years) enrolled; the program runs from 06:00 – 09:00 and/ or 15:00 - 18:00 during school terms; provide at least one breakfast or afternoon meal; and the program is not exclusively advertised as a homework or physical activity-related club (e.g. dance academy, swimming or football clubs).[20] A power calculation and sample size estimation were generated with 5% precision requiring 128 OSHC programs to be recruited. Given the large sample size required, all eligible services in the two Local Health Districts will be invited to participate via email and telephone (Appendix 1).

4.2.2 Recruitment

Written informed consent will be obtained from OSHC directors (Appendix C). Data collected from a service will primarily consist of observing a) staff behaviour, interactions and involvement during OSHC programs, b) food and beverages provided and c) physical activity opportunities. Due to the observational nature of this research, methods have been determined as low risk.[20] A passive consent approach, however, will be applied for collecting accelerometery data. Children will be invited to wear an accelerometer for the duration of their time at the program, unless parents/ guardians have opted their child out of wearing an accelerometer. A child can refuse assent at any stage of the research process. Staff and parents will be notified of the study via several channels, including: 1) recruitment video, digital research posters and information sheets shared via OSHC internal communication avenues; 2) research notification posters at each entrance way, notice boards and sign in/out desk within each OSHC; and 3) participant information sheets and opt-out forms (that provide detailed explanation of the research study,

investigator contact details, and the opportunity for participants to be excluded from the study) located at sign in/out desks (Appendix D) . Information relating to this study will be displayed for a minimum of two weeks prior to data collection commencing and for the duration of the data collection period. Data collectors will be on site during data collection and available to discuss the study with staff and parents as required.

4.2.3 Context

In 2012, the National Quality Framework was implemented in Australia as the overarching regulatory framework for early childhood education and care, under which sit OSHC services.[21] Within this framework are seven National Quality Standards that are underpinned by National Legislation and Regulations.[21] Healthy eating and physical activity fall under the National Quality Standards 2, Element 2.1.3, "*healthy eating and physical activity are promoted and appropriate for each child*". The Australian Children's Education and Care Quality Authority disseminated the *Guide to the National Quality Standard*[21] to support service providers in meeting the requirements of the National Quality Standards. These guidelines within the National Quality Framework are not authoritative, but provide flexibility on how service providers might meet the Standards.[22] As demonstrated in Table 4.1, this guide describes best practice guidelines for education and care services, recommending staff use positive role modelling behaviours, engage children in healthy eating conversations, use cooking experience to build knowledge, provide meals consistent with the Australian Dietary Guidelines (ADG), implement frequent opportunities for physical activity and role model enjoyment by engaging in activities.[21] A combination of resources designed to support OSHC programs in meeting Quality Area 2, will be used to guide the criteria within this study including; 1) Heart Foundations *'Eat Smart, Play Smart'* manual,[23] 2) Nutrition Australia's '*Healthy eating in the National Quality Standards',*[21] and 3) the '*Food and drink checklist for outside school hours care'*.[24] For the purpose of this study we will report on whether staff behaviour relating to the best practice guidelines was observed or not observed.

Table 4. 1 Best-practice guidelines, selected from the Guide to the National Quality Standards for the reporting of HEPA promotion behaviours in OSHC.

National Quality Standards	Direct observation	SOSPAN[b]	Accel[c]	HAAND[d]
Healthy Eating Environment				
Engage children in experiences and conversations that promote mealtimes to be enjoyable and promote healthy, balanced lifestyles	✓			
Use cooking experiences to further children's understanding of food and nutrition	✓			
Never use food to reward children	✓	✓		
Sit and eat with children and model, healthy eating and nutrition practices during mealtimes	✓			
Provide food and beverages consistent with the Australia dietary guidelines	✓			✓
Provide foods and drinks consistent with the menu	✓	✓		✓
Access to water throughout the day	✓	✓		
Physical Activity Environment				
Implement physical games and activities as part of the program and encourage children to participate		✓		
Become involved and demonstrate enjoyment in children's physical activity		✓		
Children should have frequent opportunities to engage in active play		✓		✓
Children should lead physical play activities with peers		✓		
Opportunity for dance, creative movement and drama and respond to music		✓		✓
Provide resources and equipment to support children participate in physical activity		✓		
Additional Measures[a]				
Nutrition and physical activity policies				✓
Children accumulate 30 minutes MVPA in the hours before and after school			✓	
Annual nutrition and physical activity staff training				✓

Note: This is not an exhaustive list of best-practice behaviours, only those that could be reported on by the selected tools used within this study. Some of the descriptions have been summarised within this table.

[a]Additional measures are not found within the *Guide to the National Quality Standards*

[b]SOSPAN: System for observing staff promotion of activity and nutrition

[c]Accel: Accelerometer

[d]HAAND: Healthy Afterschool Activity and Nutrition Document

Healthy eating and physical activity measures were selected from the Australian Dietary Guidelines[25] and the Australian Physical Activity and Sedentary Behaviour Guidelines for Children and Young People, respectively.[26,27] Due to the observational nature of this study, the frequency of food groups offered/ served to children will be reported. National physical activity guidelines state that children should accumulate a minimum of 60-minutes of moderate-to vigorous physical activity (MVPA) across an entire day.[27] For the current study, a minimum measure of 30 minutes of MVPA has been selected as the criterion.[28,29] This amount of time is half of the daily recommendation. It is recognised as an achievable goal specifically within the after school period[29] and has been used in studies conducted in similar settings in the United States.[30–34]

4.2.4 Healthy eating environment

Food and beverages offered to children will be captured via direct observation and digital images (Appendix E). Digital images will capture descriptive data for the provided foods, including food labels, branding, packaging and serving methods (individual portion sizes or "family style", characterised by a shared platter).[18,35,36] Trained data collectors or final year dietetics students will collect all food and nutrition behavioural observation data. Water will be recorded as available if cups of water or designated water stations are available to children during the snack time or throughout the program.[18,31]

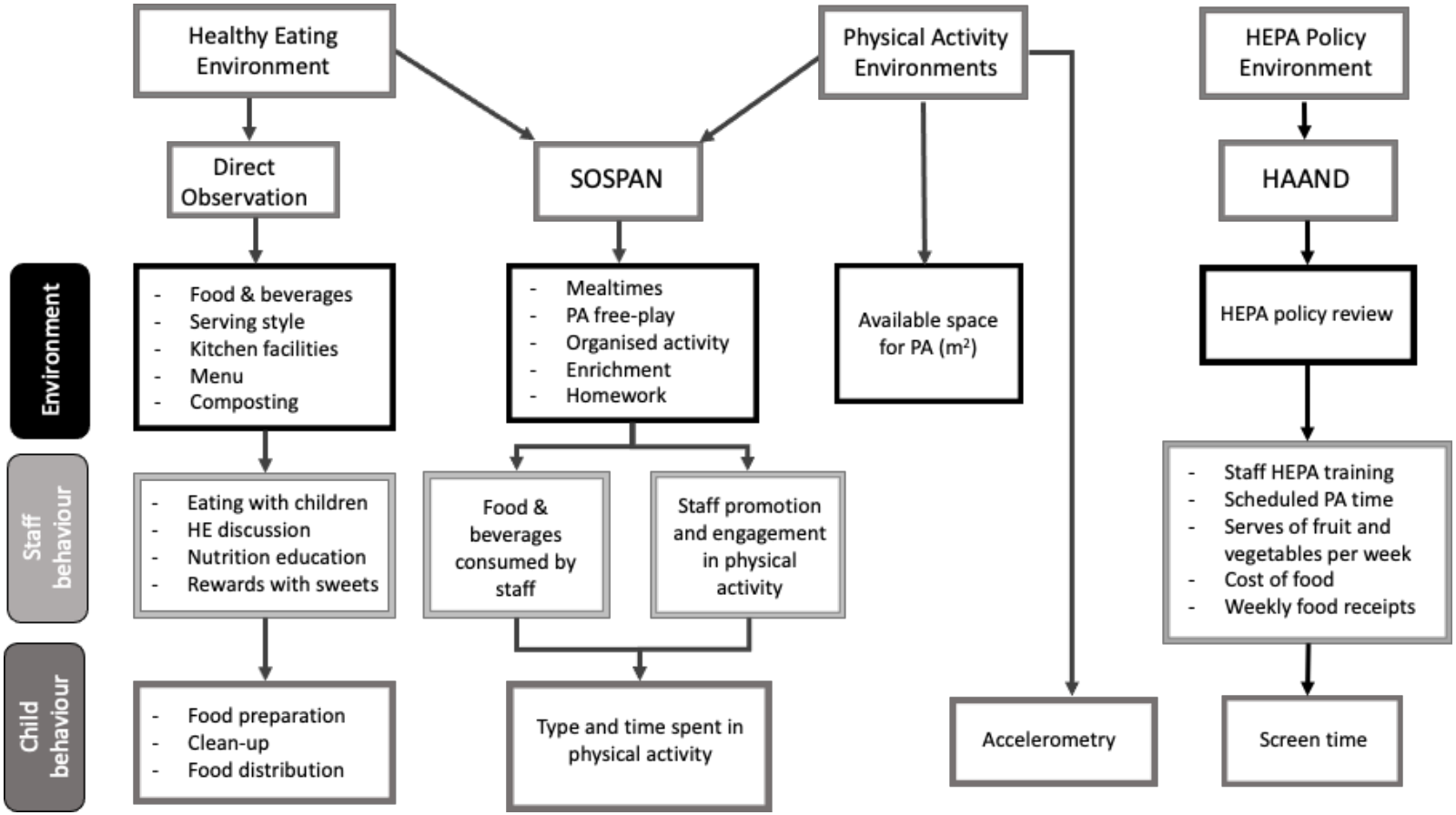

Figure 4. 1 Data collection methods for observing the HEPA environments within out of school hours care (OSHC).

HEPA -Healthy eating and physical active
SOSPAN – Systems for Observing Staff Promotion of Activity and Nutrition
HAAND – Healthy After school Activity and Nutrition Document instrument
PA – Physical activity
HE – Healthy eating

Observations of the healthy eating environment will be made during the scheduled mealtime including: staff healthy eating promotion behaviours; staff sitting and eating with children; staff promotion / discouragement of healthy foods and beverages; staff engaging children in healthy eating discussions or nutrition education during the meal time; provision of food knowledge and skill development (including children's involvement in the food preparation activities, and food clean-up); rewarding of good behaviour with discretionary food items[21,23] (e.g. sweets and confectionary); and food waste management (e.g. use of a compost or worm farm). Weekly food menus will be observed and recorded including if they are displayed for parents, whether menus were consistent with foods served and if they met the requirements of the 'Food and drink checklist for outside school hours care'.[37] Types of food preparation (kitchen) facilities will be observed and documented including food storage, cooking equipment, preparation areas and washing up facilities.

4.2.5 Physical activity environments

Prior to data collection, all OSHC programs will be visited to record the physical characteristics of the program environment, including indoor (non-physical activity enrichment or snack areas) and outdoor spaces (physical activity spaces). These spaces will be divided and identified as zones or "target areas" during the data collection period. Available space accessible to children during the OSHC program will be mapped and measured in metres using a Craftright measuring wheel (Figure 2) (Appendix G). Permanent facilities (e.g. basketball courts, fixed equipment and sandpits) will be measured and identified as zones.

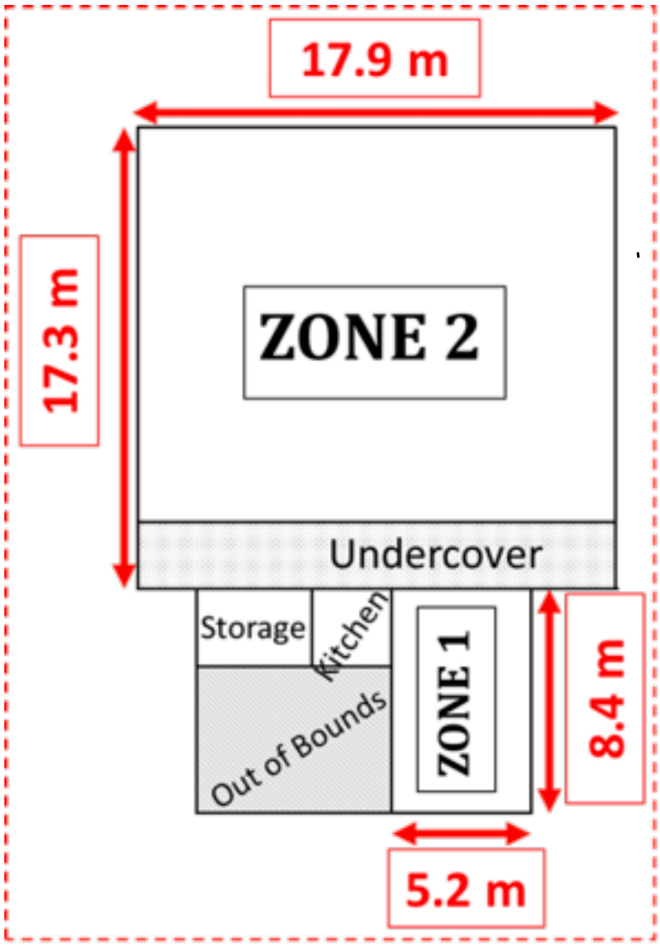

Figure 4. 2 An example of the zones and the size of zones measured in metres (m) in OSHC program.

Child physical activity will be measured via ActiGraph accelerometers (wGT3X-BT models). Accelerometers are widely used to provide an objective estimate of physical activity in free-living research.[38–42] Accelerometers are small, unobtrusive devices that sit around a child's waist, attached using adjustable elastic belts. As children arrive at a program, the accelerometers will be fitted around their waist by trained data collectors, ensuring the unit is sitting on the right hip. The time-on and demographic data of each child (school grade and sex) will be recorded. As children depart from the program accelerometers will be removed and time-off recorded (Appendix H) .[43]

4.2.6 System for observing staff promotion of activity and nutrition

Staff promotion of HEPA behaviours will be measured by direct observation and momentary time sampling using the System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) instrument (Appendix F).[44,45] SOSPAN is a validated observation tool created and used within after school programs in the United States.[45] The tool is designed to capture 13 physical activity and six

healthy eating behaviours of staff as described in detail elsewhere.[46] Staff behaviours captured by SOSPAN include staff encouragement of physical activity (e.g. leading physical activity, verbally promoting physical activity, staff engagement in physical activity with children and providing children with multiple physical activity options) or discouragement of physical activity (e.g. idle time, providing elimination games, children standing or waiting for a turn and withholding physical activity). SOSPAN captures the context of the program, documenting the duration of scheduled activities (physical activity, indoor enrichment activities, homework/ academics and mealtime). Other contextual activities recorded by SOSPAN include the identification of organised activity (structured activity set up by OSHC staff) versus physical activity free-play (unstructured activity time that was child-led and not organised by staff in the after school programs).

Staff promotion and modelling of healthy eating behaviours are captured in SOSPAN via staff verbally promoting healthy eating, educating children on healthy eating and consuming healthy food and beverage options or discouraging healthy eating by staff consuming inappropriate foods or drinks.

Systematic SOSPAN scans will be continually completed throughout the duration of the program or until there are less than five children remaining at the program.[45] Data collectors will move systematically between zones (Figure 4.2) where both staff and children are present, completing five scans before moving to the next area.[44,46] Data collectors will be required to meet greater than 80% interrater reliability agreement via an interval-by-interval agreement on two consecutive data collection days.[47] Interrater reliability will be continuously monitored throughout the data collection process, completing a minimum of five reliability scans per day.

4.2.7 HEPA Policy Environment: Healthy after school activity and nutrition documentation

Written HEPA policies, that use clear-language to guide staff practices have been shown to improve the HEPA environments within child care services.[48] The Healthy After school Activity and Nutrition Documentation (HAAND) instrument[49] is a validated tool that will be used to guide and collect information on HEPA policies and practices through a short interview with Directors from each OSHC program (Appendix I). Detailed information on this tool has been published elsewhere.[49] HAAND explores 11 healthy eating and ten physical activity policy characteristics captured through a short, structured interview that is conducted on-site with the OSHC Directors by trained data collectors. In short, HAAND evaluates the level at which program policies support HEPA characteristics through written policies, staff training, use of HEPA resources, time allocations and types of physical activity, healthy eating practices and screen-time availability. In addition, a copy of the nutrition and physical

activity policies, as well as weekly food receipts and menus, will be requested from each OSHC program. For the purpose of collecting healthy eating and physical activity policy information, the HAAND will be applied to both before and after school OSHC programs. To minimise potential response bias, all staff will be reminded at the commencement of the interview that all data collected will be deidentified and the importance of not modifying any of their behaviours.

4.2.8 Training

Data collectors will be extensively trained in all data collection methods prior to data collection commencing. This will occur via a combination of classroom simulation and practical on-site training at local, non-participating OSHC programs. Theoretical classroom training will include the review of study protocols, memorising observational codes and watching video clips depicting the out of school hours environment and coding scenarios using observational tools, developed by Weaver et al (2015).[43] Data collection will be primarily conducted by PhD candidates, nutrition and dietetics final year students and research assistants.

4.3 DATA ANALYSIS

Food and beverages will be categorised by a dietitian or nutritionist into the five core food groups according to the AGHE: fruit, vegetables, lean meats, dairy and grains (whole grains). Additional categories of discretionary items, refined grains, water and 'extra' drinks (fruit juice, cordial, soft drinks and flavoured milk) will also be recorded. Food categorisation will be guided by the AUSNUT 2011-13 database developed by Food Standards Australian New Zealand, for the Australian Health Survey nested hierarchical food classification system[50] and the Discretionary food listing[51,52] developed by the Australian Bureau of Statistics. Food categories will be checked by a researcher independent of the OSHC observations. The frequency of food groups and beverages offered across observation days will be calculated and expressed as a percentage, mean and standard deviation, for normally distributed data and median and interquartile ranges for skewed data. Data transformation is not deemed relevant to this study.

Accelerometer-derived physical activity data will be calculated for minutes per day spent in sedentary, total physical activity and MVPA. For this study the Evenson cut points will be used: sedentary behaviour <26 counts/ 15 seconds, light-to-moderate activity 26-573 counts/ 15 seconds, moderate activity 574-1002 counts/ 15 seconds, and vigorous activity >1002 counts/ 15 seconds.[53] The Evenson cut points have been recognised as accurate cut points for measuring the time spent in different physical activity

intensities for children aged five to eight years.[53] Within after school programs, physical activity data will be considered valid if a total wear time of accelerometers is equal to or greater than 60 minutes.[17] All accelerometery data will be analysed using SPSS software[54] and STATA.[55]

Staff behaviours captured through direct observation, SOSPAN and responses from the structured interview (i.e. HAAND) will be quantified and reported as a percentage of observations and responses completed using SPSS software 'IBM SPSS Statistics for windows, version 25.0. (IBM Corp., Armonk, N.Y., USA)'.

The relationship between serving healthy snack foods and variables such as: socio-economic index for areas (SEIFA), availability of kitchen facilities and healthy eating training of staff will be explored. To explore the relationships between the physical activity environment and child activity levels, correlations between time spent in MVPA, total physical activity and sedentary behaviour will be assessed against: physical activity policy, staff engagement in physical activity, available space for physical activity (m^2), ratio of number of children to staff, physical activity equipment and sex of child.

4.5 ETHICS AND DISSEMINATION

Ethical approval has been provided by the University of Wollongong, Australia Human Research Ethics Committee (approval HE17/490). Results from this study will be disseminated through peer-reviewed scientific journals, conference presentations, scientific reports, service reports (providing findings to participating OSHC care providers) (Appendix J) and will form part of student dissertations.

4.6 REFERENCES

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Chapter 5: Factors associated with providing healthy foods and beverages in out-of-school-hours services: an observational study

The previous chapter outlined the methodological approach that has been used within this thesis to capture data about the HEPA environments within OSHC services. *Chapter 3* provided some evidence that the healthy eating environments within OSHC services were not meeting dietary recommendations for vegetables, dairy, whole grains, lean meats and discretionary foods after school. However, due to the small sample size it was recommended that further exploration be conducted across a more diverse sample. The following chapter presents the results from a cross-sectional study that explored the healthy eating environments within 89 OSHC across two Local Health Districts to address the following research aims and questions:

Aim 2: *To investigate sector-level and setting-level factors associated with OSHC providing foods aligning with the Australian Dietary Guidelines*.

