THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

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Project: To Identify Effective Strategies to Support the Implementation of Physical Activity Programs in Schools.
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Nicole Nathan  
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Signed  15th September 2017  
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Date
KEY WORDS

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INTRODUCTION

“Healthy citizens are the greatest asset any country can have”

- ~ Winston Churchill

Without the population wide implementation of evidence based practices, the potential public health benefits they are intended to deliver to the community will not be seen. School-based physical activity programs can significantly increase children’s physical activity levels, thereby potentially reducing children’s risk of developing numerous chronic diseases. However within Australia the implementation of mandatory school-based physical activity policies and programs is limited. Despite this, relatively little research has been undertaken to identify how to best ensure that such policies are routinely implemented.

I received a 2016 Churchill Trust Fellowship to travel to Canada and The United States to meet with leading public health researchers and implementation scientists, to identify effective strategies to support the implementation of physical activity policies and programs in Australian schools. My Fellowship provided me with opportunities to learn about current implementation theories, frameworks and methodologies being used in both clinical and public health settings as well as first-hand experience of successful school-based implementation interventions. Through this experience I hope to enhance implementation research and practice that is occurring within Australia, increasing the speed at which research is translated into practice, thereby improving the health of Australians.
EXECUTIVE SUMMARY

Fellow (at the time of the fellowship)

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My Fellowship was undertaken from 29th May to 28th June 2017 where I travelled to Victoria, Quebec and Toronto in Canada and Boston, Massachusetts in The United States to identify effective strategies to support the implementation of physical activity programs in schools. During this time I attended three conferences, had formal meetings with over 22 people and had countless informal meetings with people that I was introduced to through hosts or through conference seminars.

HIGHLIGHTS

- Meeting with the Action Schools! BC team in particular Professor Patti-Jean (PJ) Naylor, who was so generous with her time and advice.
- Visiting a local Action Schools! BC school, seeing their program first hand and hearing from parents and teachers about their experiences of the program.
- Meeting and or interviewing leaders of implementation science including Professor Jeremy Grimshaw, Professor France Legare and Professor Noah Ivers who through their work in the clinical setting challenged me to think how these learnings could be applied to community settings in particular schools.
- Visiting the team at the Harvard School of Public Health, who are undertaking such rigorous evaluation of numerous public health programs.

SUMMARY OF KEY RECOMMENDATIONS

Below is a summary of key recommendations for researchers, practitioners and policy makers undertaking implementation science in community-based settings (specific recommendations
for those undertaking physical activity research in schools is within the report);

- Utilize theoretical frameworks in the planning of implementation interventions and if possible identify how intervention effects are mediated.
- Prior to undertaking any implementation intervention ensure that a comprehensive analysis of barriers/facilitators, using a theoretical framework, is undertaken.
- Where possible carry out more pragmatic research trials, so that intervention effects under real world conditions can be understood.
- Utilize alternative trial designs that enable two or more intervention strategies to be compared in a head-to-head manner so that policy makers and practitioners can make informed decisions when choosing between implementation interventions.

**DISSEMINATION STRATEGY**

In order to encourage the adoption of key recommendations a number of personal and professional strategies have or will be employed including;

1. **Personal strategies.** I established a twitter account [https://twitter.com/NicoleKNathan](https://twitter.com/NicoleKNathan) where I disseminated information throughout my fellowship and continue to promote and advocate for best practice implementation science. I have also created a staff profile with The University of Newcastle [https://www.newcastle.edu.au/profile/nicole-nathan](https://www.newcastle.edu.au/profile/nicole-nathan) and Hunter Medical Research Institute (under development) where a repository of my implementation research is accessible including a link to this report.

2. **Professional strategies.** The learnings from this Fellowship has had an immediate impact on research trials being run in Hunter New England Population Health which include both local and state level stakeholders. As a result, findings of projects that are directly influenced, will be disseminated through policy and practice briefs, evidence summaries, presentations at local forums and conferences, and peer reviewed journal publications. As these projects involve senior policy advisers other investigators may also disseminate the findings through their international and national networks and professional appointments.
ACKNOWLEDGMENTS

My sincere thanks go to The Sir Winston Churchill Trust and The Northern Districts Education Centre (Sydney) for sponsoring my 2016 Fellowship. As an Early Career Researcher this five week Fellowship provided me with opportunities and experiences that would have otherwise never occurred or taken me years to achieve. I will be forever grateful to the Trust and The Northern Districts Education Centre for affording me this once in a lifetime opportunity. Thankyou.