Research Question 2:

i. What environmental factors (social economic area, food cost, staff healthy eating training, kitchen facilities, or menu planning) are associated with OSHC providing foods and beverages consistent with Australian Dietary Guidelines?

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5.1 INTRODUCTION

The vast majority of Australian children do not meet the national recommendations for consumption of vegetables (99.6%) or lean meats and meat alternatives (99.3%); and girls under-consume dairy products (96.1%).[1] Furthermore, Australian children receive almost 40% of their energy from discretionary foods and beverages, high in saturated fat, salt or sugars.[1,2] Poor dietary intake during childhood is likely to progress into adulthood and is linked to an increased risk of obesity and disease. [3,4] Research has identified the important role that school and childcare services can play in fostering healthy food environments and promoting healthy eating practices in children. [5,6] A number of interventions have focused on schools and early childhood education and care settings (0-5 years)[6–9] within Australia. Less attention, however, has been given to food environments within the out of school hours care (OSHC) setting for primary school aged children (5-12 years). Studies conducted within after school programs across the United States have frequently reported less than optimal food environments, with many services not achieving healthy eating standards.[10–12]

In Australia, a large number of children attend OSHC; before- and after school. [13] In the after school period, children are provided with an afternoon snack. Childcare in Australia is governed by the Australian Children's Education and Care Quality Authority to ensure that child education and care settings meet the National Quality Framework and its seven National Quality Standards.[14] The only directive regarding the quality of food and beverages is that all food provided should be consistent with the Australian Dietary Guidelines (ADG) and water should always be available. The ADG are whole of day guidelines which recommend consumption of a variety of foods from the five food groups (fruit, vegetables, grains, lean meats or alternatives and dairy) and to limit discretionary foods. Providing foods that align with the ADG can assist children to meet their daily nutritional requirements, especially of under-consumed food groups (e.g. vegetables).[15] However, apart from this, no sector-specific guidelines exist.

Data relating to the types of food and beverages offered in OSHC services is lacking, with the most recent Australian studies conducted prior to 2003[16–18] and none exploring the potential environmental factors associated with providing healthy food options. As attendance in after school care is growing, it is

important to understand what foods and beverages are available for children and what sector and setting-level factors may influence the availability of healthy foods.

A socio-ecological model is a useful framework when exploring food environments as it accounts for the complex connection between sectors (e.g. government policy and legislation), settings (e.g. childcare), and individual factors that impact upon a person's food choices and consumption behaviours.[19] For the purpose of this study, the focus is on connections between the food environment with sectors and settings.

This study aimed to 1) describe the types of foods and beverages offered within OSHC after school settings in two Local Health Districts in New South Wales (NSW), Australia, and 2) investigate sector-level and setting-level factors associated with OSHC services aligning the ADG.

5.2 METHODS

5.2.1 Study design and setting

A cross-sectional observational study was undertaken in OSHC services operating in the after school period across two Local Health Districts in NSW, Australia. The two districts contain metropolitan, suburban, regional and rural communities and a diverse range of socioeconomic areas.[20,21] Ethics approval was granted by the University of Wollongong Human Research Ethics Committee (HE17/490). The reporting of this research was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.[22]

5.2.2 Sample selection and recruitment

OSHC services from within the two districts were eligible to participate if they: operated from 15:00 - 18:00 during school terms; had a minimum of five primary school-aged children (5-12 years) enrolled each day; provided at least one afternoon snack; and were not exclusively advertised as a homework or physical activity-related club (e.g. dance academy or football club). Written informed consent was obtained from OSHC directors. OSHC service staff and parents were notified of the study via OSHC internal communication avenues and all information relating to this study was displayed at each OSHC service for a minimum of two weeks prior to data collection and during the data collection period. A detailed methodology has been previously published.[23]

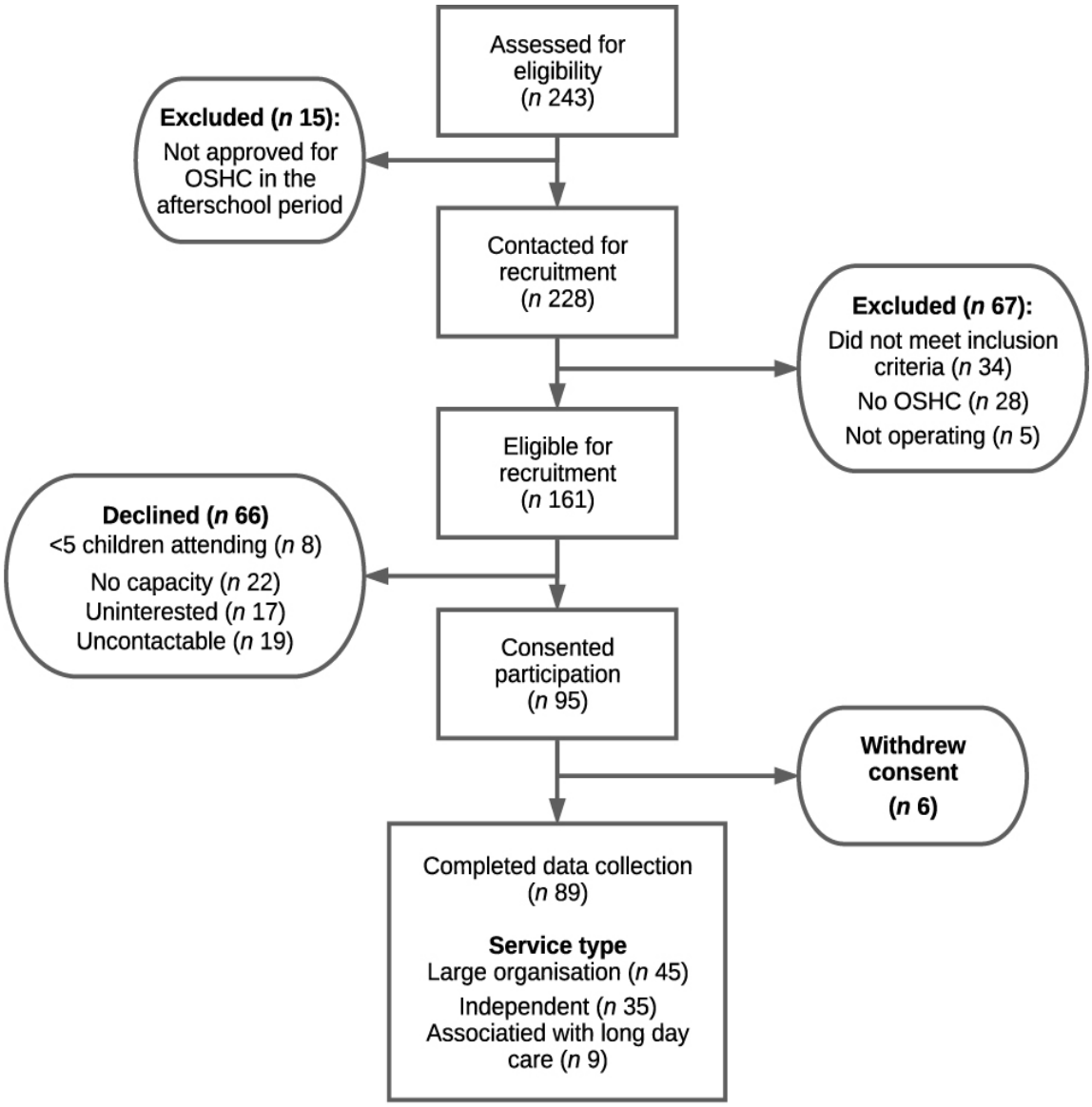

Figure 5. 1 A flow diagram of recruitment of Out of School Hours Care (OSHC) services.

5.2.3 Data collection

All data were collected by trained data collectors between March 2018 and April 2019. Training included classroom simulation and practical on-site training at a local, non-participating OSHC service. Data were collected from each participating OSHC service on two, non-consecutive weekdays.

5.2.4 Food and beverage observation and categorisation

The types of foods and beverages served to children were recorded via direct observation by trained data collectors, following previously published protocols.[12,24,25] Within this study, foods observed were reported as *offered*, rather than *consumed*, as the purpose of this study was to describe the types of foods served to children within the OSHC after school setting. Prior to foods being offered to children, they were recorded and photographed by a data collector. If foods were made prior to our arrival (e.g. cooked

meals or prepared sandwiches) recipes were collected and all available nutritional labels were documented and photographed. Following this, food items were coded into the five food groups of the ADG[4,26] with an additional sixth group for discretionary food items. Food groups were coded dichotomously, as offered or not offered and each food group was sub-categorised. For food sub-categories, see Table 5.1.

5.2.5 Sector-level factors

The Australian Bureau of Statistics, Socio-Economic Indexes for Areas, was used to classify each service into low, medium or high socio-economic area.[27]

5.2.6 Setting-level factors

A brief, semi-structured interview was conducted with each OSHC service director during one of the site visits. The interview explored the service healthy eating policies and practices and was guided by the Healthy Afterschool Activity and Nutrition Documentation (HAAND) tool.[28] If the service had a healthy eating policy a copy of the policy was requested. Policies were assessed and the level of detail was categorised as: non-specific (limited detail, only states foods will be offered that align with the ADG) [26] or specific (clear objectives e.g. serve a fruit and vegetable each day, beverages will only include water and milk). Practices that were assessed included a) annual staff nutrition training: no training (<1 hour per year) or training (≥1 hour per year); b) the use of food assessment methods to assess weekly menus against the ADGs: non-valid assessments (no or limited assessment) or valid assessments (dietitian or use of a nutrition calculator); and c) grocery expenditure which was divided by the number of children per day to calculate daily expenditure.

In addition to exploring service policies and practices, we also observed food preparation facilities and menus. The types of facilities were coded as either: limited (sink, refrigerator, limited bench space and food storage space); moderate (sink, refrigerator, microwave, moderate bench space and food storage space); or complete (sink, refrigerator, microwave, oven, stove, dishwasher, large bench space and food storage space).

Menus were photographed on each observation day. Although no menu collected contained specific instructions or a checklist to offer all five food groups, a portion of menu templates contained instructions or a checklist component to serve fruit, or fruit and vegetables daily. Therefore, for the purpose of this analysis, menus were reviewed regarding their inclusion of fruits and vegetables and were coded as: none

(no food groups mentioned), non-specific (serve a fruit or a vegetable daily) and specific (serve a fruit and a vegetable daily).

5.3 DATA ANALYSIS

Data were summarised using descriptive statistics, including frequency, mean (standard deviation) for food and beverages observed to offered across two observation days. Shapiro-Wilk tests indicated that all food data were skewed. A McNemar test was applied to explore if discretionary foods were offered more frequently than each of the five food groups (vegetables, fruit, grains, lean meats or meat alternatives, and dairy) with the McNemar-Bowker's test of symmetry used to investigate differences between site visits. For categories that showed significance, a chi-square/McNemar test was used to determine on which days the significant difference occurred. To control for multiple t-tests, a p value of < 0.017 was applied. Fisher's exact test was used to explore whether sector and setting-level factors were associated with OSHC services offering foods that aligned with the ADG, with a significance of $p < 0.05$. Sensitivity analyses were performed to assess the impact of misreported data from the director interviews. All analyses were conducted using SPSS software (version 24, IBM Corporation, Armonk, NY, USA). Data were analysed in 2019-2020.

5.4 RESULTS

There were a total of 243 OSHC services in the two Local Health Districts at the time of recruitment (Figure 5.1). In total, 89 OSHC services (37%) participated in the study with 4,408 children in attendance across the two observation days. All services ran between 15:00 and 18:00, on at least four days a week and provided an afternoon snack to children.

5.4.1 Food groups and meal types offered

Fruit was the most frequently observed food group offered as part of the afternoon snack (1.82±0.47days), followed by discretionary foods (1.5±0.68 days), refined grains (0.98±0.78 days), dairy (0.97±0.81 days), vegetables (0.82±0.80 days), whole grain (0.45±0.75) and lean meats (0.22±0.54 days). The McNemar-Bowker's test indicated that discretionary foods were offered more frequently than vegetables ($p< 0.001$), dairy ($p = .013$) and lean meats or their alternatives ($p< 0.001$).The most commonly provided meal types consisted of fruit platters, sandwiches with confectionary fillings, healthy cooked meals and discretionary cooked meals (Table 5.2).

Table 5. 1 Food and beverage items provided by Out of School Hours Care services over a two day observation period.

Food group	Food description	Days (%) foods and beverages observed to be offered (n =176)
Fruit		**166 (94)**
	Fresh fruit	165 (94)
	Dried fruit	8 (5)
	Canned fruit	6 (3)
Vegetables		**77 (44)**
	Fresh/ raw	67 (38)
	Cooked vegetables in meals	10 (6)
Dairy or alternatives		**90 (51)**
	Cheese	66 (37)
	Milk	16 (9)
	Light milk	8 (5)
	Full cream milk	8 (5)
	Dairy alternatives	3 (2)
	Yoghurt	15 (9)
	Flavoured (full fat)	5 (3)
	Flavoured (reduced fat)	10 (6)
Lean meats or alternatives		**19 (11)**
	Beef or chicken	8 (5)
	Chickpeas/hummus/baked beans	8 (5)
	Eggs	1 (1)
	Tuna	2 (1)
Grains		**124 (70)**
	High fibre/whole grain	41 (23)
	Refined grain	88 (50)
Discretionary foods		**142 (81)**
	[a]Processed meats	48 (27)
	[b]High salt/ low fibre snacks	50 (28)
	[c]Sweet snacks	32 (18)
	[d]Confectionary	52 (29)
	[e]Discretionary dairy	16 (9)
Sauces and spreads		
	Sauces (Tomato / Barbecue / sweet chilli)	37 (21)
	Cream cheese	23 (13)
	Margarine	50 (28)
Beverages		
	Water	174 (99)
	100% fruit juice	2 (1)
	Fruit drink	2 (1)
	Milo™ (chocolate drink)	4 (2)

Foods may not have been provided in isolation, but with a combination of other reported items.
[a] includes *chicken nuggets, sausages, hotdogs/frankfurts, chorizo, luncheon meat, salami, cabanossi*
[b] includes *two-minute noodles, chips, savoury biscuits >1800kJ/100g, packet soup mix, savoury pastries*
[c] includes *chocolate, cakes, muffins, sweet biscuits/ cookies, jelly, muesli bars, sweet pastries*
[d] includes *jam, honey, cinnamon sugar, sprinkles/ hundreds-and-thousands*,
[e] includes *cream, ice-cream, custard, butter, frozen yogurt*

5.4.2 Sector and setting level factors

Sixty-four services (72%) provided their nutrition policy. Thirty-three services (37%) were part of a larger organisation and used the policy of the overarching organisation; therefore, 24 unique policies were collected. All policies were similar, using non-specific language throughout their documentation and, therefore, were excluded from Pearson's chi-square analyses.

Table 5. 2 Proportion (%) of meal types provided (cooked meals, sandwiches, platters and other) to children attending out of school hours care services in the after school period.

Meal type	**Description**	**Freq. (%) of meals observed**
Cooked meals		
	Healthy	42 (24)
	Discretionary	25 (14)
Sandwiches		
	Confectionary	47 (26)
	Lean meat or alternative	13 (7)
	Salad	10 (6)
Platter		
	Fruit	51 (29)
	Fruit & Vegetable	20 (11)
	Savoury	21 (12)
Other		
	Dessert	8 (4)
	Fruit & Dairy	19 (11)

Healthy cooked meals include (pasta, rice, curry/ stir-fry).
Discretionary cooked meals include (chicken nuggets, sausage/ hotdog, pasties/ pies/ pizza scroll, two-minute noodles).
Confectionary sandwiches include (fillings of jam/ honey/ sprinkles/ hundreds and thousands)
Meat based sandwiches include (fillings of tuna, chicken breast, eggs)
Savoury platters include (could include a mixture of biscuits, dips, processed meats (cabanossi), cheese or vegetable sticks)
Dessert include (cakes, muffins, slices, sweet biscuits, jelly,)
Fruit & Dairy include (fresh or canned fruits with yogurt or custard)

OSHC services operating out of a long day care facility and those who reported assessing the quality of their menus with valid methods (nutrition calculator or dietitian) offered more lean meats or alternatives (p= .002, and p= .004 respectively) (Table 5.3). OSHC associated with large organisations offered more vegetables (p=0.015) and discretionary foods (p=0.007). OSHC services that had menus which specified serving "fruit AND vegetables" daily, were observed to offer more fruits (p= 0.009), vegetables (p< 0.001) and whole grains (p=0.003).

5.4.3 Sensitivity analysis

Nine directors reported assessing the quality of their menus with "valid" methods. As five of these nine services reporting a valid method were from a large organisation, we assumed that all services from within one organisation would use the same method of assessing foods offered. The sensitivity analysis showed no differences in the results (p< 0.005).

Table 5. 3 The associations between sector-level and setting-level factors and the provision of food groups aligning with the Australian Dietary Guidelines on any observation day.

Service characteristics	[a]Fruit (%)	[b]Vegetable (%)	[c]Dairy/ alternatives (%)	[d]Lean meats/ alternatives (%)	[e]Refined Grains (%)	[f]Whole grain (%)	[g]Discretionary (%)
SECTOR -LEVEL							
SEIFA ranking							
Low (n=40)	95	55	62	15	30	20	85
Medium (n=31)	96	70	80	20	43	43	97
High (n=18)	100	44	50	20	39	28	90
SETTING-LEVEL							
Service type							
Large organisation (n=43)	100	**72***	70	11	49	35	**98***
Independent (n=37)	92	40	62	14	27	27	87
Long day care (n=9)	100	62	62	**63***	12	12	62
Kitchen facilities							
Limited (n=14)	100	57	71	0	100	43	93
Moderate (n=21)	100	75	65	15	80	15	85
Complete (n=54)	94	52	65	22	87	32	91
Staff training							
No training (n=59)	98	60	66	17	36	31	88
Training (n=30)	93	53	67	17	37	27	93
Daily cost of food, AUD$							
≤ $0.39 (n=34)	94	59	62	12	47	41	94
$0.40 – $0.69 (n=34)	100	49	63	15	24	27	85
≥ $0.70 (n=21)	95	71	76	29	38	14	91
Food quality assessment							
None (n=44)	100	63	60	9	42	33	88
Non-valid (n=36)	94	50	69	17	25	19	89
Valid (n=9)	89	67	78	**56***	56	56	100
Menu							
None (n=14)	**84***	47	53	26	84	21	79
Non-specific	100	39	63	21	68	16	92

(Fruits OR vegetable) (n=44)							
Specific (Fruits AND vegetable) (n=31)	100	**87***	77	7	58	**52***	93

Socio-Economic Index for Areas (SEIFA)

[a] Includes all fresh, frozen, canned in natural juice (not syrup). Excludes dried fruit and fruit juices.

[b] Includes vegetables that are fresh, frozen, cooked or canned.

[c] Includes fish, eggs, lean meat and poultry, nuts, seeds, legumes and beans.

[d] Includes milk, cheese, yoghurt, milk alternatives (calcium fortified alternatives). Excludes cream, sour cream, dairy desserts or iced confectionary (ice cream or frozen yoghurts),

[e] Includes all grains, bread, cereals, rice, pasta, noodles, couscous and polenta,

[f] Includes all grains products specified as whole grain, whole meal, rye, barley, oats and quinoa.

[g]Includes cream, sweet biscuits, cakes, pastries, pies, processed meat, chips or savoury crackers >1800kJ/100g, high sugar/ salt/ fat spreads, sugar-sweetened beverages and lollies/ candy.

5.5 DISCUSSION

This cross-sectional study observed the food and beverages provided to children (5-12 years), across a large sample of OSHC after school services in NSW. To the authors' knowledge, this is the first observational study to explore both the food and beverages offered and sector-level and setting-level factors that may influence compliance with ADG within Australian OSHC services. Fruit was found to be the most frequently offered food group across all OSHC, however, discretionary foods were observed significantly more than vegetables, dairy and lean meats or their alternatives. Water was the most frequent provided beverage type. Results indicated a number of environmental factors were found to be associated with offering food groups aligning with the ADG.

Discretionary foods are recommended to be consumed infrequently and in small amounts,[26] yet our results indicated that discretionary foods may frequently be offered by OSHC services. Although the ADG are an important national resource, their appropriateness as the sole resource for the OSHC setting may be unsuitable as before-school and after-school services only provide breakfast or one afternoon snack across a child's day. To consider this within the context of a day, findings from the National Health Survey report that discretionary foods, specifically cakes, sweet biscuits (cookies) and processed meats, are some of the primary sources of energy, saturated fats, added salt and sugars within children's diets.[29] Additionally, a NSW study reported children to have on average, 1.5 serves of discretionary foods already within their school lunch boxes[30,31] earlier in the day. As Australian children may be exceeding recommended serves of discretionary foods outside of the OSHC setting, it highlights the need for clear healthy eating guidelines specific to the OSHC sector, especially regarding discretionary foods. An example of how clear guidelines and policy within the school setting may have had a positive influence on the OSCH sector, can be seen by comparing beverage data before and after the introduction of the mandatory cessation of the sale of sugar sweetened beverages in NSW Government schools in 2007 by the NSW Government. Data collected in OSHC services prior to this date reports 24% of services offering sugary beverages (cordial) to children,[17] in comparison to just 1% of services in the present study.

Other childcare settings, such as Early Childhood Education and Care, have clear sector-specific guidelines ("Caring for Children - birth to 5yrs"),[32] to assist their services to offer foods consistent with

the ADG, [4] Infant Feeding Guidelines [33] and the National Quality Standards.[14] *"*Caring for Children - birth to 5 years*"* contains a detailed menu planning section outlining the type and quantity that each food group should provide each day. Serving lean meats or alternatives daily is one such requirement. This clearly specified requirement may have indirectly impacted the behaviour of OSHC services associated with long day care (primarily a care setting for 0-5years) and may explain why these services were observed to offer significantly more lean meats within our study; as a portion of the lunch time meal was provided during the afternoon OSHC. Further to this, the use of valid food quality assessment methods (dietitian or nutrition calculator), at least once per year, was also positively associated with services offering more lean meats or their alternative. As lean meats were seldom observed within our sample, the provision of annual menu support, such as dietitian or nutrition calculator, may assist support OSHC services to make achievable improvements to their menu practices and provide foods that align with dietary guideline recommendations.

Although our findings demonstrate OSHC services are regularly providing fruits, vegetables were observed on less than half of the observation days. Interestingly, we found significantly more vegetables and whole grains to be offered at services that used menu planning templates with a checklist instructing the provision of "fruit and vegetables" daily. These types of menu planning templates were found mostly in OSHC services associated with large organisations, who disseminated a uniform template across all of their services and may explain why these services were more likely to offer vegetables. It is, however, unclear why whole grains were associated with menu planning templates specifying to offer "fruit and vegetables" and may be a chance finding. Although uniformity in menu templates can equate to positive behaviours such as serving more vegetables, we found that the opposite was also possible. Large organisations in this sample were also linked to offering discretionary foods more frequently, which may be due to organisations within our study using an identical daily menu across each of their services, with their daily menu consisting of sandwiches, processed meat, cream cheese, jam and honey with a fruit and vegetable platter. Producing menus compliant with dietary guidelines has been identified throughout the literature as a complex task[34] with a number of key barriers including, a lack of training, resources and ongoing support.[35–37]

Evidence from systematic reviews indicates that in order to make significant behaviour changes, and to support menu development to align with dietary guidelines, multi-component interventions are needed

within childcare settings.[5,36] A randomised controlled trial, conducted in NSW, within the early childhood education and care sector applied a multicomponent intervention focusing on: staff training (menu planning workshops), menu audits and feedback, face-to-face support and additional resources (menu planning template/checklist).[38] The intervention found a significant improvement in recommended food groups on planned menus compared to the control group, and a significant increase in child vegetable and fruit consumption only in the intervention group.[38] Although nutrition training was not found to be associated with food groups served within our study, this may be due to the type, quality and frequency of the training provided. Currently in NSW, there is no tailored nutrition training, menu development support or feedback available to OSHC services and, therefore, any training provided to OSHC staff would have been organised internally and may not have been sufficient to produce behaviour change. Future interventions should trial the effect of sector-specific guidelines, nutrition training and menu planning tools to support effective behaviour changes within the OSHC setting.

The findings in our study need to be considered in context of its limitations. Firstly, although this study sample included a number of services from a diverse geographical landscape, all services were recruited from within two health districts in NSW and may not be representative across NSW or Australia. Secondly, this study observed food groups provided by OSHC and did not report on the number of servings per child nor actual consumption of food and beverages.

5.6 CONCLUSION

Findings from this study indicate that OSHC services in NSW may not be providing foods in accordance with ADG, specifically for vegetables, lean meats and their alternatives, dairy and discretionary foods. Introducing a menu planning tool specific to the OSHC setting may be a useful and cost-effective resource to provide a variety of food groups aligning with the dietary guidelines. Future research should focus on the impact of multiple-component interventions (such as the development of sector-specific guidelines, training opportunities, and menu planning tool) on the quality of foods offered within NSW OSHC services.

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Chapter 6: Exploring healthy eating and physical activity policies and staff practices in out of school hours care: a cross-sectional study.

The previous chapters have explored the healthy eating environments and investigated sector and setting-level factors that may be associated with OSHC services offering foods aligning with the ADG. The chapters reported services regularly offered fruit and water, however, discretionary foods were also frequently provided. Evidence implied the implementation of clear menu planning guidelines (similar to the early childhood sector) and menu planning templates may assist OSHC provide children with food groups more consistent with dietary recommendations. The following chapter sought to explore the policy environments related to both healthy eating and physical activity to investigate the impact of policy on practice. This chapter addresses the following research aim and questions.

Aim 3: *To investigate the relationship between healthy eating and physical activity policy environments and staff practices within OSHC services.*

Research Question 3:

i) What is the association between healthy eating policy elements and staff healthy eating practices?

ii) What is the association between the quality of physical activity policies and child physical activity levels?

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6.1 INTRODUCTION

The establishment of children's healthy eating and physical activity behaviours play a key role in childhood obesity prevention and are protective against obesity in adulthood.[1] However, a large proportion of Australian children are not meeting national guidelines for vegetable consumption, physical activity, and recreational screen-time.[2] The after school period (15:00 – 18:00), is an important time in a child's day when considering children's healthy eating and physical activity (HEPA) behaviours. Children can accumulate one quarter of their daily moderate-to-vigorous physical activity (MVPA) and up to 80% of their recreational screen-time[3] during this time. Additionally, snack foods are commonly consumed to bridge the gap between lunch and the evening meal which can make an important contribution to meeting daily nutrition requirements.[4] In Australia, 31% of children attend out of school hours care (OSHC)[5] and, as such, is an important setting for promoting HEPA practices to children.[4,6]

However, research to date indicates that HEPA practices in this setting could be improved. A study that explored healthy eating environments within a sample of OSHC services in New South Wales (NSW), Australia found discretionary foods were offered more frequently than vegetables, milk, yoghurt and cheese, and whole grain foods.[7] In a South Australian study, opportunities for children to engage in MVPA ranged from 4% to 49% of program time and recreational screen-time varied from 0% to 41% of program time.[8] Further, staff were rarely observed engaging in physical activity with children (16% of time) or verbally encouraging physical activity practices (12% of time).[8]

International studies have shown that the presence of clearly worded policies that include measurable and achievable goals can help OSHC services create healthier environments.[9] For example "serve a fruit or vegetables everyday" or "provide children with 30 minutes of MVPA"), was shown to be associated with higher quality food and beverages offered and increased level of MVPA.[9–12]

In Australia, OSHC services are regulated under the National Quality Framework which includes the National Quality Standards (NQS) and the Education and Care Services National Laws and Regulations.[13] The promotion of HEPA falls under Quality Area 2, Element 2.1.3, which describes potential practices that may be implemented to meet the National Quality Framework. For example, healthy eating may be promoted through staff sitting with children during snack times and physical

activity may be promoted via scheduling opportunities for planned and spontaneous physical activity. These practices are not designed to be prescriptive; rather they provide suggestions for promoting HEPA. Although nutrition policies are mandatory, there are no requirements for what should be included within them, except for those within the national regulations (Table 6.1).[14] While physical activity policies are recommended, they are not mandatory within OSHC services.

To the authors' knowledge, no study has reported on the policy environments within Australian OSHC services. Further, no study has investigated how service-level policy elements impact staff healthy eating practices or child physical activity levels. Therefore, this study aimed to examine the quality of HEPA policy environments and their association with staff health promotion practices and child physical activity levels while attending OSHC in NSW, Australia.

6.2 METHODS

Recruitment occurred in 2017 and there were 243 OSHC services registered on the Australian Children's Education and Care Quality Authority (ACECQA) website at this time.[15] OSHC services were eligible to participate in the study if they: a) provided care to primary (elementary) school aged children (kindergarten to 6th grade), b) operated during after school hours (15:00 – 18:00hr), c) were located within the Illawarra Shoalhaven or South Western Sydney Local Health Districts in NSW, Australia, and d) had more than five children enrolled each day. Eligible OSHC services (n=161) were contacted for recruitment via email or telephone. Ethical approval was granted by the University of Wollongong Human Research Ethics Committee (HE17/490). The reporting of this research was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Table 6. 1 Required practices, as stipulated by the NSW Education and Care Services National Regulations, for all childcare services who provide food and beverages to children.

Regulation Number	**Required Practice**
Regulation 78	Childcare services offering food and beverages must provide: a) access to drinking water,
Regulation 79	a) food and beverages provided are nutritious and adequate in quantity; and b) appropriate to the needs of the children; including

	a. growth and development needs b. Specific cultural, religious and health requirements.
Regulation 80	All services must ensure that a weekly menu: a) Is displayed for parents and children and; b) Accurately describes the foods and beverages provided.

6.2.1 Procedures

A set of systematic instruments, validated for after school programs, were selected.[16–18] A brief description of the procedures and measures are provided below and a detailed protocol has been published elsewhere.[19] Each service was visited, unannounced, on two non-consecutive days by trained data collectors between March 2018 and April 2019.

6.2.2 Policy environments

HEPA policy environments were assessed via the Healthy After school Activity and Nutrition Document (HAAND) tool [20] via a structured short interview and policy observation. [17] Service-level HEPA policies were reviewed on site, and a copy requested. HAAND consists of two sub-scales; 1) the Healthy After School Program Index for Physical Activity (HAPI-PA) and 2) the Healthy After School Program Index for Nutrition (HAPI-N) scale. Both scales are validated specifically for HEPA practices within the after-school setting, [17,20] and provides each service with a numerical score that indicates the strength of their HEPA environments. The scale is based on a range of HEPA practices and documents including written HEPA policies, staff training, HEPA promotion materials, snack food quality, children's involvement in planning menus and daily programs, physical activity schedules, recreational screen-time, and HEPA evaluation methods. Each practice has a numerical value and assigns points between 0 to 4 to reflect the varying level a service may be implementing a practice. For example, if a service reported offering no vegetables across a week they were awarded 0 points, however, if a service provided a vegetable everyday they were awarded 4 points. Scores for each item were summed to provide an overall numerical value or score (HAPI-PA scored out of 25 and HAPI-N scored out of 34), with higher scores representing stronger HEPA policy environments. The original scale with questions, scores and star ratings have been provided in Appendix I.

6.2.3 Direct observation

Daily programs, menus and staff behaviours during mealtimes were captured via direct observation, following previously established procedures.[12] Each observation day, physical activity programs and snack menus were captured via digital photography. Additionally, data collectors used a data collection exit checklist to record if the staff were wearing active footwear and whether schedules and menus were on display for the parents to view and aligned with food provided.

6.2.4 Nutrition policy review

The relationship between service-level policies and staff promotion practices were explored by policy review and direct observation. Firstly, policies were reviewed for documented practices, referred to as policy elements, based on practices described within the NQS (QA 2, Element 2.1.3) (see Table 6.3). The inclusion of a policy element was coded as 'present' or 'not present'. Secondly, staff healthy eating promotion practices were captured via direct observation. Practices were coded as 'observed' or 'not observed'.

6.2.5 Physical activity policy review

Due to the limited service-level physical activity policies available, the relationship between physical activity policies and accelerometry-derived child activity levels were explored using the summed HAPI-PA scores and child accelerometry data. Each service HAPI-PA scores were summed and rated, with higher star rating (5-Stars) indicating a stronger physical activity policy environment.

6.2.6 Accelerometry

Child physical activity was measured using Acti-Graph (GT3X+ model) accelerometers, initialised at a sampling rate of 30 Hz. Upon arrival at the OSHC, children were fitted with an accelerometer and the time accelerometers were fitted was recorded (time-on). As children departed the service, data collectors removed the device and recorded the time (time-off). A valid accelerometry day was defined as wear time of at least 60 minutes.[21]

6.3 STATISTICAL ANALYSIS

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 27 (IBM Corp, Armonk, NY, USA). Descriptive means, frequencies and percentages for dichotomous variables were calculated. Chi Square and Fisher's exact tests were used to investigate if the presence of policy elements

were associated with positive staff practices (e.g. staff sitting eating with children during mealtimes). ANCOVA with Bonferroni adjustments (controlled for sex, age and % of wear time) were used to explore the relationship between physical activity policies (HAPI-PA scores) and child physical activity intensities. Means and Standard Errors (SE) were calculated for time spent in activity levels: sedentary, light activity, MVPA and total physical activity. Statistical significance was set at $p<.05$.

6.4 RESULTS

Of the 161 eligible OSHC services contacted, 89 participated (55%). A total of 4,408 children attended the services, with 3,613 valid accelerometry days. All participating services completed a HAAND interview. HAPI-N scores ranged from: 2-Stars (n = 8, 9%), 3-Stars (n = 54, 60%), 4-Star (n = 23, 26%) and 5-Stars (n = 2, 2%). HAPI-PA ratings ranged from: 1-Star (n = 19, 21%), 2-Star (n = 38, 43%), 3-Star (n = 25, 28%), and 4-Star (n = 6, 7%). No service scored a 5-Star rating for their physical activity policy environments (Table 6.2).

Table 6. 2 Description of service-level policy characteristics captured using the Healthy Afterschool Activity and Nutrition Documentation (HAAND) instrument.

HEPA items	Level	HAPI-PA n = 89 (%)	HAPI-N n = 89 (%)
Policy	No written policy	86 (97)	0 (0)
	Written policy, non-specific language	3 (3)	84 (93)
	Written policy explicit language (ie. measurable)	0 (0)	5 (6)
Child feedback	None	5 (6)	12 (13)
	Informal (verbal)	62 (70)	55 (62)
	Formal (survey)	22 (25)	22 (24)
Staff training	No training	49 (55)	58 (65)
	1-4 hours of training/ year	40 (45)	23 (25)
	+4 hours of training/ year	0 (0)	7 (8)
Staff training quality	No training	49 (55)	58 (65)
	Training conducted by non-certified personnel	14 (16)	8 (9)
	Training conducted by certified personnel	26 (29)	23 (25)
HEPA promotion workshops for parents	None	87 (98)	83 (92)
	1 workshop/ year	2 (2)	6 (7)
	2+ workshops/ year	0 (0)	0 (0)
HEPA curricula	None	69 (78)	64 (72)
	Non-evidence based	7 (8)	13 (15)
	Evidence based	11 (12)	12 (13)

Evaluation	None	61 (69)	44 (49)
	One evaluation using non-valid methods (self-report)	6 (7)	17 (19)
	2+ evaluation using non-valid methods (self-report)	20 (22)	19 (21)
	One evaluation using valid methods (accelerometry/ nutrition calculator or dietitian)	0 (0)	5 (6)
	2+ evaluation using non-valid methods (accelerometry/ nutrition calculator or dietitian)	1 (1)	4 (5)
Recreational screen time	None	25 (28)	-
	< an hour a day	55 (62)	-
	An hour or more per day	9 (10)	-
Scheduled PA	<25% of program	5 (6)	-
	25-49% of program	63 (71)	-
	>50% of program	21 (24)	-
Structured activities	Free play only	38 (43)	-
	1-2 structured activities/ day	49 (55)	-
	3 + structured activities/ day	1 (1)	-
Gender equity	Activities favour one sex	0 (0)	-
	Activities are equitable	89 (100)	-
Fresh fruit	None	-	0 (0)
	1 time/ week	-	0 (0)
	2 times/ week	-	1 (1)
	3 times/ week	-	3 (3)
	4 times/ week	-	85 (95)
Fresh, uncooked vegetables	None	-	3 (3)
	1 time/ week	-	24 (27)
	2 times/ week	-	13 (15)
	3 times/ week	-	12 (13)
	4 times/ week	-	36 (40)
Whole grains	None	-	19 (21)
	1 time/ week	-	22 (24)
	2 times/ week	-	20 (22)
	3 times/ week	-	12 (13)
	4 times/ week	-	15 (17)
Sugar sweetened beverages	None	-	85 (96)
	1 time/ week	-	4 (4)
	2 times/ week	-	0 (0)
	3 times/ week	-	0 (0)
	4 times/ week	-	0 (0)
Access to vending machines	None	-	88 (89)
	Access	-	1 (1)

	Total HAPI score (average)	**9**	**18**
	HAPI score range	**2 - 18**	**11 - 29**

HAPI-PA, Healthy After school Program Index for physical activity, scored out of 25;
HAPI-N, Healthy After school Program Index for Nutrition, scored out of 34.
PA, physical activity

6.4.1 Healthy eating and physical activity promotion practices

Over the two observation days, all services provided children with an afternoon snack. Staff provided access to water daily, and sufficient amounts of food for children to have second servings (1.91±0.36/2days). Menus were regularly available (1.98±0.15/2days), on display (1.77±0.59/2days) and consistent with what was offered (1.69±0.58/2days). Staff rarely sat with children during meal times (0.38±0.63/2days); used nutrition promotion activities; had conversations to promote/ educate children about nutrition (0.15±0.39/2days); or involved children in food preparation or cooking activities (0.15±0.39/2days). On at least one observation day staff from nine services were observed consuming discretionary drinks (i.e. energy drinks, soft drinks) and staff from 14 services were observed consuming discretionary foods (i.e. crisps, chocolate bars).

Staff were observed to frequently wear active footwear (1.87±0.40/2days); engage in active games (1.15±0.72/2days); and verbally encourage children during physical activity sessions (1.06±0.77/2days). Staff withholding physical activity from children as a form of punishment (0.28±0.62/2days) was very rarely seen.

6.4.2 Nutrition policy and healthy eating practices

Sixty-four services (72%) provided their nutrition policy to the researchers for review. Table 6.3 displays the relationship between policy elements and observed staff practices. Positive associations were found between service-level policies and staff using healthy eating promotion/ education (games or activities to promote healthy eating to children) ($p = .027$); regularly consulting with families and children regarding foods they liked/ disliked ($p < .001$); and involving children and families in menu development and recipe sharing ($p = .011$). A negative association was found between policies instructing the staff to role model healthy eating practices to the children and researcher observed occurrences of staff sitting with children during mealtimes ($p = .020$).

Table 6. 3 The association between service-level nutrition policy elements and OSHC staff healthy eating practices observed on at least one observation day.