I would like to thank my two referees Associate Professor Luke Wolfenden and Professor John Wiggers for encouraging and supporting me to apply for the Fellowship and facilitating connections with some of my hosts. Also special thanks to Karen Gillham, Director of Health Promotion Hunter New England Population Health as well as my employer, Hunter New England Local Health District for supporting my application to travel.

To the numerous people who hosted me, met with me or introduced me to colleagues (some of which are pictured below) THANKYOU! Your commitment to, and enthusiasm for, your fields of research was very inspiring; and your generosity of time and hospitality very much appreciated! I hope that one day I can return the favour.

Finally thank you, to my incredibly supportive family who have always encouraged and supported me in all my research endeavours. I couldn’t have undertaken this Fellowship without your support.
PROGRAMME

Week 1: 29th May - 2nd June, Victoria, Canada.

- Hosted by Professor Patti-Jean Naylor (University of Victoria).
- Visit to Northridge Elementary school.
- Meeting with Professor Mark Beauchamp (University of British Columbia), Professor PJ Naylor and Professor Ryan Rhodes (University of Victoria).
- Meeting with Dr Jennifer McConnel-Nzunga (University of Victoria).

WEEK 2: 5th- 10th June, Victoria, Canada.

- Attendance and presentation at the 16th ISBNPA Annual Conference
- Meeting with Professor Louise Masse (University of British Columbia).
- Meeting with Professor Catherine Draper (University of Cape Town).
- Meeting with Dr Erin Howie (University of Arkansas).
- Meeting with Professor Helen Brown (University of Cambridge).
- Attendance at Inaugural Implementation and Scalability Special Interest Group Forum.

WEEK 3: 11th- 16th June, Quebec, Canada

- Attendance at 2017 Annual Knowledge Translation Conference
- Meeting with Professor France Legare (Clinical Investigator, Population Health and Practice-Changing Research, CHU de Québec - Université Laval).
- Meeting with Professor Jeremy Grimshaw (Senior Scientist, Clinical Epidemiology Program Ottawa Hospital Research Institute).
- Meeting with Tatiana Agbadje (Université Laval).

WEEK 4: 19th- 22nd June, Toronto, Canada

- Attendance and presentation at the 2017 Global Implementation Conference
- Meeting with Dr Elaine Toomey (National University of Ireland, Galway)
- Meeting with Professor Noah Ivers and Dr Laura Desveaux (University of Toronto)

WEEK 5: 26th-28th June, Boston, Massachusetts

- Presentation to Harvard School of Public Health
- Meeting with Professor Steve Gortmaker, Ms Jessica Barrett, Ms Catherine Giles, Professor Angie Cradock, Ms Chasmine Flax (Harvard Prevention Research Center).
- Meeting with Professor Angie Cradock (Harvard Prevention Research Center).
BRIEF BACKGROUND

Physical inactivity is the fourth leading cause of death worldwide\(^1\) and is estimated to be responsible for 6–10% of all non-communicable deaths or approximately 5.7 million deaths globally.\(^1\) Within Australia, approximately 6.6% of the total burden of disease is attributable to physical inactivity\(^2\) and is the second greatest contributor, behind tobacco smoking, to the cancer burden.\(^3\) In 2008, the cost of physical inactivity to the Australian economy was estimated to be $13.8 billion.\(^4\)

Australian physical activity guidelines recommended that children accumulate at least 60 minutes of moderate-to-vigorous physical activity (MVPA) each day.\(^5\) However, similar to other countries,\(^6\) only a third of Australian primary school aged children are estimated to be sufficiently active to meet these guidelines.\(^7\) As physical activity patterns developed in childhood track into adulthood,\(^6, 8\) ensuring children are adequately active is essential for future chronic disease prevention\(^8\) and could prevent an estimated 8,000 deaths each year in Australia.\(^9\) As such creating environments more supportive of children’s physical activity has been identified as a public health priority by the World Health Organization, and governments across the globe.\(^10\)