Policy Elements	Included in service-level policy N = 64 (%)	Practice observed on at least one day N = 64 (%)	χ^2 (df)	*P*	Phi
Engage children in conversations that promote healthy, balanced lifestyles	39 (61)	13 (20)	.451(1)	.535	-.085
Games, conversation or activities that promote understanding or knowledge of how to make healthier food choices.	**47 (73)**	**13 (20)**	**5.576(1)**	**.027**	.298
Use cooking experiences to educate children in healthy eating	23 (36)	7 (10)	-	.699[b]	.047
Staff role model healthy eating practices during mealtimes	**49 (77)**	**19 (30)**	**6.222(1)**	**.013**	**-.314**
Food never used as rewards	20 (31)	60 (93)	.004(1)	.952	-.008
Food never used as punishment	31 (48)	-		-	
Provide food and beverages that are nutritious and adequate in quantity*[a]	56 (88)	-	-	-	-
Water is available daily*	64 (100)	64 (100)	-	-	-
Children and families are consulted regarding food they like and dislike	**35 (55)**	**16 (25)**	**12.671 (1)**	**< .001**	**.448**
Children and families should be included in the planning and selecting of healthy meal options	**38 (59)**	**30 (47)**	**-**	**.011**	**.322**
Healthy eating training and skill development is available for staff members each year	27 (42)	16 (25)		.884[b]	
Menus are to be provided*	62 (97)	64 (100)	-	-	-
Menus are to be on display*	61 (95)	62 (97)		1.000[b]	
Menus are consistent with what is provided*	36 (56)	60 (94)	-	.572[b]	
Provide food and beverages appropriate to the needs of each child*[a]	41 (64)	-	-	-	

Note: Policy elements are based on practices described within the National Quality Standards (QA 2, Element 2.1.3).
Policy elements indicated with a (*) refer to those elements found within National Regulations (78,79 or 80) and have an associated monetary fine if not practiced.
Policy elements indicated with an (a) refer to those elements that could not be quantified and reported on due to their qualitative nature.
Fisher's Exact test are indicated by (b) and have no statistics to report other than p-value.

6.4.3 Physical activity policy and practice

Twenty-two services reported having a physical activity policy, however, upon request only three services (3%) were able to provide an example of their policy; none of which used explicit language to specify how much time should be allocated to physical activity or screen-time, nor the types of activities that might be provided (staff-led games versus child-led play). As shown in Figure 6.1, children were sedentary for an average of 33 minutes per day, and spent an average of 21 minutes/ day in MVPA and 67 minutes/ day in total physical activity (Figure 6.1). Children attending services with the highest scoring HAPI-PA, spent significantly less time sedentary (p<.001), had an additional five minutes in MVPA (p<.001), and four minutes more in total physical activity (TPA) (p<.001), compared to those in the lowest scoring services (Figure 6.1).

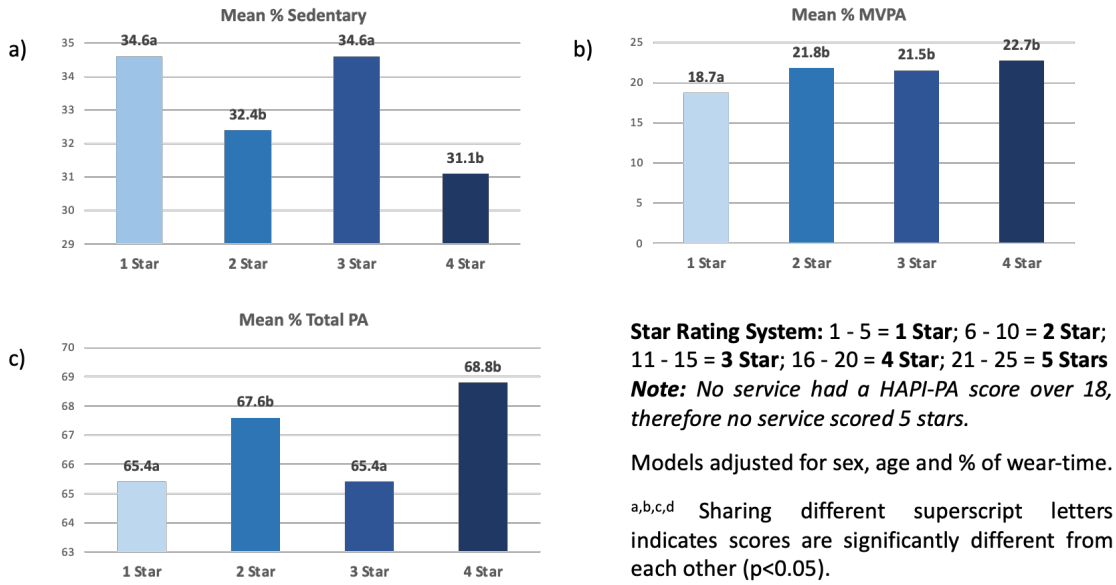

Figure 6. 1 The relationship between physical activity policy environments (rated using the HAPI -PA scores) and accelerometry derived activity intensity levels (expressed in % of wear time).

6.5 DISCUSSION

This study examined the HEPA policies and practices within OSHC after school services and their associations with staff health promotion practices and child physical activity levels. Some policy elements were associated with observed staff practices. Children who attended services that rated highest for physical activity spent significantly more time in MVPA, TPA and less time being sedentary compared to services that rated lowest.

6.5.1 Healthy eating

Our study indicates that policies may be effective at influencing staff practices when they are supported by national regulations. Of all the policy elements and practices that were observed, all services had a nutrition policy and provided water, while menus were displayed (> 95%) by almost all services. This is in contrast to Sangster et al. (2004), who reported that only 34% of OSHC services had a nutrition policy, and 39% had a written afternoon tea menu of which only half were displayed for parents.[22] Although, the majority of policies (88%) included a statement reflecting Regulation 79 (Table 6.1) in relation to food "adequate in quantity", we were not able to quantify their compliance due to the qualitative nature of the regulation. Nevertheless, we did observe OSHC services frequently provided enough food for additional servings if children requested.

Additionally, positive relationships were found between service-level policy elements and observed practices. Children and families are consulted regarding food they like and dislike and, children and families should be included in the planning and selecting of healthy meal options' being included in the nutrition policy and this practice being observed. Conversely a US study reported after school programs rarely collected formal feedback from families regarding foods children liked/ disliked.[18] Possible reasons this was observed in our study may be attributed to OSHC services attempting to meet the requirements found within the national regulations and NQS. Regulation 79 and, one of the six guiding principles of the NQS is to have a *collaborative partnership with families* (QA2 and QA6 of the NQS). Therefore, these practices may reflect how OSHC services interpret the policy requirements and attempt to operationalise them. Another association found that services who practiced healthy eating promotion/ education also had a policy element of engaging children in activities, conversations or games to promote healthy eating. Similar to other studies, healthy eating promotion/ education was rarely observed within OSHC settings,[23,24] and although healthy eating training has been suggested as a strategy to improve these practices, it was unclear why it was observed in our services as only six of the 13 OSHC directors reported receiving healthy eating training from their OSHC.

A negative relationship was found between the policy element of staff role modelling healthy eating practices during mealtimes and this practice being observed. Although a large proportion of service-level policies included this policy element, few instances of role modelling were observed. Services without this policy element were more likely to be observed practicing role modelling behaviours compared to those services with a policy element. While this is counterintuitive, a similar phenomenon has been

observed in other childcare settings[25] highlighting the complex relationships between policy and practices.

6.5.2 Physical activity

This study found a lack of service-level physical activity policies within OSHC services. During the HAAND interview, just one quarter of directors reported scheduling more than 50% of their program to physical activity and half reported using a combination of free-play and structured activities. Screen-time was frequently reported, with 10% of the services permitting more than one hour each day. Physical activity promotion training was occasionally provided, but was not always conducted by qualified personnel. These findings are similar to Maher et al. (2019)[8] who found few South Australian OSHC services had physical activity policies; scheduled more than one third of program time to physical activity ; or provided staff physical activity training. Furthermore, Maher et al. (2019)[8] found that screen-time was widely available. With a lack of overarching national or state OSHC policies stipulating recommended levels of physical activity or screen-time, and limited staff training opportunities, the findings of these two Australian studies are not surprising.

Overall, OSHC services scored relatively low HAPI-PA scores, with no service achieving a 5-star policy rating. However, we did find a positive association between reduced sedentary behaviours, MVPA and TPA at the services that rated highest on the HAPI-PA scale (4-Star) compared to lowest (1-Star). The highest scoring services reported they: a) scheduled greater amounts of program time to physical activity ; b) had access to physical activity promotion training (conducted by certified trainers); and c) used evidence-based curricula to promote physical activity to children. These results are similar to other studies which found the types of activities scheduled, the structure of games, and staff training all impact child MVPA levels in the OSHC setting.[26–28] These studies also showed that scheduling 60 minutes or more to physical activity[26–28] and providing annual staff training[27] has a positive association with child MVPA. Conversely, inadequate training led to a weaker association with child physical activity levels often due to low-intensity activities (e.g. Yoga).[8] Furthermore, of the services using evidence-based curricula to promote physical activity, *Munch & Move*® was the most commonly used. *Munch & Move*® is a NSW Health training and education initiative, to train and support educators within the early childhood sector (birth to 5 years) to promote HEPA and reduce screen-time. Directors anecdotally reported a lack of resources available within the OSHC sector for programming ideas compared with the early childhood sector. These results indicate a need for additional support within OSHC services in NSW, including

professional development opportunities, and comprehensive OSHC specific physical activity and screen-time policies or guidelines.

This study has a number of strengths. It is the first-known Australian study to explore the relationship between HEPA policies and practice in OSHC services. It utilised OSHC specific validated tools to capture HEPA policy environments; and accelerometry to assess child physical activity levels. There were, however, some limitations.. Although many OSHC services participated from two Local Health Districts, including services from metropolitan and semi-rural locations, it is unclear how representative these findings are as all participating services were from one Australian state. This study collected data on only two site visits and, therefore, may not have represented typical behaviours.

6.6 CONCLUSION

The relationship between policies and practices are complex; regardless, our study findings indicated national policies may be effective in driving practice at a service level, especially when reinforced by national regulations. Overall, this study found that there is a need for more comprehensive HEPA policy environments within the Australian OSHC setting; in particular, those that contain clearly worded, achievable and measurable policy elements. Future interventions should focus on policy development, support and training specific to the OSHC sector to assist in increasing healthy eating promotion behaviours, reduce time spent sedentary and increase child MVPA and TPA.

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Chapter 7: Physical activity in Out of School Hours Care: an observational study.

The previous chapter explored the association between healthy eating and physical activity policy environments on staff practices and child physical activity levels. The study found when policies are supported by national regulations they can be effective for operationalising practice. While previous chapters have described the healthy eating and policy environments within OSHC services; no Australian study has explored physical activity levels of children using accelerometry devices. Therefore, the following chapter reports the physical activity levels of children and investigates the environmental factors associated with children meeting 30 minutes or more of MVPA while attending OSHC services.

The chapter addresses the following research aim and questions:

Aim 3: *To investigate objectively measured physical activity levels of children attending OSHC in the after school period.*

Research Question 3:

i. How active are children who attend OSHC in the after school period?
ii. What proportion of time is spent in sedentary, light physical activity, moderate, vigorous and total physical activity?
iii. What proportion of children meet 30 minutes or more of moderate- to vigorous-intensity physical activity in the afternoon? And what factors are associated with children meeting 30 minutes of MVPA while attending OSHC?

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7.1 INTRODUCTION

Moderate-to-vigorous physical activity (MVPA) is a vital part of a healthy lifestyle. Regular engagement in MVPA during childhood has not only been associated with numerous physical health outcomes including the protection against non-communicable diseases (e.g. type 2 diabetes mellitus, cardiovascular disease), and disease risk factors (e.g. high blood pressure and high cholesterol, overweight and obesity),[1] it is also associated with positive social and emotional health implications (e.g. reduced depression and anxiety).[2] Like many countries, Australia recommends children accumulate a minimum of 60 minutes of MVPA each day,[3] however, only 1 in 4 Australian children (aged 5-12years) are meeting this recommendation.[3]

With the vast majority of a child's school day spent sedentary, the after school period (15:00 -18:00hr) has been identified as a key time for children to accumulate up to half (30 minutes) of their recommended daily MVPA.[4,5,6] Out of school hours care (OSHC), under which sits after school care, is the second largest childcare setting in Australia, with more than 450,000 children attending each year.[7] However, device-measured physical activity (accelerometry) within OSHC is not well documented in Australia. Therefore, this study aimed to a) describe the physical activity environments in OSHC; b) explore factors associated with children meeting 30 minutes of MVPA while attending OSHC in the after school time period; and c) determine MVPA levels of children while attending OSHC.

7.2 METHODS

7.2.1 Participants and setting

A total of 243 OSHC services were registered on the Australian Children's Education and Care Quality Authority (ACECQA) website, in 2017, at the time of recruitment commenced. OSHC services were eligible to participate in the study if they a) provided care to primary-school aged children (Kindergarten to 6th grade) b) operated during afterschool hours (15:00 – 18:00hr), c) were located within the Illawarra Shoalhaven or South Western Sydney Local Health Districts in New South Wales, Australia, and d) had more than five students enrolled per day. Once the eligibility criteria were applied, a total of 161 OSHC services were contacted for recruitment. Written informed consent was obtained by each OSHC director. All parents/ guardians had the ability to opt-out (passive consent) their children from the research at any time. The study was advertised to staff, parents and guardians, for a minimum of two weeks prior to the

study commencement and throughout the data collection period. Advertisement consisted of several methods; including a) recruitment video and electronic participant information sheets/ opt-out forms were disseminated by each respective OSHC service to all families and employees; b) research notification posters, were displayed at each OSHC entrance, sign in/ out desks and on notice boards; and c) participant information sheets and opt-out forms were available at each sign in/out areas. All children were invited to wear an accelerometer while in attendance at the OSHC, unless parents/ guardians had opted their child out. All children were given the option to refuse their assent on the day of data collection.[6,8] Ethical approval was granted by the University of Wollongong Human Research Ethics Committee (HE17/490). A brief description of the study procedures are provided below and a detailed protocol has been published elsewhere.[8]

7.2.2 Physical activity measurements

Child physical activity was objectively measured using Acti-Graph GT3X+ model (ActiGraph Corporation, Pensacola, FL) accelerometers, initialised at a sampling rate of 30Hz. Upon arrival at the OSHC, children were fitted with an accelerometer, worn around the waist sitting at the right-hip. The time accelerometers were fitted was recorded (time-on) and child demographics (school grade and sex) were also collected. As children departed the service, data collectors, stationed near the exit, removed the device and recorded the time (time-off). A valid day of accelerometry data was defined as a child wearing the accelerometer for at least 60 minutes while in attendance at a service.[9,10]

7.2.3 Physical activity policies and practices

Physical activity policies and practices were initially captured via short, structured interviews with the service directors. The interview questions were guided by the validated Healthy Afterschool Activity and Nutrition Document (HAAND) tool[11] and captured information on service policies and practices, including: a) the presence of a physical activity policy, b) staff training, c) the use of physical activity promotion materials, d) the inclusion of children's voices when planning daily programs (children's feedback), and e) the use of recreational screen time (TV and handheld devices e.g. tablets/ smart phones).

The System for Observing Staff Promotion of Physical Activity and Nutrition (SOSPAN)[12] was used to capture physical activity promotion practices and behaviours, including the type and structure of physical activity opportunities within OSHC programs.[12,13] In brief, each service was visited, unannounced, on two non-consecutive days by trained data collectors between March 2018 and April 2019. The data were captured via continuously scanning, from left to right, in all rooms and zones consisting of five or more children and at least one staff member. Data collectors systematically rotated between zones, performing a minimum of five scans in each zone before moving into a different area. Scans were continuously completed from the commencement of the session until the end of the program or until less than five children remained at the service. Physical activity behaviours were coded as either: a) free play, which consisted of children playing in an unstructured manner with no direction or input from adults/ staff, b) organised play, usually involving structured games or activities with rules directed by staff (e.g. softball, dodgeball or stuck in the mud), and c) enrichment, a non-physical activity (e.g. reading, craft, quiet-play, or homework) typically performed indoors. Other behaviours captured, included: a) the level of staff interaction (i.e supervising only, engaging in physical activity , encouraging physical activity or leading/ instructing an activity), b) if games were able to engage a majority of the children, c) stand and wait time (i.e. were children lining-up and waiting their turn to play in a game), or d) elimination games (i.e. were participants eliminated from a game when they were deemed "out").

7.2.4 Available physical activity space

Indoor and outdoor spaces, accessible to children, were identified by staff prior to data collection. Designated areas were divided into zones and identified as physical activity areas (eg. open fields, basketball courts, fixed-equipment) or non-physical activity areas (classrooms, halls) and measured (metre^2) using a Craftright measuring wheel by data collectors.

7.2.5 Observer training and reliability

Data collectors were trained over a three-day period, using a combination of classroom simulations and field practice prior to the study commencement. Data collectors were required to meet >80% interrater-reliability via an interval-by-interval agreement on two consecutive days prior to data collection. Reliability scans were collected on each data collection day, with a minimum of 30% of scans used to calculate reliability.[14] Interrater-reliability was calculated using percentage agreement and Cohen's Kappa.[15] The median percentage agreement was 91% and a Kappa coefficient of 0.97 (ranging from 0.81 to 1.00).

7.3 STATISTICAL ANALYSIS

All accelerometry data was downloaded in 15-second epochs from ActiLife software and physical activity levels were calculated in Python software (Python Software Foundation, version 2.7) using Evenson cut-points.[16],[17] All descriptive means, standard deviations, frequencies, percentages and independent t-tests were calculated using SPSS software (v26, IBM Corporation, Armonk, NY, USA). All physical activity practices and behaviours were coded dichotomously, as either observed/reported or not observed/reported. The accumulated time (minutes) spent in various activity types (free-play, organised play and screen-time) were calculated using Microsoft Excel (Microsoft Excel, version.16.49) and the predefined activity categories and time stamping captured within the SOSPAN instrument. The association between program practices and children meeting 30 minutes of MVPA was tested using mixed effects logistic regression, adjusted by OSHC service and child using STATA (V15.1, College Station, TX).

7.4 RESULTS

Of the 161 eligible OSHC services contacted, 89 participated (55%). Seventy-four (83%) services were located on school grounds, nine (10%) in early childhood settings, five (6%) in community centres and one (1%) in a faith-based location. On average, sessions ran for 180 (±16.8) minutes and provided opportunities for children to be physically active for 97 (±41.1) minutes of the session. A total of 4,408 children attended the services, with 3,614 children wearing an accelerometer for a minimum of 60 minutes on at least one observation day. Children spent an average of 70.6 (±23.5) minutes in total physical activity and 22 (±12.8) minutes in MVPA/day (Table 7.1). Boys spent significantly more time in MVPA and less time sedentary (p <0.001) than girls.

Table 7. 1 Sedentary and physical activity levels of children attending Out of School Hours Care (OSHC) services in the after school period.

						Independent t-test	
Activity Levels	**Minutes Mean (SD)**	**Minutes Mean (SD)**	**Std. Err.**	**Minutes Mean (SD)**	**Std. Err.**	**Sig.**	**95% CI**
Mean time (minutes) spent sedentary and in physical activity levels							
	All children (n=3614)	**Girls (n =1521)**		**Boys (n =1514)**			
Sedentary	36.0 (19.5)	41.1 (19.8)	0.51	31.1 (18.0)	0.46	**< .001**	-11.38, -8.68
Light physical activity	48.4 (16.3)	48.5 (16.2)	0.42	49.3 (16.7)	0.43	.148	-0.31, 2.04
MVPA	22.1 (12.8)	18.5 (10.9)	0.28	25.7 (13.6)	0.35	**< .001**	6.38, 8.14
Total physical activity	70.6 (23.5)	67.0 (22.5)	0.58	75.0 (24.0)	0.62		
		Grade K - 2 (n = 1709)		**Grade 3 - 6 (n = 1326)**			
Sedentary		33.9 (18.6)	0.45	38.8 (20.5)	0.56	**.001**	-6.33, -3.54
Light physical activity		49.6 (18.0)	0.43	46.2 (16.5)	0.45	**< .001**	2.86, 5.20
MVPA		22.4 (12.8)	0.31	21.7 (12.7)	0.35	.167	-0.27, 1.57
Total physical activity		73.2 (23.6)	0.57	68.4 (23.4)	0.64		
Mean percentage (%) of wear time spent sedentary and in physical activity levels							
	All children (n=3614)	**Girls (n =1521)**		**Boys (n =1514)**			
Sedentary	33.5 (15.5)	37.7 (15.1)	0.39	29.1 (14.5)	0.37	**< .001**	-9.76, -7.65
Light physical activity	45.5 (10.3)	45.0 (10.4)	0.27	46.4 (10.2)	0.26	**< .001**	0.75, 2.22
MVPA	21.0 (11.4)	17.2 (9.5)	0.25	24.5 (11.8)	0.30	**< .001**	6.50, 8.00
Total physical activity	66.5 (15.5)	62.2 (15.1)	0.38	70.9 (14.5)	0.37		
		Infant (n = 1709)		**Primary (n = 1326)**			
Sedentary		31.5 (15.0)	0.36	35.9 (15.7)	0.43	**< .001**	-5.54, -3.35
Light physical activity		47.3 (10.1)	0.24	43.5 (10.2)	0.28	**< .001**	3.05, 4.50
MVPA		21.1 (11.4)	0.28	20.5 (11.2)	0.31	.109	-0.15, 1.48
Total physical activity		68.5 (14.9)	0.36	64.1 (15.7)	0.43		

Note: Missing descriptive (sex, age group) data of 579 children.
Bolded values are significant P <0.05
K - 2: kindergarten to year 2; Grade 3 - 6: years 3
MVPA: Moderate-to-vigorous physical activity

A total of 9,218 SOSPAN scans were completed across 178 observation days. The percentage of time spent in different activities comprised: 52% physical activity (38% child-led free play and 15% staff-led organised play), 43% enrichment, and 4% afternoon snack. Staff supervised children 98% of the time, engaged in physical activity with children 9% of the time, and instructed or led physical activities 11% of the time. A total of 26% of children met the criterion of 30 minutes or more of MVPA. Children who attended services that provided a combination of child-led free play with staff-led organised play spent significantly more time in MVPA than those services which only offered free play or organised play opportunities (Table 7.2).

Table 7. 2 Characteristics of reported and observed practices, environments and accumulated child physical activity across Out of School Hours Care (OSHC) services.

Reported program practices (Short interview)	**Freq.**	**%**	**Mean (SD)**
Written physical activity policy	20	22	
Physical activity promotion training by a certified training	26	29	
Physical activity promotion material used	18	20	
Children's voices and preferences are included in daily programming	87	97	
[b]Available physical activity space (m^2)			
Outdoor			3,616.6 (3182.7)
Indoor			70.3 (98.3)
Observed physical activity practices	**178**	**100**	
Child-led free play			
<29min	40	22	
30-59min	54	30	
>60min	83	46	
Staff-led organised play			
None	98	55	
<29min	34	19	
>30min	41	23	
Recreational screen time	55	30	
>30min	34	19	
Recreational handheld devices (i-pads, tablets, smart-phones)	54	30	
Active games that engage the majority of children	46	25	
Active games consisting of elimination components	46	25	
Child stand and wait games	15	8	
Staff engage in physical play	104	58	
Homework	45	25	
[d]Mean minutes of moderate-to-vigorous physical activity (MVPA) accumulated in different activities types			
Child-led free play only	1869	52	21.5 (12.8)
Staff-led organised play	119	3	16.3 (10.5)
Both free play and organised play	1573	44	**24.0 (12.6)**
None	52	1	8.2 (8.0)

% of children meeting 30min> MVPA			Pearson's Chi Square
Total children	**925**	**26**	
[a]Boys (n= 1514)	546	15	***p*< .001**
[a]Girls (n =15521)	235	6.5	
[a] **Grade** K - Year 2 (n= 1709)	453	12	*p .366*
[a] **Grade** 3 – Year 6 (n =1326)	327	9	

[a]Missing descriptive (sex, age) data of 579 children

[b]Measured on site, in metres using a craft.right measuring wheel

[c]Physical activity data collected using Actigraph wGT3X-BT model accelerometers

Note: Bolded values are significant P< 0.05

Services that provided opportunities for 30-59 minutes (OR=2.6; 95%CI 1.7-4.0), or more than 60 minutes of child-led free play (OR=6.4; 95%CI 3.9-10.5); 30 minutes or more of scheduled staff-led organised play (OR=2.3; 95%CI 1.5-3.8); or facilitated games which engaged the majority of children (OR=1.7; 95%CI 1.1-2.6), were more likely to have children meet the 30 minutes of MVPA guideline while attending OSHC services (Table 7.3). Services that played games with children that included an elimination component were less likely to meet the recommended 30 minutes of MVPA than those that did not (OR=0.6; 95%CI 0.4-0.9). The presence of a physical activity policy, staff training, the use of physical activity promotion material, recreational screen time, incorporating child activity preferences, stand and wait games and staff engaging in physical activity with children were not associated with children meeting 30 minutes of MVPA while at the OSHC service.

Table 7. 3 Association of Out of School Hours (OSHC) service physical activity promotion practices on child attainment of more than 30minutes of moderate-to-vigorous physical activity (MVPA) in the after school period.

Physical Activity Promotion Practices	OR	95%CI	*P value*
Physical activity policy			
No (Ref)	-	-	-
Yes	1.0	(0.65, 1.55)	0.968
Staff training in physical activity promotion			
No (Ref)	-	-	-
Yes	1.3	(0.94, 1.96)	0.102
Use of physical activity promotion material			
No (Ref)	-	-	-
Yes	1.0	(0.49, 2.11)	0.953
Recreational screen time available (TV, movies, computer, video games)			
No (Ref)	-	-	-
Yes	0.8	(0.54, 1.07)	0.121
Recreational handheld devices (i-pad, phones, Tablet) available			
No (Ref)	-	-	-

Yes	0.7	(0.50, 1.02)	0.069
Children's voices and activity preferences are included in daily programming			
No (Ref)	-	-	-
Yes	1.1	(0.29, 4.00)	0.905
Scheduled time for child-led free play			
≤ 29minutes (Ref)	-	-	-
(30-59minutes)	**2.6**	**(1.70, 3.98)**	**> 0.001**
≥60minutes	**6.4**	**(3.90, 10.49)**	**> 0.001**
Provision of staff-led organised play			
None (Ref)	-	-	-
(≤ 29minutes)	1.4	(0.88, 2.16)	0.157
(≥30minutes)	**2.3**	**(1.47, 3.83)**	**> 0.001**
Active games that engage the majority of children to participate			
No (Ref)	-	-	-
Yes	**1.7**	**(1.11, 2.61)**	**0.015**
Active games where children stood still in lines and waited their turn to participate			
No (Ref)	-	-	-
Yes	1.1	0.67, 2.05	0.567
Active games that consist of child elimination components			
No (Ref)	-	-	-
Yes	**0.6**	**0.37, 0.86**	**0.008**
Staff engage in physical play with children			
No (Ref)	-	-	-
Yes	0.8	(0.56, 1.04)	0.088

Clustered by OSHC service and child, adjusted for sex and age
Note: Bolded values are significant P <0.05

7.5 DISCUSSION

This study examined the physical activity levels and environments in a large sample of Australian after school OSHC services and the relationship between physical activity practices and staff behaviours on children's physical activity. We found that children spent an average of 22 minutes in MVPA, with boys accumulating significantly more MVPA than girls. These findings are similar to international studies conducted in comparable settings, in the United States and Norway.[18,19,20,21] Although, sedentary time was much higher within the international literature; a recent meta-analysis exploring physical activity and sedentary behaviours in structured settings, found children attending after school programs spent an average of 54.5min/d[18] sedentary compared to 36minutes/day, within our study. These differences may be attributed to international after school programs having longer periods of scheduled sedentary-based activities, including: mandatory cultural studies[19] or allocated homework time[13,22,23,24], compared to

Australian OSHC.[25] Although homework and craft-based sedentary activities were offered within our sample, they did not occur at structured time intervals nor were they mandatory.

Across all observation days, 26% of children accumulated 30 minutes or more of MVPA. The odds of children accumulating 30 minutes of MVPA increased by 6.4 when services provided 60 minutes or more of child-led free play and 2.3 times when services scheduled at least 30 minutes of structured, staff-led organised play into their program. Child-led free play has been recognised throughout the literature as an effective activity type for eliciting high levels of MVPA.[20,22,26] However, given the autonomous nature of free-play, it is likely that not all children will choose to engage in active play during this time, therefore, organised structured activities may be an important activity to incorporate within the OSHC settings to maximise participation and engage a wider range of children, especially girls.[27] The odds of children meeting 30 minutes of MVPA further increased by 1.7 times when organised activity included games that engaged the majority of children. Given that organised staff-led activities were observed on less than half of observation days and only a quarter of activities included games engaging the majority of children, this identifies a potential area for future intervention within the OSHC setting.

The benefits of structured staff-led organised play within childcare settings, however, have been debated,[24,26,27] with some studies reporting organised activities to have a lower association with MVPA and higher duration spent idle due to prolonged activity set-up, instructions, and the selection of games that require children to wait their turn or be eliminated from the activity if deemed “out”. This has previously been attributed to a lack of effective staff physical activity training.[21,28] It is, therefore, not surprising that our results report the odds of children meeting 30 minutes of MVPA reduced by nearly half when organised games included elimination components to their activities. Unexpectedly, no associations were found between the presence of physical activity policies, staff training or staff engagement in physical activity with children and an increase in child MVPA. This may be reflective of a lack of specific National/State-level policy or standards surrounding physical activity within the Australian OSHC setting, and the non-mandatory requirements for service-level physical activity, sedentary behaviour or screen-time policies nor staff physical activity promotion training. This also may explain the low reported number of physical activity policies, opportunities for staff physical activity training, or the limited observed engagement of staff members in physical activity with children. These results further highlight potential areas for future health promotion opportunities including the development of specific guidelines for the OSHC setting. Additionally, regardless of limited specific

guidelines, recreational screen-time was not overtly observed nor was it associated with reduced odds in children meeting 30 minutes of MVPA. Although recreational screen-time (including handheld devices) was reported to be available (if requested) at 30% of services; it was only observed for more than 30 minutes on 19% of days, and it was typically available after 16:30 allowing children the opportunity to be physically active for an hour before these devises became available to them.

7.5.1 Strengths and Limitations

This study has several strengths. It is one of the first studies in Australia to use device-based measures of physical activity (accelerometry) to capture child activity levels within OSHC services and explore environmental factors associated with MVPA. Our study also used a validated observation tools to capture contextual data on physical activity environments and staff behaviours within a large sample of OSHC services. Several limitations must be considered; first, this study was conducted in only two Local Health Districts of NSW, and although this was a large and diverse sample, due to the inconsistency of OSHC requirements between state and territories these findings may not be generalisable outside of NSW. Second, there is the potential for staff and children to have modified usual behaviour due to the presence of data collectors. We attempted to reduce this risk by conducting unannounced site visits and asking services to proceed as normal. Furthermore, child activity levels, accumulated during school hours were not captured within this study, as this was beyond the scope of our research.

7.6 CONCLUSION

OSHC services have the potential to provide positive environments that support physical activity through play and recreation. On average children accrued nearly one quarter of their daily MVPA, with 26% meeting at least 30 minutes of MVPA while attending OSHC after school. Although this is an encouraging finding, there is the potential for OSHC services to further support children to increase levels of MVPA through play. Results from our study show this could be achieved via scheduling a minimum of 60 minutes/day for child-led free play, and incorporating opportunities for staff-led organised games for at least 30minutes/day, several times per week. When staff lead organised games they should choose activities that engage the majority of children and exclude barriers to physical activity, such as eliminating children from the games. Future interventions should focus on staff training resources or the development of sector-specific physical activity policies/guidelines to assist staff to support children to meet daily physical activity requirements.

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Chapter 8: Thesis summary and recommendations

Recommended levels of healthy eating and physical activity are important modifiable risk factors for preventing non-communicable diseases, such as cardiovascular disease, diabetes and some cancers.[1,2] Developing healthful behaviours during childhood is important as eating patterns and activity behaviours can transition into adulthood.[2,3] However, the adequate consumption of vegetables are low (4%),[4] discretionary foods are over-consumed (99%)[5] and recommended levels of physical activity are insufficient (26%).[6] Childcare environments, such as OSHC, are ideal settings for HEPA promoting interventions due to their reach and influence over the types of food and beverages available and time allocated to physical activity. However, little is known about the HEPA environments within Australian OSHC, especially over the past 15 years.

To develop HEPA interventions within OSHC services, there is a need to first understand these environments.[7] The first phases of the *Behavioural epidemiological framework* were used to guide the studies within this doctoral thesis, which aimed to: a) describe the healthy eating environments in OSHC services, b) investigate sector-level and setting-level factors associated with OSHC providing foods that align with the Australian Dietary Guidelines, c) explore the relationship between healthy eating policies and staff practices, d) investigate the associations between physical activity policies and child physical activity levels, and e) explore environmental factors that may be associated with children meeting 30 minutes or more of MVPA while attending OSHC. Guided by the social ecological model, a cross-sectional, observational study design was used to address the research aims. The purpose of this chapter is to discuss the main findings of this thesis within the context of the broader literature.

8.1 OVERVIEW OF THE FINDINGS

This thesis provides evidence of the healthy eating and physical activity environments within a large sample of OSHC services, across two Local Health Districts in NSW. The outcomes from this thesis demonstrate that OSHC services are regularly providing fruit and water to children, however, discretionary foods were frequently offered as a part of the afternoon snack. Additional support and sector-specific resources may be necessary to assist services provide foods that align more closely with the Australian Dietary Guidelines. Policy elements were most likely to be practiced when they were

clearly written and supported by national regulations. No OSHC services had a specific physical activity policy, however, in our analyses the services with the highest policy scores were found to be positively associated with MVPA, total physical activity and reduced sedentary time. Finally, evidence from this thesis determined that scheduling 60 minutes of program time to child-led free play is positively associated with children meeting 30 minutes or more of MVPA.

8.2 DISCUSSION OF THE FINDINGS

Healthy eating environments were examined across two observational studies within this thesis; the types of food and beverages offered to children have been reported in C*hapter 3* and *Chapter 5.* Both studies found that the most frequently provided foods and beverages offered by OSHC services were fruit and water. These findings are encouraging as they demonstrate a substantial improvement from previously reported Australian studies, conducted prior to 2004.[8,9] These studies found that only 44% of OSHC in NSW provided a fruit or vegetable each day[8] and just under 17% offered water as a beverage;[9] with many services favouring cordial or fruit juice.[8,9] Compared to our study which found almost all services provided a fruit (94%) and water (99%) each day. Such improvments are likely influenced by national policies and numerous public health campaigns initiated within NSW and Australia over the past decade. For-instance, improvements observed in the frequency of water provision may be attributed to the introduction of the Education and Care Services National Regulations in 2011, which states, under Regulation 78, all children must have access to drinking water while in care.[10] Services that do not comply with this standard are at risk of incurring a financial fine of up to AUD$2000. Additionally, in the 15 years since these studies were conducted, NSW has released numerous public health campaigns, messages and initiatives promoting the increase of fruit, vegetables and water within NSW schools, consisting of: a sugar sweetened drinks ban for NSW schools (2007) ,the NSW Healthy Eating and Active Living strategy (2013 -2018), Live well @ school (2011)[11] and *Crunch & Sip*® (2016).[12] Although these initiatives are not directed at OSHC, it is plausible they may have had a positive flow-on effect into the OSHC setting; as many OSHC are located on school grounds and must comply with school policies. These results demonstrate the important role national and state policies and public health initiatives can have on the types of food and beverages available within childcare settings, such as OSHC. Despite these encouraging improvements in consumption of fruit and water, discretionary foods continue to be regularly offered by OSHC after school.

Results from both *Chapter 3 and Chapter 5* observed similar types of discretionary foods across the two samples, which mainly consisted of highly processed meats (e.g. chicken nuggets, sausages, salami, cabanossi, hot dogs or sausage rolls) salty crackers/biscuits, desserts (e.g. cakes, muffins, sweet biscuits) or sandwiches with high sugar spreads (e.g. sprinkles, honey, jam, cinnamon sugar). Foods categorised as "discretionary" were offered significantly more often than foods within the whole grains, lean meat or vegetable food groups. These results are worrying as whole grains, lean meats and vegetables are essential parts of a healthy diet,[13–21] and are under-consumed by Australian children.[22] Discretionary foods are overconsumed, with children consuming >six serves of discretionary food each day, well over the recommended 0-2 serves, resulting in more than one-third of their daily energy from discretionary foods.[23,24] These findings highlight the need for clearer policy guidelines on the types of foods that should be offered within OSHC services in NSW.

Although the National Quality Framework stipulates, when providing food to children, OSHC must serve food and beverages that align with Australian Dietary Guidelines,[25] whole-of-day guidelines may be unsuitable for a childcare setting that traditionally provides breakfast (before school care) and afternoon snack (after school care). Previous studies have found environmental factors, (i.e. the cost of healthier foods, staff training and clear policy goals) are associated with offering foods that align with dietary guidelines or healthy eating standards within in the US.[26–32] No known studies have examined facilitators and barriers to providing foods aligning with dietary guidelines in Australia. Therefore, the second half of *Chapter 5* aimed to address this gap by investigating several interpersonal, organisational and policy factors and their relationship with offering foods from within the five food groups (vegetables, grains, lean meats and meat alternatives, fruit, and dairy). The presence of clearly worded guidelines was associated with OSHC providing more opportunities for lean meats, vegetables, and whole grains within the after school time period.

Chapter 5 reported that services that operated out of a long day care (childcare centre for 0-5 years old) provided significantly more lean meat and meat alternatives than any other OSHC service. As lean meats were the least observed food group offered across the OSHC services, these findings are particularly interesting. Unlike OSHC, early childcare services (under which sits long day care) have clear sector-specific menu planning guidelines, which clearly outlines the types and quantities of each food group that should be offered.[33] As the foods served at these OSHC were commonly prepared by long day care cooks, it is probable that menu planning guidelines from the government regulator influenced the types of

foods offered within the affiliated OSHC services. Further to this, detailed menu planning templates, which clearly state that a fruit and vegetable must be provided each day, were associated with an increase in vegetable offerings.

According to the National Quality Standards and supported by the E*ducation and Care Services National Laws and Regulations* (Reg 80) (Table 6.1), OSHC must ensure a weekly menu is displayed by the service and that this menu accurately describes the foods offered.[25,34] As such, organisations commonly distributed a uniform menu planning template. Three types of templates were used by OSHC services (Appendix K). No menu templates included all five food groups nor described foods and beverages that should not be offered on a menu. Services that used the most detailed menu template (For example, serve a fruit and vegetable) offered significantly more vegetables than those that had less detailed templates. These findings are encouraging as they suggest the implementation of a clearly worded and detailed menu planning resource, may assist OSHC provide foods from within the five food groups. Previous studies have reported that menu planning resources, in combination with staff training, were effective in increasing serves of fruit, vegetables, dairy, lean meats and in reducing the provision of discretionary foods within the ECEC sector.[30,35,36] As a high proportion (70%) of OSHC staff are employed casually in NSW,[37] it is not possible to provide professional development to all staff. Furthermore, there are no minimal qualifications or healthy eating knowledge required to be employed by OSHC in NSW and, therefore, the implementation of a uniform menu planning resource, that clearly outlines food groups to provide or avoid on a menu, might be a particularly useful and cost-effective approach within the OSHC setting. Future research should investigate the efficacy of such a menu planning resource on foods provided within OSHC.

Policies and guidelines can be a powerful public health promotion strategy used by governments and institutions to direct the types of foods offered or environments created within a setting.[26,38] Studies have found when policies are clearly worded and measurable they can assist childcare services establish healthier environments.[26,27,39,40] Best practice benchmarking for healthy eating and physical activity can be found under Quality Area 2 of the National Quality Standards and outlines how a service might provide HEPA environments (Figure 1.1). However, these standards are not mandatory, rather they are intended to be used as a guide to best practice. Only those practices defined within the Education and Care Services National Regulations (Table 6.1) are obligatory and hold a monetary consequence for non-compliance. To the candidate's knowledge no previous studies or national report has described the way in

which HEPA is promoted by Australian OSHC services. Therefore, *Chapter 6* aimed to fill this gap by exploring the HEPA policy environments within OSHC and their impact on staff practice.