Schools have been identified as key settings to implement interventions to promote physical activity by the National Cancer Prevention Policy\(^11\) and NSW Cancer Council\(^12\) as they provide almost universal access to children on a continuous and intensive basis.\(^8\) Systematic reviews demonstrate school-based interventions that increase opportunities for student physical activity are effective in increasing student MVPA. For example, the most recent Cochrane review (2013)\(^8\) of 44 studies, found that multi-component school-based physical activity interventions increase children’s MVPA by up to 45min per day. Specifically, reviews have found that interventions that increase opportunities to be physically active during the school day through regular quality PE, sport or physical activity in the classroom are particularly effective.\(^13\) As such, governments across the globe, including Australia, have released guidelines or policy mandating minimum accumulated periods each week primary schools are to schedule structured activity for children.\(^14-17\)
However, research suggests that most schools internationally fail to implement school physical activity policies requiring minimum periods per week for student physical activity. For example an international review of schools in 27 countries found that 21% were not implementing physical education (PE) in accordance with policies or guidelines.\[15\] For almost 20 years studies have reported poor compliance with physical activity policies by Australian primary schools.\[18\] For example in 1999 67% of South Australian primary schools did not meet the mandated 100 minutes of physical education per week.\[19\] A 2007 survey of 71 primary school key stakeholders found that only 27% of Queensland schools were providing 2 or more hours of planned physical activity per week.\[20\] In NSW, an Auditor-General report estimated, that <20% of primary schools provide >150 minutes of planned physical activity per week.\[21\] Without their population wide implementation, school based physical activity policies cannot yield the benefits to children they are intended to deliver. Despite this, relatively little attention has been paid to identifying how to best ensure that such policies are implemented in routine practice.

**AIM**

The aim of this project was to identify effective strategies to support the implementation of physical activity policies and programs in Australian schools.

**METHOD**

The itinerary for my fellowship and context for visits, meetings or conference attendance was purposefully planned to meet with leading researchers or practitioners undertaking physical activity and or implementation research in schools or other settings (either clinical or community-based). Over the course of my five week itinerary at-length discussions were undertaken with over 22 people. Using a semi-structured interview format, some or all of the following themes were discussed during the meetings;

1. The extent of implementation research currently occurring in schools.
2. Robust implementation theories or frameworks that can be used in the school-setting.
3. Factors that need to be considered for successful implementation.
4. Identifying and selecting effective implementation strategies.
5. Evaluating and sustaining implementation.
As such numerous sources have contributed to the findings below. Therefore, unless specific to a host's context findings are presented within each of the themes rather than as a summary of each visit.

**FINDINGS**

**THE EXTENT OF IMPLEMENTATION RESEARCH CURRENTLY OCCURRING IN SCHOOLS.**

*What is implementation science?*

Models of research translation suggest that in order to determine what is best practice care potential interventions must first be rigorously trialed, and then only if effective, acceptable and cost-efficient, considered for implementation by policy makers and practitioners. However, evidence suggests that this process takes approximately 17 years of which only 14% of health innovations actually influence policy or practice.[22] Defined as “the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice and, hence, to improve the quality and effectiveness of services”[23] implementation science has tremendous potential to significantly improve population health by accelerating the use of efficacious policies or programs in practice.

*Implementation research currently occurring in schools.*

A key theme that emerged through meetings and conferences was the need to move research in schools further along the translation continuum. Figure 1 provides an example of what was typically described as the research translation continuum within the school setting. However, many felt that school-based research was generally stalling at feasibility or efficacy trials and never being tested under more pragmatic conditions significantly reducing their likelihood of adoption at a population level.
Whilst a number of impediments were identified that restrict school-based research moving from efficacy to effectiveness or dissemination, a frequently recommended solution was for a “participatory research” approach to be considered.

Participatory research is the bidirectional communication between researchers and stakeholders\(^\text{[24]}\) (which may include individuals or organizations) that aim to answer research questions that are a direct need of the stakeholders. Participatory research may therefore produce evidence that is more relevant and applicable to policy and practice stakeholders, therefore potentially increasing the likelihood of being disseminated.

1.2.1 Case Study: Action Schools! BC

Whilst not explicitly a participatory research project, Action Schools! BC, which I was able to learn about during my visit with Professor Patti-Jean Naylor and Northbridge Elementary school, is a good example of a research project that, through co-production with key stakeholders successfully moved through all stages of the research translation continuum in a relatively short period of time. Developed in collaboration with three government agencies (Education, Health and Tourism, Sport, and the Arts (MTSA)), all of which had increasing childhood physical activity as a priority area, Action Schools! BC, aimed to increase schools implementation of a mandatory physical activity policy to meet a recommended standard of 150 minutes of physical activity per week. First piloted in 10 schools in 2003-2004, the
intervention involved schools being randomised to one of the three arms i.e. Usual Practice (UP, three schools), Liaison (LS, four schools) or Champion (CS, three schools). Teachers in both LS and CS schools received Action Schools! BC training and resources but differed on the level of in-school support provided. At follow-up opportunities for physical activity had significantly increased in both LS and CS schools with minutes of physical activity delivered being +67.4 min/week and +55.2 min/week in LS and CS respectively.\[^{25}\]\[^{26}\] Based upon these results in 2005 Action Schools! BC was expanded into an effectiveness trial in 30 schools and by approximately 2008 had moved to full scale up to over 300 schools (see Figure 2 below).\[^{26}\]