Results from this study found policy elements, from within OSHC service-level healthy eating policies, were not associated with staff daily practices, except for those practices that were supported by National Regulations. *Chapter 6* reported that all OSHC services (100%) provided children with access to drinking water (Reg .78) and almost all (> 95%) utilised a weekly food menu that were displayed for parents to view (Reg .80). These two policy benchmarks are clearly worded and achievable, making it straightforward for OSHC to implement. However, the language used within Regulation 79, is unclear, making it challenging for OSHC to apply within their services. Despite this, a number of policy elements were found within service-level healthy eating policies which could be interpreted within the context of Regulation 79 and unlike other policy elements, OSHC were more likely to practice them. OSHC were frequently observed to include children and their families in the selection of recipes for the weekly menu. This may be an attempt by services to meet the requirement of regulation 79 which states, "*ensure food is appropriate to the needs of the children, including specific cultural, religious and health requirement*s". Furthermore, OSHC services regularly provided enough food for children to have second helpings if desired. Again, this could be an interpretation of the wording found within regulation 79, stating "*food and beverages provided are nutritious and adequate in quantity*".

In comparison to these findings, OSHC staff were rarely observed to sit with children during mealtimes, role model healthy behaviours, conduct cooking experiences or engage children in conversations to build an understanding of healthy eating. While these practices are encouraged within the National Quality Standards they are not compulsory. Although it is discouraging to find few OSHC services that engaged in these practices, they are unlikely to improve without the support of professional development opportunities or stronger policy benchmarkss.[38,41] These results are similar to several studies conducted within a comparable childcare setting (after school care), which found that when policies or standards were clearly worded and mandatory, even at an organisation level, they can lead to positive improvements in the quality of foods and beverages offered and behaviours practiced.[27,39,40]

In contrast to the healthy eating environment, there are no national regulations which OSHC must adhere to for physical activity. Although physical activity promotion behaviours are described within the National Quality Standards they do not consist of measurable language nor mention guidance for screen-

time use. The National Quality Standards encourages OSHC to a) provide opportunities for physical activity, b) become involved in physical activity with children, and c) ensure there are occasions for both planned and spontaneous physical activity. Results from *Chapter 6* found that one third of services designated 50% of program time to physical activity, with more than 40% of services only offering child-led free play opportunities and more than 70% of services providing access to electronic media. Only one quarter of services provided access for staff training in physical activity. Although, staff were observed to frequently engage in physical activity practices with children, these practices were not associated with an increase in child MVPA. It is likely that these findings are reflective of the physical activity environments in other OSHC in Australia. A study from South Australia found that only a small number of OSHC scheduled more than half of their program time to physical activity, provided staff with physical activity promotion training and observed that access to screen-time was widely available.[42]

Unlike healthy eating, OSHC services are not required to have a physical activity policy and very few services within our sample possessed one. It was found that policy environments were associated with several staff practices. A positive relationship was found between Healthy After School Program Index for Physical Activity (HAPI-PA) scores and child-accumulated physical activity levels (accelerometer derived). OSHC services who scored highest spent significantly more minutes in MVPA, total physical activity and less time sedentary than services who scored lowest. There were several differences in daily practices reported by the highest scoring services, compared with the lowest scoring. These included scheduling more than 50% of program time to physical activity, access to annual professional development training, and the use of evidence-based curricula for promoting physical activity. These findings are similar to previously reported studies which found scheduling more than 60 minutes of program time to physical activity, annual professional development training and staff involvement in physical activity were associated with child MVPA levels.[43–46] However, without clear guidelines for physical activity, screen-time practices or access to evidence based training, it may be difficult for Australian OSHC to improve the quality of their physical activity environments within the OSHC setting.

Children are recommended to accumulate a minimum of 60 minutes of MVPA over an entire day.[47] However, only 1 in 4 Australian children are meeting this recommendation.[48] No known Australian study has reported accelerometry derived, physical activity levels within OSHC. Thus, the amount of MVPA accrued during the after school period is relatively unknown. Although no specific recommendations exist for after school period in Australia, more than 450,000 children attend OSHC

each day and hence, it is important to understand how OSHC can support children achieve these optimal levels of activity while in care. Therefore, *Chapter 7* reported the physical activity levels of children and examined the environmental factors associated with children meeting 30 minutes or more of MVPA within OSHC.

Chapter 7 found that 26% of children accumulated at least 30 minutes of MVPA in the hours after school. A number of environmental factors were associated with children meeting 30 minutes of MVPA. The strongest of these was scheduling 60 minutes or more free play. Services that did this were 6.4 times more likely to have children accumulate 30 minutes of MVPA during their program that those that did not. Providing at least 30 minutes of staff-led organised activities and implementing games that engaged the majority of the children were also associated with children meeting 30 minutes of MVPA. These findings are similar to previously reported studies, which found scheduling greater amount of time to physical activity and prolonged opportunities for child-led free play were associated with MVPA levels during after school programs.[49–51] Staff-led organised activities have also been associated with an increase in MVPA levels, especially in girls.[42] As girls were less active than boys, scheduling regular staff-led organised activities may help promote MVPA levels of girls during OSHC. The quality of staff training does need to be considered. Unlike after school programs in the US, few OSHC services reported having access to professional development training from qualified trainers within our sample, and no training exceeded four hours each year. Staff who are not effectively trained in physical activity promotion strategies can potentially have a negative impact on child activity levels.[40,43,45] This is supported by the finding in this thesis of a negative association between children accumulating 30 minutes of MVPA and organised games that consisted of elimination components (removed from active play if deemed "out").

Overall, the findings within *Chapter 7* are encouraging for the NSW OSHC sector as they indicate the potential impact that small modifications to program schedules (i.e. types and duration of activities) could have on child physical activity outcomes. Although the literature highlights the importance of staff professional development on child physical activity outcomes,[31,46,52] there were limited opportunities for staff training or professional development reported within our sample. As traditional methods for training can be time consuming and expensive,[50] there may be resistance from organisations to continuously upskill staff who are predominately employed casually. Therefore, future research should explore possible avenues for developing cost effective training resources or online modules which can be self-led to address these challenges within the Australian OSHC sector.

8.3 Significance of the research

This thesis is the first known cross-sectional study to provide evidence of the healthy eating, physical activity and policy environments within OSHC settings in Australia. The results showed that many children were not consuming the recommended essential food groups (vegetable, whole grain, lean meats and dairy) and were not meeting physical activity guidelines. This thesis identified a number of potential strategies, including the introduction of a menu planning resource, which could be effective in improving the types of foods offered by OSHC services. A uniform menu planning checklist could be inexpensive and easily administered by Local Health Districts and supported by government bodies to assist OSHC services meet the requirements found within the Australian Dietary Guidelines.

Furthermore, this thesis reported accelerometry-derived physical activity levels of children attending OSHC services. The findings have important implications for future practice as they demonstrate the significance of scheduling opportunities for free play, and ensuring organised games engage a large number of children and do not consist of eliminating children from the game when they are deemed "out". These findings provide evidence to support the development of a) physical activity and/or staff training interventions; and b) assist policy makers develop physical activity and screen-time guidelines specific to the OSHC sector.

8.4 Research Strengths

Chapter 3 was the first study in Australia to systematically observe the foods provided and staff healthy eating promotion behaviours in more than 15 years. It used validated tools and well-established protocols, specific to the after school period, which had previously been implemented in a number studies conducted in similar childcare settings in the US.

Chapter 5 captured HE environmental data from the largest known observational study conducted in Australian OSHC services. It consists of a sizable sample of OSHC spread over two geographically diverse LHDs. *Chapter 5* was also the first study to explore both the foods and beverages offered and sector- and setting-level factors that may be associated with providing foods in compliance with the Australian Dietary Guidelines.

Chapter 6 is the first-known Australian study to explore the healthy eating and physical activity policy environments and their impact on practice within OSHC services. This study uses a number of validated tool, specific to the OSHC setting, to capture HEPA policy environments including accelerometry devices to assess child physical activity levels.

Chapter 7 presents results from the first Australian study to capture child activity levels using accelerometry-derived devices within OSHC services. This study also is the first Australian study to investigate environmental factors associated with children accumulating 30 minutes of MVPA. A strength of this study is it used a number of validated observation tools to capture contextual data on physical activity environments and staff behaviours.

8.5 Limitations

There are several limitations within the studies conducted within this thesis. Firstly, the food and beverages observed within *Chapters 3 and 5* only provide an estimation of the food groups offered, and do not provide an estimation of the quantity of foods consumed by the children. *Chapter 3* has a relatively small sample size, with all services belonging to one organisation located in a small regional town in NSW and can not be generalised to the wider population.

Although the sample within *Chapters 5, 6 and 7* consisted of a large number of services that were located across a diverse geographical landscape, all the services that participated in this study were recruited from within two health districts in NSW. Therefore, the findings within this study may not be representative of OSHC services across all of NSW or Australia. Additionally, there is potential that some self-reported data within this chapter may have been misreported as socially desirable practices rather than actual practices; however, a sensitivity analysis was conducted in Chapter 5 to account for any possible discrepancies.

Chapter 6 requested policies from all 89 OSHC services, however, only 64 services provided their policies for review. Therefore, the evaluation did not consist of the full sample size within this analysis.

Within *Chapter 7* there is the potential for staff and children to have modified usual behaviour due to the presence of data collectors. This limitation was ameliorated by conducting unannounced site visits and

asking services to proceed as normal. Finally, this thesis was unable to explore environmental factors which might impact the sex differences found in physical activity outcomes while in OSHC.

8.6 Recommendations for future research

This thesis has provided novel insights and evidence on the HEPA environments within OSHC in NSW Australia. The outcomes of the studies within this thesis provide support for several potential improvements to practice and policy that could further assist the OSHC sector to improve the quality of services and should be investigated further within future research. This section outlines six key areas for future research based on the outcomes of this thesis.

Recommendation #1: Due to the frequent provision of discretionary foods offered to children as a part of the afternoon snacks, it is recommended that clear menu planning guidelines be developed for the OSHC sector. For example, the development of clear guidelines that outline the types and frequency (i.e daily or three times per week) that food and beverages are to be provided. Further to this, due to the number of untrained staff in healthy eating practices, it is recommended a guideline also consists of a clear description and listing of all foods that should not be offered to children as a part of the afternoon snack due to its high salt, added sugars or fat content.

Recommendation #2: *M*enu planning templates should consist of a fruit and vegetable every day, as this was found to have a positive association with offering vegetables more frequently than other services. Further to this, it is hypothesised that if a menu planning template was designed to include all five food groups of the Australian Dietary Guidelines, it may increase the frequency of other food groups such as lean meats, dairy and whole grains. Future research should develop and trial the efficacy of a menu planning template resource on providing foods more consistent with the Australian Dietary Guidelines within the OSHC sector in NSW, Australia.

Recommendation #3: Although physical activity and screen-time policies are not mandatory within the OSHC sector, they can be a powerful tool for setting standards of practice within a service. Opportunities exist for future policy makers, researchers and health promotion officers to work with OSHC services to develop clearly worded and measurable physical activity and screen-time policies. Future research should a) focus on exploring the effectiveness of clear and achievable service-level policies on improving staff

practice and increasing the level of MVPA accumulated by children in OSHC services, and b) trial the impact of a screen-free time period, restricting the use of screens prior to 4:30pm, on child sedentary and total physical activity levels.

Recommendation #4: Children were six times more likely to meet 30 minutes of MVPA when a service scheduled 60 minutes or more to child-lead free play activities. It is therefore recommended, that OSHC services, assisted by their LHDs, develop a simple strategy for improving physical activity opportunities to children.

Recommendation #5: MVPA increased when staff-led active games engaged the majority of children and did not include elimination games. As girls were significantly less active than boys, future research should focus on exploring this relationship within the Australian OSHC sector. Furthermore, the negative effects of elimination games on children's ability to be active needs to be actively communicated within the OSHC sector. The development of whole group activities that do not consist of eliminating children should be developed and implemented within the Australian OSHC sector.

Recommendation #6: There is currently no evidence of the types of food, beverages and activity levels of children attending OSHC in the before hours care or vacation care. To more fully understand the HEPA environments of OSHC, future research should explore the before school hours and vacation care aspects of OSHC.

8.7 CONCLUSION

OSHC has the potential to provide HEPA environments to more than 450,000 Australian children by increasing their access to foods aligning with the Australian Dietary Guidelines and opportunities to be active in the hours after school. As indicated within this thesis foods offered to children are falling short of meeting dietary guidelines. Although OSHC are providing regular access to water and fruit, few services offer vegetables, whole grains, or lean meats; while discretionary foods are frequently offered. Opportunities exist for the development sector specific menu planning guidelines and the implementation of a menu planning checklist to assist OSHC provide food and beverages consistent with the Australian Dietary Guidelines recommendations.

Other evidence within this thesis may be used to guide OSHC services in scheduling adequate amount of program time to child-led active play. Evidence implies that children are more likely to meet 30 minutes of MVPA if programs schedule between 30 to 60 minutes of child-led free-play activities. Furthermore, there is the potential that staff-led active games can positively improve children's odds of meeting 30 minutes of MVPA. Through simple changes to program scheduling and avoidance of elimination games the OSHC sector can positively assist Australian children meet important activity guidelines in the future. Such strategies could be further supported and outlined through the implementation of national, state and service-level physical activity policies specific to the OSHC sector.

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Appendix

Appendix A

Published Article: Systematic observation of healthy eating environments in after-school services: a cross-sectional study

Public Health Nutrition: page 1 of 100 doi:10.1017/S1368980021003220

Systematic observation of healthy eating environments in after-school services: a cross-sectional study

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Abstract

Objectives: Few studies have examined the healthy eating environments within the Australian out of school hours care (OSHC) setting. This study aims to describe healthy eating environments, consisting of: (a) the alignment of provided food and beverages to Australian Dietary Guidelines; (b) healthy eating promotion practices; (c) nutrition education through cooking experiences; (d) staff role modelling healthy eating and (e) regular water availability.

Design: A cross-sectional study was conducted using direct observations and the validated System for Observing Staff Promotion of Activity and Nutrition (SOSPAN) tool.

Setting: OSHC located in urban and semi-rural regions of NSW, Australia.

Participants: Staff (151) and children (1549) attending twelve OSHC services operating in the hours after school.

Results: Fifty per cent (50 %) of services offered fruits and 100 % offered water as a part of the afternoon snack on all four observation days. Discretionary foods were offered on more days compared to vegetables (+1·9/d, $P = 0·009$), lean meats (+2·7/d, $P = 0\ 004$) and wholegrains (+2·8/d, $P = 0\ 002$). Staff promoted healthy eating on 15 % of days, sat and ate with children 52 %, consumed high sugar drinks 15 % and ate discretionary foods in front of children 8 % of days, respectively. No opportunities for cooking or nutrition education were observed.

Conclusion: Afternoon snacks regularly contained fruits and water. Opportunities exist to improve the frequency by which vegetables, wholegrains and lean meats are offered in addition to staff healthy eating promotion behaviours. Future research is warranted to further explore healthy eating behaviours, practices and policies within the after-school sector.

Keywords
Healthy eating
Snack
After-school programme
Nutrition
Health promotion
Behaviour

Appendix B

Published Article: Healthy eating and physical activity environments in out-of-school hours care: an observation study protocol

Open access Protocol

BMJ Open

Healthy eating and physical activity environments in out-of-school hours care: an observational study protocol

Ruth Crowe ,[1,2] Yasmine Probst ,[2] Jennifer Norman,[2,3] Susan Furber,[2,3] Lisa Franco,[2,3] Rebecca M. Stanley,[2,4] Cecilia Vuong,[5] Karen Wardle,[5] Marc Davies,[6] Sarah Ryan,[4] Anthony D. Okely[4]

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ABSTRACT

Introduction Childcare settings have been widely identified as important venues for promoting healthy lifestyles to children. Out-of-school hours care (OSHC) is a rapidly growing childcare service, yet there has been limited research reported on healthy eating and physical activity (HEPA) environments within the Australian OSHC setting. This research aims to describe the HEPA environments related to foods and beverages served, staff behaviours and child physical activity levels across two local health districts within New South Wales, Australia. This study will provide evidence to support future interventions and policies in Australian OSHC settings.

Methods and analysis A cross-sectional study design will be used to describe the food and beverages provided and child activity levels, and report on environmental correlates. OSHC programmes will be visited on non-consecutive weekdays between 2018 and 2020. The frequency of foods and beverages offered will be observed and categorised into food groups aligned to the Australian Dietary Guidelines. Children's physical activity will be measured using ActiGraph wGT3X-BT accelerometers. Staff behaviour will be captured via direct observation and the System for Observing Staff Promotion of Activity and Nutrition. Short interviews with programme directors will gather contextual information about OSHC practices and policies.

Ethics and dissemination Findings will be disseminated through peer-reviewed scientific journals, conference presentations and individualised feedback to each participating service. Ethical approval was granted by the University of Wollongong Human Research Ethics Committee (HE17/490).

Strengths and limitations of this study

- This will be one of the first known Australian studies to systematically describe the healthy eating and physical activity environments within before-school and afterschool programmes to support the development of future interventions, better policies and healthier environments for children attending out-of-school hours care (OSHC) programmes.
- Foods observed can only provide an estimation of food groups offered, rather than actual foods consumed by the children.
- OSHC programmes from the two local health districts in New South Wales may not be representative of all OSHC programmes across New South Wales or Australia.

INTRODUCTION

Healthy body weight in childhood supports optimal bone development, cognition and

discretionary food intake guidelines.[4] Nearly half of Australian children are not meeting physical activity guidelines and nearly three-quarters exceed the recommendations for recreational screen-time.[5] The out-of-school hours' time period may be a critical window in a child's day to intervene, as studies have shown children consume large amounts of snack foods[6] and participate in long periods of screen-based sedentary activities[7 8] during out-of-school hours.

In Australia, out-of-school hours care (OSHC) programmes operate before school (06:00–09:00), after school (15:00–18:00) and during school holidays (vacation care) (09:00–18:00). OSHC programmes are of growing importance for many Australian parents whose employment requires them to

Appendix C

Participant Information Sheet and consent form Directors

EARLY START

UNIVERSITY OF WOLLONGONG AUSTRALIA

Information Sheet and Consent Form for Centre Directors/Organisations

EXPLORING THE HEALTHY EATING AND ACTIVE LIVING (HEAL) ENVIRONMENTS OF OUT OF SCHOOL HOUR (OOSH) PROGRAMS IN NSW

Researchers: Prof Tony Okely, Dr. Rebecca Stanley, Dr. Yasmine Probst and Ruth Crowe.

To the Centre Director,

The University of Wollongong would like to conduct an observational research study of the food and physical activity environments within the centre in which you are employed.

PURPOSE OF THE RESEARCH

The purpose of the research is to review and evaluate the snack foods and participation in physical activity among children attending OOSH centres. Healthy eating and physical activity are known to be essential components for reducing the risk of lifestyle diseases including: diabetes, obesity and cardio-vascular disease later in life. OOSH programs have the ability to positively impact children by providing structured activity and healthy snacks. Therefore, this project aims to explore of the current nutrition and physical environments to examine the quality of these two important areas and to maximize opportunities for healthy lifestyle behaviours within OOSH programs.

METHODS AND DEMANDS ON PARTICIPANTS

Children will be invited to wear a lightweight activity monitor (belt) on the days that they attend their normal OOSH program over a two-day period. The belt will be worn around their waist (as shown in the picture) and will be worn for the duration the child will be at the centre. Belts will be placed on children as they arrive and removed on their departure. This belt will monitor the level of physical activity they do during the time they are at their program. These belts are non-intrusive and will not stop children from being involved in normal program activities (i.e. all children can be involved in all activities planned for that day).

Activities of staff and children will be observed and recorded during the afternoon by trained researchers. Researchers will be using a safe observation tool called the Systematic Observation of Staff Promoting Activity and Nutrition (SOSPAN), which will be completed during normal daily activities.

This research will not interfere with normal daily activities, and NO PERSONAL INFORMATION on any child or staff will be collected.

All data collected will remain confidential, and kept in a secure location.

The information gathered will be used to evaluate the levels of physical activity and nutritious snacks provided to children within OOSH services. The information will be used by PhD candidate (Ruth Crowe) to evaluate these environments and provide evidence based feedback to NSW Health and the Office of Preventive Health as a guide to address and improve areas to better meet current recommendations within and across each of the centres. The data collected will be used to form part of Ruth's PhD thesis, and may be used in publications and conference presentation, however no individual centres or any personal information will be reported.

NSW GOVERNMENT

Apart from the short time that it takes to place the activity monitor on and off each day over the week, there are no risks foreseen for any child or staff. Staff and children's involvement in the study is voluntary and they may withdraw from the study at any time. Withdrawal or refusal to participate in the study will not affect your relationship with NSW Health nor with the University of Wollongong.

Confidentiality is assured, and your details will not be recorded or identified in any part of the research.

If you have any concerns or complaints regarding the way the research is or has been conducted, please contact the Ethics Officer, Human Research Ethics Committee, University of Wollongong on 4221 3386 or email rso-ethics@uow.edu.au.

If you have any questions about the research or would like to withdraw your consent from the study, please call or email Ruth Crowe on 4221 4274 or at oosh-project@uow.edu.au. Ruth can be contacted by telephone Monday to Friday 9am to 5pm or anytime via the provided email address.

Ruth Crowe

Early Start
Faculty of Science Medicine and Health
School of Medicine
02 4221 4274
oosh-project@uow.edu.au

I give consent for the research outlined within this information sheet to be conducted

at …….. Afterschool OOSH program.
(name of the centre)

…….....date ……

Appendix D

Participant Information Sheet and consent form Parent/ carers

Information Sheet and Opt-Out Form for Parents/Carers

EXPLORING THE HEALTHY EATING AND ACTIVE LIVING (HEAL) ENVIRONMENTS OF OUT OF SCHOOL HOUR (OOSH) PROGRAMS IN NSW

Researchers: Prof Tony Okely, Dr. Rebecca Stanley, Dr. Yasmine Probst and Ruth Crowe.

To Parents and/or Carers,

The University of Wollongong would like to conduct an observational research study of the nutrition and physical activity environments within the centre in which your child attends, this is an invitation to participate.

PURPOSE OF THE RESEARCH

The purpose of the research is to review and evaluate the snack foods and participation in physical activity among children attending OOSH centres. Healthy eating and physical activity are known to be essential components for reducing the risk of lifestyle diseases including: diabetes, obesity and cardio-vascular disease later in life. OOSH programs have the ability to positively impact children by providing structured activity and healthy snacks. Therefore, this project aims to conduct an audit of the current nutrition and physical environments to examine the quality of these two important areas and to maximise opportunities for healthy lifestyle behaviours within OOSH programs.

METHODS AND DEMANDS ON PARTICIPANTS

Children will be invited to wear a lightweight activity monitor (belt) on the days that they attend their normal OOSH program over a two-day period. The belt will be worn around their waist (as shown in the picture) and will be worn for the duration the child will be at the centre. Belts will be placed on children as they arrive and removed on their departure (children may decline to wear the belt at any time). This belt will monitor the level of physical activity they do during the time they are at their program. These belts are non-intrusive and will not stop children from being involved in normal program activities (i.e. all children can be involved in all activities planned for that day).

Additionally, afternoon activities conducted during the program will be observed and recorded by two trained researchers. Researchers will be using a safe observation tool called the Systematic Observation of Staff Promoting Activity and Nutrition (SOSPAN), which will be completed during normal OOSH activities on two occasions.

This research will not interfere with normal daily activities, and NO PERSONAL INFORMATION on any child or staff will be collected.

All data collected will remain confidential, and kept in a secure location at the University of Wollongong.

The information gathered will be used to describe and understand the levels of physical activity and nutritious snacks provided to children within OOSH services. The information will be used by PhD candidate (Ruth Crowe) to evaluate these environments and provide evidence based feedback to NSW Health and the Office of Preventive Health as a guide to address and improve areas to better meet current recommendations within and across OOSH services. The data collected will be used to form part of Ruth's PhD thesis, and may be used in publications and conference presentations, however no individual centres or

any personal information will be reported.

Apart from the short time that it takes to place the activity monitor on and off each day over the week, there are no risks foreseen for any child or staff. Staff and children's involvement in the study is voluntary and they may withdraw from the study at any time. Withdrawal or refusal to participate in the study will not affect your relationship with NSW Health or with the University of Wollongong.

Confidentiality is assured, and personal details will not be recorded or identified in any part of the research.

If you have any concerns or complaints regarding the way the research is or has been conducted, please contact the Ethics Officer, Human Research Ethics Committee, University of Wollongong on 4221 3386 or email rso-ethics@uow.edu.au.

For this study, you only need to inform the university if you do **NOT** wish for your child to wear an accelerometer during those observation days as it has been described in this Information Sheet for Parents and Carers.

By not completing and returning this form or responding to the University through the provided email address or telephone number you are indicating that you understand the data collected within this project will be used primarily for the evaluation and improvement of physical activity and nutrition environment within OOSH centres and that you consent for it to be used in that manner.

If you have any questions about the research or would like to withdraw your consent from the study, please call or email Ruth Crowe on 4221 4274 or at oosh-project@uow.edu.au. Ruth can be contacted by telephone Monday to Friday 9am to 5pm or anytime via the provided email address.

Ruth Crowe
Early Start
Faculty of Science Medicine and Health
School of Medicine
Ph. 02 4221 4274
oosh-project@uow.edu.au

I **DO NOT** give consent for my child …….. to wear an accelerometer for the research outlined within this information sheet. (name of child)

…….....date ……

(signature)

Please return this form to your normal OOSH centre Director.

Appendix E

Food and beverage observation form and protocol

SNACK OBSERVATION FORM

Your Name:						
Observer #2:	**Site Name:**	**Target Area:**	**Total # Staff:**	**Total # Children:**	**Grade Level:**	**Date:**
Observer #3:						

FOODS & BEVERAGES OFFERED **#Male staff** **#Female staff**

Item Offered	Describe Brand/Package Label	Serving /Package Size	Single Serve Package	Fresh	Frozen	Cooked	Canned	Dried
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

BEHAVIORS **CONTEXT**

Staff Program Behaviors		Staff Nutrition Behaviors		Child Involvement		Snack Context	
Other Duties	☐ YES ☐ NO	Nutrition Promote	☐ YES ☐ NO	Children Prepare	☐ YES ☐ NO	Family Style Service	☐ YES ☐ NO
Off Task	☐ YES ☐ NO	Nutrition Discourage	☐ YES ☐ NO	Children Distribute	☐ YES ☐ NO	# of items 1 child can take for snack = _____	
Eating Snack	☐ YES ☐ NO	Nutrition Education	☐ YES ☐ NO	Children Clean	☐ YES ☐ NO	(*example: 1 option from fruit category and 1 from grain category*)	

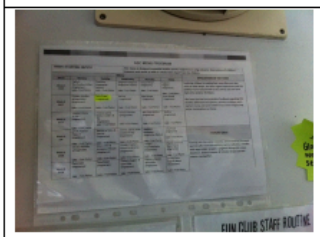
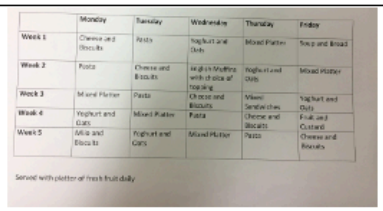
DIRECT OBSERVATION-CHILD SNACK

- **Nutrition promotion**= Are any staff members verbally promoting healthy eating and nutrition
- **Nutrition Education** (Are any staff members educating children about healthy snack options by talking about the nutritional content of snacks, holding taste tests of healthy snacks, or other methods of nutrition education?)
- **Child prepare**= Are any children assisting with the preparation of snack? Ie washing food, presenting, chopping etc.)
- **Child clean**= Are children cleaning up and/or throwing away snack packaging, or placing plate in a designated area or bucket?
- **Family Style Service** = a type of meal service that allows children to serve themselves from common platters or bowls of food

Behaviour during snack time	**Field note observations**
Was there at least one staff member sitting and eating the provided meal with the children? Explain	
Where were staff eating and drinking? (ie. Kitchen, with children or while supervising?)	
What were staff eating and drinking? (provided, chips, fruit/ veg?)	
Were there any children not eating? If so, why?	
How was nutrition being promoted or educated? Explain	
Were children included in the food preparation activities? If yes, explain what they were doing or asked to do. Did they seem to enjoy it?	
Were children asked to clean or put their dishes away? Explain	
Were children allowed to get seconds? How many children went back for seconds? (Estimate)	
At any time during the program were children rewarded with lollies? If so explain.	
Do you have a photo of snack food before it was served and once snack was over?	
Facilities: Describe the kitchen including: • What are the storage facilities? • What are the Food prep area? • Is there adequate room in the kitchen? • Is the kitchen small/medium/large • What are the limitations? • Does the centre have access to the school canteen? • Take a photo of kitchen, weeks snack menu, any promotional material displayed.	
Waste: Are leftovers thrown away or kept for another day?	
Is there a compost bin or worm farm used for food scraps?	

After Mealtime:

1. Once snack is over and you have finished photographing all food items, including left over food
2. Make sure all snack observation form has been completed as well as field notes.
3. Commence SOSPAN scans
4. Be aware that a second round of snack foods may be provided later in the afternoon and will need to be captured by both photographs and included on the snack observation forms
5. Email to oosh-project with the correct subject: Name of site and date of program

Individual serve	**Family style**
	
Packaging: what NOT to do	**Packaging: good example**
 **Image is blurry**	 **Front view**  **Nutrition Lable**
Individual serve: what NOT to do	**Individual serve: good example (but 45° angle)**
	
Menu: what NOT to do	**Menu: good example**
	

Meal and Snack Observation Protocols

ON-SITE Meal Observation Protocol

When Used: Anytime programs are eating snack/ meals PROVIDED by the program.

Equipment Associated: SNACK observation Form, clip board, pens, iPhone/ Android

General Procedures

- Snack/Meal time begins when the staff signals that the snack/meal time has begun and the children begin to eat their food.
- Designated snack observer to make field notes on foods offered to children,
- Observe and record behavior of staff and children before (preparing), during (eating with or distributing food) and after (children clean?)
- Photograph snack food before children start eating and after they have finished (Even if it is an empty plate)
- Observe and tally number of times a child returns for seconds (if applicable)
- Photograh weekly meal plan
- Make observational notes of kitchen and storage facilities and disposal of food waste.

Before the snack:

1. **Determine when, where, and what meal will be served.**
    a. Fill out **ON-SITE Meal Observation Form, Side 1**
        i. **Time Meal is Served**
        ii. **Target Area** (designated meal area)
        iii. **Photograph snack food prior to it being served**
    b. If the meal is served in one location
        i. Go to the designated meal area
    c. If the meal is served in multiple locations simultaneously
        i. Go with the largest group.
    d. If they are divided by grade level
        i. Mark which **Grade Level** you observed on the **ON-SITE Meal Observation Form**. Indicate in field notes if this will happen every day or just this particular day.

Collect a Reference Meal.

1. Ask site leader for a sample meal with all available food and beverage options included (e.g., condiments, meal choices etc.)
    a. If you are not allowed a **Reference Meal**, take a picture and write a note in the field notes that you were unable to get one.
2. Take a picture with the iPhone of the **FULL** meal and all available condiments.

Provided snack

Individual plate

Weekly Menu

3. If the children are offered a choice between two similar items (e.g., apple or banana, Doritos or Corn chips) do not take a picture of two separate meals, include everything in one photo and note that one fruit option is allowed.
4. If the meals are completely different (e.g., pasta meal or sandwich meal) take separate pictures.
5. Additionally, take a picture of **ALL** of the packaging that the food and beverages came in.
    a. Take pictures of all pertinent information including quantity, name of brand, type of food, food label, etc.
    b. Make sure all photos are **CLEAR**. Check by viewing each photo in the **Gallery** on the device. Package information (e.g., Nutrition Facts) should be legible when zoomed in.

During Mealtime:

1. **Observe staff behavior:** Are they engaging with children encouraging them to try new things, speaking positively about healthy food options? (Nutrition promotion)
2. Were children included in the meal preparation, distribution or cleaning process?
3. Take a tally of how many times children went back for seconds
4. Take a before and after photo of the food including what was left over.
5. Fill out the nutrition observations on the form. If there are questions not applicable please indicate this by writing N/A not leaving it blank.

Appendix F

SOSPAN: Coding protocol

i. SOSPAN (Physical Activity Promotion Scan) Protocol

When Used: Complete this protocol to record all activities and staff behaviors unless the program is engaged in snack, meals, or on a field trip. If the program is engaged in snack or meals refer Meal and Snack Observation Protocols (**Forms Associated:** SOSPAN Form (iPad).

Equipment Associated: iPad

Phase 1. Reliability Check

Category	Protocol
Reliability	Select "yes" if the scan to follow is conducted for the purpose of establishing reliability
Target Area	Choose the corresponding target area
Raining	Select "yes" if it is raining at the time of the scan
Other Coder	Select one or more observers with whom the scan is being conducted

Phase 2. Staff Behaviors

Staff behaviors can be directly observed during child activity. Code these behaviors by following the protocols below. Staff members can be involved in more than one behavior at once (e.g. supervising and setting up for the next activity). However, each staff member should only be coded as engaged in **one behavior**. If the observer is unsure about what category the staff behavior falls into, code the category that most favors the program. Code as many categories as are present. Scan the area from left to right to observe staff behaviors. When in a water area, count lifeguards as staff members and code their behaviors. Likewise, if an adult outside of the regular program staff is leading the activity in which the children are engaged, count them as a staff member and code their behaviors. Code all the staff members that are present in the target area in which the group you are scanning populates, or are interacting with children of your group. If a staff member is in an adjacent target area, but is still visible code their behaviors.

Category	Protocol
NOTE: Select one or more of the following…	
Num Staff Present	Input the total number of staff members in the target area
Supervise	Select "yes" if the staff member is present and monitoring children. This is the default code. If a staff member is engaged in or leading an activity that does not promote PA, code this category.
PA Instruct/Lead	Select "yes" if the staff member is giving children instructions about or leading physical activity, but not participating.
PA Engaged	Select "yes" if the staff member is participating in physical activity with the children.
Nut Ed	If a staff member is educating children about healthy snack options by talking about the nutrition content of snacks, holding taste tests of healthy snacks, or other methods of nutrition education (e.g. worksheets, songs) select "yes."
Other Duties	Select "yes" if the staff member is present, but is engaged in behaviors other than child supervision related to their duties as an ASP/SUMMER staff member.
Off Task	Select "yes" if the staff member is present, but is engaged in behaviors other than their duties related to the ASP/SUMMER or monitoring children (i.e. back turned to all children, talking with other staff members about non-program related topics).

NOTE: Select all codes that apply…	
PA Promote	Select "yes" if the staff member verbally promotes physical activity (e.g. keep going, awesome job, good effort).
PA Discourage	Select "yes" if the staff member verbally discourages PA (e.g. "stop running" "slow down").
Withhold PA	Select "yes" if the staff member removes a child from physical activity (i.e. present or future) or threatens to remove a child from physical activity (i.e. present or future) as a consequence for behavior.
PA as Punishment	Select "yes" if the staff member prescribes PA as a punishment.
Eat Foods	If the staff member is eating/holding a food select "yes."
Eat Describe	If "yes" was selected for the previous question, describe the food that the staff member is eating by selecting from the codes below: Provided = the snack that is provided to the children Fruits/Vegetables = vegetable, fruit fresh, fruit dried, fruit cup, fruit sauce Sweetners = Fruit candy, cereal, granola/cereal bar, candy bar, cookie, pastry, other dessert Salty foods = Cracker, popcorn, chips Dips = ranch, peanut butter, hummus Dairy = yogurt, cheese Fast food = hotdogs, burgers, pizza, fast-food chain food Other = foods that do not fall into any other categories
Drinks	If the staff member is drinking/holding a beverage select "yes."
Drinks Describe	If "yes" was selected for the previous question describe the beverage that the staff member is drinking by selecting the green box and using the keyboard. Use the codes below: Colored drink = drinks that are colored (soda, Kool-Aid, lemonade, etc.) Fast food cup = drinks consumed from a chain fast food cup Water = water Can't tell = drinks from a non-translucent container

Phase 3. SDC Context

This phase involves coding the context of the ASP/SUMMER environment. (Age, ASP/SUMMER Activity, Target Area, etc.) Following the protocols below.

Category	**Protocol**
NOTE: Select one of the following…	
Enrichment	Select "yes" if children are doing activity that is not school work and is not a physical activity (i.e. arts and crafts)
Physical Activity Org	Select "yes" if children are engaged in physical activity or the time is designated as physical activity time that involves planned activities incorporated.
Physical Activity FT	Select "yes" if children are engaged in physical activity or the time is designated as physical activity time that does not involved planned activities.
Academics	Select "yes" if children are doing school work
BathroomWater	Select "yes" the time is designated as bathroom time or time for children to get water. This includes time designated for changing (e.g. changing into swim attire)
Track Change	Select "yes" the time is designated as a site wide rotation of activities

Other SDC	If none of the above categories capture the activity enter a description of the activity taking place by pressing the green box and using the keyboard that appears. Press "go" on the bottom right of the screen when you are done typing

Phase 4. Equipment Available

The third phase of the instrument requires the observer to categorize what equipment is available to children. Scan the area from left to right. Choose as many equipment options as are seen. Do not record if equipment is visible, but is off limits to children (would the children be disciplined for playing with the equipment). Do not code equipment if it is fixed (e.g. monkey bars, slides, goals) or is marking boundaries of goals or play space (e.g. cones, goals). Jerseys/Pennies are not PA equipment. Note: If cones are being used to facilitate active play count them as activity equipment. Count equipment if it is available to children, but not in use. Follow the protocols below.

Category	Protocol
NOTE: Select one or more of the following…	
NonPAequipment Bats Balls Jump Ropes Hula Hoops Balls (Basket, Foot, Etc) Frisbee Music	Select the equipment that is present in the area and available for child use by selecting the "yes" option next to all of the corresponding equipment categories that are present in the target area. Select all the codes that apply. (NonPAequipment, includes any equipment that is not PA promoting)
OtherEQ	If none of the above equipment categories capture equipment that is present and available for use in the area, describe the equipment you observe by selecting the green box next to "OtherEQ" and using the keyboard
Active Equip Amount	Sum the amount of active equipment that is available to the children

Phase 5. Activity Type

Type of activity is recorded in the fifth phase of the SOSPAN. Scan the area from left to right. Complete the following items using the protocol below. Characterize the activity that is present in the target area by selecting "yes" beside the appropriate code. The activity does not have to be organized for it to be coded in an activity area (e.g. children shooting a basketball would be categorized as "Physical Activity FT" and "basketball"). If we are putting on belts mark belts in the other code.

Category	Protocol
NOTE: Select one or more of the following…	
Idle Time	Select "yes" if children are not engaged in any specific activity and are awaiting instructions from staff
Nut Ed	Select "yes" if children are engaged in a nutrition education activity (nutrition coloring sheets, taste testing) *note: different from the staff behavior*
Instructions	Select "yes" if children are receiving instructions from a staff member
Discipline	Select "yes" if children are being disciplined by staff
Screen Time	Select "yes" if children are viewing a screen other than on a hand held device
Seated Game	Select "yes" if the majority of children are seated for the majority of the game (e.g. duck duck goose)
Circle Game	Select "yes" if the game formation is that of a circle (e.g. parachute games, round and round)

Clean up	Select "yes" if children are engaged in setting up or putting away equipment
Energizer	Select "yes" if the activity occurring is breaking up long periods of sedentary time
Free Play	Select "yes" if children are allowed to play at their own discretion without staff direction including the use of equipment.
Follow the Leader	Select "yes" if children perform predetermined movements based on staff/child (leader) commands (e.g. red light green light, Simon says, poop deck)
Races Relay/Other	Select "yes" if children are engaged in a racing activity (e.g. relay races)
Sing/Dance	Select "yes" if children are singing and dancing
Tag Games	Select "yes" if children are playing organized tag games
Basketball	Select "yes" if children are playing any organized game (e.g. horse, 2v2) or just shooting baskets
Soccer	Select "yes" if children are playing any organized game of soccer (e.g. world cup) or just shooting on goal
Football	Select "yes" if children are playing any organized game or free play that involves a football
Kickball	Select "yes" if children are playing an organized game of kickball
Dodgeball	Select "yes" if children are playing any variation of an organized game of dodgeball
Ball & Bat Games	Select "yes" if children are playing any games where a ball and bat are used (e.g. baseball, softball)
Swimming/water	Select "yes" if children are swimming or participating in water activities (i.e. in a pool, waterpark, hoses, sprinklers)
Other1 Other2	If none of the codes capture the activity that is occurring in the target area, describe the observed activity by selecting the green box and using the keyboard. If in enrichment time describe the activity here.
Primary PA	Select the activity which is the most prominent activity in the target area

Phase 6. Activity Context

If you have not coded a primary activity do not complete an activity context scan. Staff contextual behaviors are behaviors that cannot be observed directly during child activity but are indirectly controlled by the staff (i.e. modifying game rules). Scan the area from left to right to observe the context of the activity.