![Figure 2: Action Schools! BC timeline from efficacy to scale-up. Sourced from McKay HA, Macdonald HM, Nettlefold L, et al Action Schools! BC implementation: from efficacy to effectiveness to scale-up Br J Sports Med 2015;49:210-218.](image-url)
Interviewees reported that that the speed of translation and sustained implementation of *Action Schools! BC*, was most likely due to three key factors;

1. The initial engagement and collaboration between researchers and multiple levels and sectors of government;

2. The sustained and substantial investment by government agencies; and

3. The adaptability of *Action Schools! BC* to continually meet the needs and priorities of schools. Initially focusing on just physical activity in the pilot, *Action Schools! BC* expanded to include components on healthy eating in the effectiveness trial, to now being seen as a comprehensive model of how health promotion is implemented in schools (see Figure 3 below).


**FOR ACTION**

Follow-up PJ Naylor and Angie Cradock re advisory role for implementation trial of physical activity policies in NSW schools.
ROBUST IMPLEMENTATION THEORIES OR FRAMEWORKS THAT CAN BE USED IN THE SCHOOL-SETTING

The use of theoretical approaches in the planning of implementation trials in schools is fundamental to advancing the field particularly as it can help explain how and why implementation succeeds or fails. However, there are currently over 60 theoretical frameworks that implementation scientists can choose from to help guide their work making it difficult to select the most robust framework.

During my fellowship, much of my learnings of how theoretical frameworks were being selected and applied came from studies undertaken within the clinical setting. Whilst numerous frameworks were presented or discussed, the most frequently utilized frameworks were the Consolidated Framework for Implementation Research (CFIR) by Damschroder et al. and the Theoretical Domains Framework (TDF) by Michie et al.

Both frameworks provide a comprehensive taxonomy of constructs from multiple disciplines including psychology and organizational change. Whilst the number of constructs and domains varies between the two (i.e. CFIR includes 39 constructs across five domains whilst the TDF includes 128 constructs across 12 domains), they are quite similar as they can both be used to help identify or describe the context of which an intervention is going to occur. Researchers using the TDF have also utilized the framework to select tailored strategies for implementing an intervention by mapping barriers to TDF constructs, which can then be mapped to recommended implementation strategies. Encouragingly, Hunter New England Population Health Research Group (HNEPHRG) have used both of these frameworks for some time, with the TDF being the most commonly used. However researchers that I met with were able to explain some extension of its use, most notably through mediation analyses. They have encouraged the use of the TDF to undertake an assessment of the mechanism by which the strategy may improve implementation.

A number of researchers were also using implementation frameworks to help evaluate implementation, in particular interventions that had been taken to scale. Whilst not the only
framework used for evaluation, the RE-AIM framework (see Figure 4 below) was often utilized given the metrics it measured. Whilst there are numerous examples of how the model had been applied within clinical and public health projects, below is an example of how it could potentially be applied to measure scale up of school based physical activity projects. Researchers using the model did reiterate that whilst measuring all components are ideal, it may not have to occur within the one process. For example, if a project has moved through the research translation continuum you may have already answered “effectiveness” during the pilot or efficacy stages. It may only be necessary to reassess this if the intervention has been modified in order for it to be taken to scale.

Irrespective of what framework is selected overwhelming advice from researchers was to simply provide a rationale as to why the framework was selected and explain how the framework contributes to their study.

FOR ACTION
Explore opportunities to collaborate with researchers for mediation analysis of schools based physical activity research.
FACTORS THAT NEED TO BE CONSIDERED FOR SUCCESSFUL IMPLEMENTATION.

During my meetings with researchers and practitioners a number of themes consistently emerged as being essential factors to the success of an intervention being adopted within a community or clinical setting. These include;

*Characteristics of the intervention.*

Whilst the use of theoretical frameworks, such as those listed above, will help identify “characteristics of the intervention” which may prevent schools’ implementation of a policy or programme, many researchers felt that by the time these issues are identified it may be too late as the policy or programme has already been designed. Interviewees reported that interventions that are too complex, appear to have no relative advantage over current practice, are time consuming, cannot be adapted to local context or trialled prior to implementation, are expensive, or require specialist expertise may be less likely to be implemented. However, it was stressed that this does not mean that “stretch” policies or programs, that is those that encourage schools to strive for more than a minimum requirement should be avoided.