Category	Protocol
NOTE: Select one or more of the following…	
Child Handheld Device	Select "yes" if children are using handheld media devices (e.g. iPod, phone)
PA child off task	Children are not engaged in the activity presented by staff (e.g. not playing the game, playing a different game when no other activity options have been provided) during PA time only.
Small Sided Games	Select "yes" if children are divided into several small games (no more than 5 per team) instead of one large game.
PA Safe	Select "no" if children are at risk of being injured (e.g. children in danger of colliding, children in danger of being hit with ball/racket, in danger of running into wall).
PA Stand/wait	Select "yes" if there are children standing and waiting their turn to play/participate.
Children Eliminated	Select "yes" if the game eliminates children from PA opportunities as it progresses
Integrated Activity	Select "yes" if the staff have integrated activity into an academic/enrichment lesson.
Choice Provided	Select "yes" if children have a choice of activities in which to participate (NOT do this or sit, free play is a viable activity choice).
Girls Only	Select "yes" if there are only girls in your target area and it is a PA opportunity

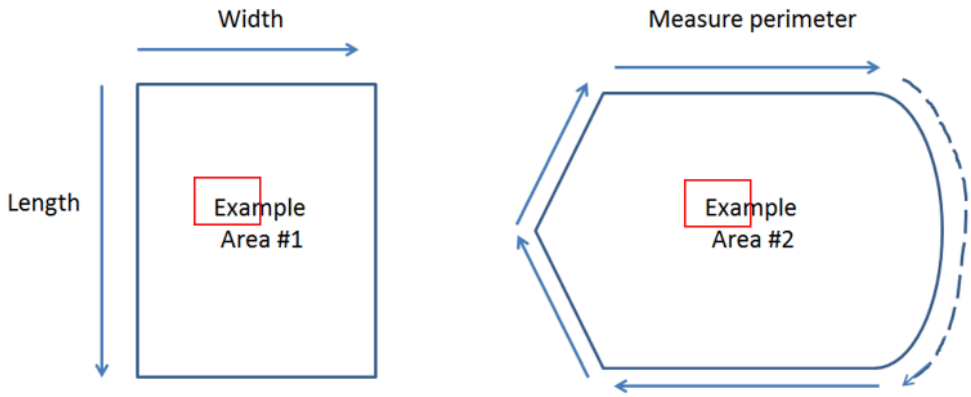
Appendix G

Protocol for measuring Target Areas

Target Area Measurement Protocol

If a Scanner comes across a target area being used by a program that **has not** been previously identified in the maps on the tablets, do the following:

1. Retrieve the **Target Area (TA) measurement wheel** from the **Data Collection Bag** (see picture below).
   a. Twist the handle to expand. Retwist to tighten.
2. Draw a diagram of the new Target Area in the **Field Notes**. Measure each side and write the measurements (to the nearest tenth) on the appropriate sides in the drawn diagram. Draw or explain where on the map the new Target Area is located.
   a. If the new Target Area is a square/rectangle, measure only the **length and width** of the area (see Example Area #1 in the diagram below).
   b. If the area is **not** a square/rectangle, measure **all sides** in order to obtain the perimeter (see Example Area #2 in the diagram below).



Appendix H

Physical activity protocols (Accelerometer)

Accelerometer Person

Forms Associated: Accelerometer Form, Data Collection Arrival & Exit Checklist, SNACK Observation Form,

Equipment Associated: Accelerometer bag, clip board, pen and Black Marker Pen

1. Retrieve the **Accelerometer bag** and **Accelerometer Form .**
    a. Before children arrive, and using the roll, write childrens names down ready for their arrival. This can save time and make it easier when children arrive
2. Ask staff/ Director if any children have returned an opt-out form and will not be wearing an accelerometer
3. When a child leaves, collect their accelerometer and record the time off on the **Accelerometer Form**.
    a. This needs to be the exact time, including hour and minute.
    b. Once you receive the accelerometer, using the back maker pen remove the childs name and replace it with an ID# - made up of the Centre ID and number of children ie 2408 (centre #24 and child #08 etc).
4. ***MAKE SURE TO ASK EVERY KID WHO LEAVES IF THEY HAVE AN ACCELEROMETER!!*** **DO NOT** let accelerometers leave the site.
5. **Afternoon Accelerometer Person** and **Scanner** get ready for departure at 6:00pm, or when the program ends; whichever occurs first.
    a. Make sure to collect all accelerometers from the remaining children. Record time-off information.

Accelerometer Management Protocol

If accelerometers 1) go missing 2) are returned after being found, 3) become damaged, then please follow the instructions below.

These instructions are for the Scanner

1. **Missing Accelerometers**
    a. If an accelerometer goes missing record the following on the **Exit Form** (iPad) **BEFORE** you leave the program for the day:
        i. Accelerometer #
        ii. Child name
        iii. ***'Yes'*** or ***'No'*** for whether or not the program leader has been informed of the missing accelerometer.
2. **Returned Accelerometers**
    a. Upon retrieval of the missing accelerometer(s),
        i. Note **the accelerometer #** and the **program** that it was returned from on your field notes.
        ii. **Do not** place returned accelerometers on children.
3. **Damaged Accelerometers**
    a. Visible accelerometer damage, such as
        i. strap/buckle breaks

Appendix I

Healthy Afterschool Activity and Nutrition Documentation – (HAAND)

Program Name			**Date of Observation** (mm/dd/yy)
Program Start Time	**Program End Time**	**Location Type** (check one) ☐ School ☐ Fitness center ☐ Faith-based ☐ Other	**Today's Weather** (check one) ☐ Sunny ☐ Partly cloudy ☐ Cloudy ☐ Rainy
# of Children Enrolled	**# of Staff**		

How much does your program spend on snacks per month?	*Snack $__ per ___ (month)*
Who providers snack at your program?	*Describe*
What was served for snack/meal today?	*Describe*
Does your program get reimbursed for foods? ☐ NO ☐ YES (describe)	**If YES, by whom?**
Did children bring outside food? ☐ NO ☐ YES	**If YES, describe…**
Did children bring outside drinks? ☐ NO ☐ YES	**If YES, describe…**
Did staff eat/drink foods other than snack in front of children? ☐ NO ☐ YES	**If YES, describe…**
Are children allowed to bring electronic media devices? ☐ NO ☐ YES	**If YES, describe…**

Total time allocated for physical activity	**# Minutes Scheduled for PA**

Healthy Afterschool Activity and Nutrition Documentation – (HAAND)

Physical Activity Scale

*Directions: Check NO or YES. Transfer the numerical value of the response **(shown in parentheses)** to the corresponding box.*

Does the program have any written documentation on physical activity (PA) policies? ☐ NO **(0)** ☐ YES (indicate)	☐ **(1)** Program has general written policy regarding physical activity opportunities ☐ **(2)** Program has detailed (explicit) written policy regarding physical activity opportunities *(measurable)* *What is the policy? -* _____	
Do staff members obtain any feedback from the parents or children regarding the activities they like or dislike? ☐ NO **(0)** ☐ YES (indicate)	☐ **(1)** Informal collection (verbal) ☐ **(2)** Formal collection (surveys) *Notes*_____	
Is screen time allowed at your program? ☐ NO **(2)** ☐ YES (indicate)	☐ **(0)** greater than or equal to 1 hr/day ☐ **(1)** less than 1 hr/day	
Do you schedule time for PA during afterschool program? ☐ NO **(0)** ☐ YES (indicate) ***If possible, collect handwritten schedule***	☐ **(1)** Less than 25% scheduled ☐ **(2)** 25-49% scheduled ☐ **(3)** 50% or more scheduled	
Do you provide structured activities?	☐ **(0)** Free play ☐ **(1)** Limited number of activities: 1 or 2 structured activities ☐ **(2)** Diverse range of activities: 3 or more structured activities	
Are scheduled activities equitable?	☐ **(0)** Activities favor single gender ☐ **(1)** Activities appeal to both genders	
Are staff members offered training on how to promote PA? ☐ NO **(0)** ☐ YES (indicate)	How much training time is devoted to physical activity promotion? ☐ **(1)** Less than 1 hour/year ☐ **(2)** 1-4 hours/year ☐ **(3)** + 4 hours/year	

What are the qualifications of the person providing staff physical activity promotion training at your program?	☐ **(0)** No training ☐ **(1)** Non-certified personnel ☐ **(2)** Certified personnel *(e.g., physical educator, health promotion specialist, graduate degree in health education field)*	
Any workshops for promoting of physical activity among parents?	☐ **(0)** None ☐ **(1)** 1 workshop/year ☐ **(2)** +2 workshop/year	
Any educational contents used at your program to promote physical activity among the children? ***see table on last page***	☐ **(0)** None ☐ **(1)** Non-evidence based ☐ **(2)** Evidence-based *What is the curriculum?* _____	
How does your program assess physical activity levels of children while at your program?	☐ **(0)** No assessment method ☐ **(1)** One time per year using staff or child self-reporting (*non -valid*) ☐ **(2)** Two or more times per year using staff or child self-reporting (*non - valid*) ☐ **(3)** One time per year using activity monitors such as pedometers and/ or accelerometers (*valid methods*) ☐ **(4)** Two or more times per year activity using monitors such as pedometers, accelerometers and/ or trained observation (*valid methods*) *Notes*_____	
Star Rating: 1 to 5 = ★, 6 to 9 = ★★, 10-14 = ★★★, 15-21 = ★★★★, and 22-25 = ★★★★★		TOTAL

Healthy Afterschool Activity and Nutrition Documentation – (HAAND)

Healthy Eating Scale

*Directions: Check NO or YES. Transfer the numerical value of the response **(shown in parentheses)** to the corresponding box.*

Does the program have any written documentation on nutrition policies? ☐ NO **(0)** ☐ YES (indicate)	☐ **(1)** Written policies using non-specific language ☐ **(2)** Written policies using explicit language *(i.e., measureable)* *What is the policy?* _____	
Does your program receive feedback about the snacks provided from the children and/or parents?? ☐ NO **(0)** ☐ YES (indicate)	☐ **(1)** Informal collection of feedback ☐ **(2)** Formal collection of feedback *Notes*_____	
How many times per week does your program serve fruit?	☐ **(0)** None served ☐ **(1)** 1 time/week ☐ **(2)** 2 times/week ☐ **(3)** 3 times/week	
	☐ **(4)** 4 or more times/week	
How many times per week does your program serve fresh, uncooked vegetables?	☐ **(0)** None served ☐ **(1)** 1 time/week ☐ **(2)** 2 times/week ☐ **(3)** 3 times/week ☐ **(4)** 4 or more times/week	
How many times per week does your program serve sugar added drinks?	☐ **(0)** +4 times/week ☐ **(1)** 3 times/week ☐ **(2)** 2 times/week ☐ **(3)** 1 time/week ☐ **(4)** None served	
How many times per week does your program serve whole grain snacks?	☐ **(0)** None served ☐ **(1)** 1 time/week ☐ **(2)** 2 times/week ☐ **(3)** 3 times/week	

Do children have access to vending machines or concession stands while at your afterschool program?	☐ **(0)** Access ☐ **(1)** No Access *Notes*_____	
What's the number of healthy eating training hours staffs at your program receive?	☐ **(0)** No Training ☐ **(1)** Less than 1 hour/year ☐ **(2)** 1-4 hours/year ☐ **(3)** More than 4 hours/year	
What's the qualification of the person providing staff with healthy eating promotion training at your program?	☐ **(0)** No Training ☐ **(1)** Non-certified personnel ☐ **(2)** Certified personnel *(e.g., nutritionist, health promotion specialist, graduate degree in health education field)*	
Does your program offer any workshops for promoting healthy eating habits among parents?	☐ **(0)** None ☐ **(1)** 1 workshops/year ☐ **(2)** +2 workshops/year	
Are there any educational contents used at your program to promote healthy nutrition among the children?	☐ **(0)** None ☐ **(1)** Non-Evidence-based curriculum ☐ **(2)** Evidence-based curriculum *What is the curriculum?* _____	

***see table on last page**		
How does your program assess the quality of snacks served to children in comparison to guidelines?	☐ **(0)** No assessment method ☐ **(1)** Limited evaluation using self-report methods (non-*valid*) ☐ **(2)** Two or more times per year using self-report methods (non-*valid*) ☐ **(3)** One time per year using trained observers or nutrition calculator (*valid methods*) ☐ **(4)** Two or more times per year using trained observers or nutrition calculator (*valid methods*) *Notes* _____	
	TOTAL	

Star Rating: 1 to 6 =★, 7 to 14 =★★, 15-21 =★★★, 22-27 =★★★★, and28-34 = ★★★★★

Appendix J

Example of the service reports provided to all participating OSHC services

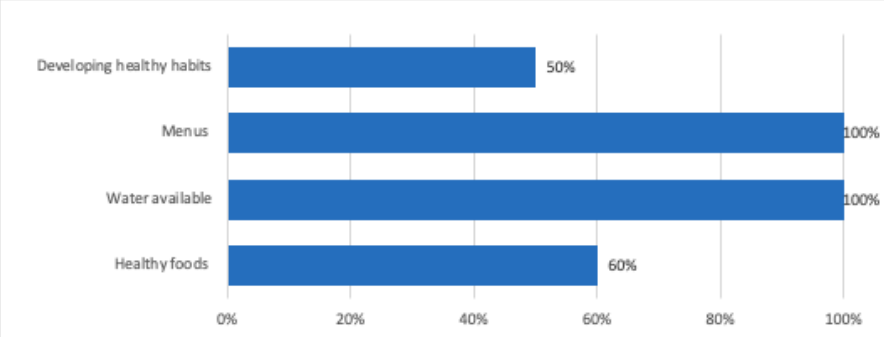
Thank you for participating in the research study "Observing the healthy eating and physical activity environments in after-school programs in NSW". The research is part of a larger study in partnership with NSW Ministry of Health, and South Western Sydney and Illawarra Shoalhaven Local Health Districts. The results will guide future professional development activities to support services to embed Healthy Eating and Physical Activity (HEPA) into their programs.
The after-school period provides a window of opportunity to encourage children in healthy eating and active play. This project observed behaviour relating to healthy eating and physical activity and recorded behaviours as either observed or not observed on two visits to your service.

1.1 Healthy Eating

The healthy eating criteria that were observed included the menus, the food and beverages offered, and developing healthy habits. Below is a list of items that were observed during the visits.

1. **Menus**:
    a. A weekly food menu displayed for parents to review
    b. Foods offered were consistent with the menu
    c. Menus included a variety of foods from at least three different food groups
2. **Foods and beverages offered**:
    a. Fruit and vegetable provided each day
    b. Whole grains or high fibre grain options offered
    c. Yoghurts, low-fat milk and cheese (cottage ad ricotta cheese and low-fat cheddar)
    d. Lean meats (or their alternatives) provided, when meats were offered
    e. Limited discretionary foods available? These are foods high in saturated fat, added sugar and salts. Discretionary foods that should not be offered include: cakes, muffins/ pastries, confectionary (lollies, jelly) muesli bars, high salt/ fat savoury biscuits, crisp breads, pizza, sour cream, or deep-fried foods.
3. **Water**: Regular access to drinking water everyday
4. **Developing healthy habits**:
    a. Children were included in food preparation activities including cooking, assisting serving of foods or clean-up after themselves?
    b. Staff discussing healthy eating, healthy habits or life skills? including growing food, cooking and recycling or composting with children?
    c. Staff sitting and eating with children? And if they were eating, they consumed healthy food options?

Figure 1: Percentage of healthy eating environment criteria observed at your service



Strengths of your program in relation to healthy eating:

- Menus were available and displayed on both occasions and consistent with what was offered
- A variety of healthy snack options were provided, including a range of fresh fruits, wholegrains and water on both observation days; fresh vegetables and cheese were observed on at least one observation day.
- There were sufficient amounts of food available for children to have more if they wanted.
- Children were included in healthy eating behaviours, including cleaning up after themselves once they had finished eating and serving food for themselves or others.

Opportunities for improvement in relation to healthy eating:

Several areas for improvement are listed below. For some suggestions there is a reference to sections of *Eat Smart, Play Smart: A manual for Out of School Hours Care (ESPS manual)*, which provides more detail regarding possible improvements in these areas.

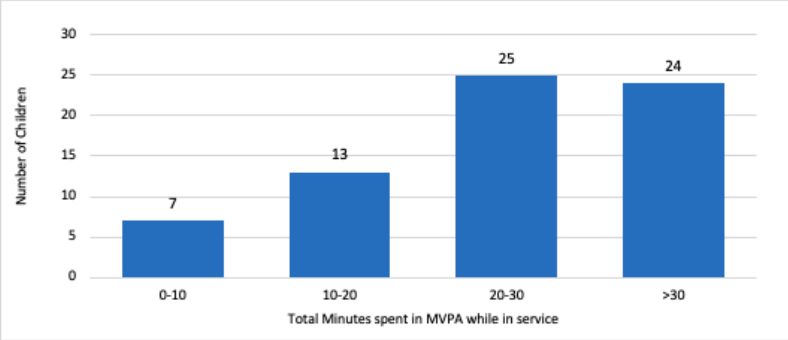
- When serving meat, consider using alternate lean meat options for sandwich fillings including: tuna, lean chicken, ham or hummus. For additional sandwich filling ideas refer to page 51 -52 of the ESPS manual.
- Sitting and talking to children is a great way to make mealtimes enjoyable and also provides a great opportunity to discuss healthy eating. For examples on how to engage children in discussions on healthy eating refer to page 65 of the ESPS manual.
- Engaging children in cooking opportunities is a great way for them to learn nutrition skills. Refer to pages 56-78 of the ESPS manual for some tips and ideas on how to do this.

1.2 Physical activity

The physical activity criteria that were observed included the environment, staff promotion, child physical activity and barriers to physical activity. Below is a list of items that were observed during the visits.

- Boys spent an average of 30 minutes and girls 22 minutes in MVPA during their time at your program.

Figure 3: Children who spent time in moderate to vigorous physical activity (MVPA)



Opportunities for improvements in relation to physical activity

- When selecting games for group activities, be mindful not to include games with an elimination aspect (e.g. if tagged you must sit out) or prolonged waiting. This limits the time and opportunities for children to be as active as possible in the after-school period. Some ideas for games can be found in the ESPS manual –see pages 180-183.
- Incorporating music into your program allows for opportunities of creative movement and dance.
- On both of the observation days, small screens (e.g. iPads, phones tablets) were in use. It is recommended to try to limit the amount of time children spend on small screens, this can be done by including a screen-free time frame between 3-5pm to allow children to engage in more physical activity opportunities. For suggestions, please refer to pages 175 & 180-187 of the ESPS manual).

Thank you again for participating in this research study! And we hope this feedback was helpful!

Additional information about this document:

This report presents the findings from observations conducted in your service. The research relates to the National Quality Standard (NQS):

- QA 2 Element 2.1.3 *Healthy lifestyle*, "Healthy eating and physical activity are promoted and appropriate for each child"
- QA2 Element 2.2.2 "Healthy eating and physical activity are embedded in the program for children" and the supporting documents, including the Australian Guide to Healthy Eating (AGHE), Eat Smart, Play Smart and Australia's Physical Activity and Sedentary Behaviour Guidelines for Children (5-12 Years).