*Understanding the political context*

A recurring theme within conference presentations and researchers I met with was that the context in which the intervention is occurring can “make or break” efforts to implement a policy or program. Whilst most of these contextual issues such as budget, staffing capacity and political influence are out of the control of most projects, advice given was that being aware of them and trying to align our work to them is essential. There was some feeling that school based programs are often at risk as so many health or education projects need to reach students in schools. As such existing projects can easily “run out of flavour” as new priority areas emerge and hence funding and political will, moves to these new focus areas. Therefore, like the learnings from *Action Schools! BC* above most felt that engaging government
stakeholders from the beginning of any project was essential as was developing and implementing a “knowledge translation” plan targeting key policy makers to ensure timely and strategic dissemination of project findings to them.

**Understanding schools’ barriers and facilitators to implementation**

The implementation of any intervention within a school requires some or all school personnel i.e. teachers, principals or administrators, to change their behaviour by doing something new or different, which may pose numerous challenges for staff at a personal, organisational or environmental level. Therefore it was strongly recommended that prior to delivering any intervention to schools researchers need to be able to clearly identify “whom needs to do what differently” so that a thorough understanding of the barriers and facilitators to implementation can be ascertained and implementation strategies selected accordingly.

Within Australia we know that schools face a number of barriers to the implementation of health promotion policies and programs broadly including an already ‘crowded curriculum’, inadequate resources, a perceived lack of support from school executive, a lack of knowledge and skills and teacher self-efficacy. Interestingly, these barriers appear to be universal as they were commonly raised during meetings, conferences and school visits that I undertook.

However, very little is known about specific barriers and facilitators to the implementation of physical activity policies in Australian schools. The implementation scientists that I met with strongly recommended that any process to identify schools’ barriers and facilitators to implementing a physical activity policy or program use a theoretical framework to do so. This provides a comprehensive understanding of the issues that schools’ face to implementation and can help guide researchers and policy-makers in the selection of evidence-based implementation strategies.

**FOR ACTION**

Complete systematic review of schools’ barriers and facilitators to implementation of physical activity policies.
IDENTIFYING AND SELECTING EFFECTIVE IMPLEMENTATION STRATEGIES.

In an attempt to address the numerous barriers schools face implementing health promotion policies or programs (as listed above) many of the implementation trials conducted to date have utilised multi-component implementation interventions. However, such interventions are often time and resource intensive which may limit their capacity to be universally adopted. The implementation scientists that I met with, in particular those working in the clinical setting, recommended the use of trial designs that enable two or more intervention strategies to be compared in a head-to-head manner. They reported that the use of comparative effectiveness research (CER) or factorial designs, provide a robust method of identifying more effective and efficient interventions and therefore may accelerate improvements in public health.

Comparative effectiveness research

A number of conference seminars I attended demonstrated how comparative effectiveness research designs were used within the clinical setting to help policy makers and clinicians make informed medical decisions. For example one clinical trial demonstrated how rather than using a traditional randomized control trial where “intervention” is compared to “no intervention control” they used a comparative effectiveness research design to compare “intervention treatment” to “usual care treatment”. The study found that the intervention was as effective for patients, but more efficient, cost-effective and acceptable to patients than usual care and thus superseded “usual care”.

I was convinced that applying such research designs to public health interventions could significantly increase our understanding within implementation science in schools. For example by applying comparative effectiveness research designs, future school-based implementation interventions would not compare an implementation intervention to a “no treatment group”, but rather the existing implementation strategy at the time with known effectiveness. As more effective interventions are identified, they themselves serve as the comparator for future studies, providing an efficient means of continuous improvement.
Factorial designs

The limitation of comparative effectiveness research designs is that it relies on known effective interventions. Within implementation interventions in schools such evidence may however not exist. In the absence of such evidence within schools’ implementation of physical activity policies it may be more feasible for researchers to conduct factorial research designs such as a “2 × 2 designs”. As I learned throughout my visits factorial designs may be more acceptable to schools as they often require smaller sample sizes than what would be needed in comparable traditional two-arm trials whilst enabling multiple intervention strategy comparisons. For example, as depicted in Figure 5 below, in a 2 × 2 factorial design, that is evaluating two different implementation interventions against control, schools may be randomized to either intervention A or B independently which results in four groups: both intervention A and B, intervention A only, intervention B only or no intervention.

<table>
<thead>
<tr>
<th>INTERVENTION B</th>
<th>INTERVENTION A</th>
</tr>
</thead>
<tbody>
<tr>
<td>School receives intervention A and B</td>
<td>School receives intervention B only</td>
</tr>
<tr>
<td>School receives intervention A only</td>
<td>School receives neither A or B</td>
</tr>
</tbody>
</table>

Figure 5: Example of a 2 x 2 factorial design

FOR ACTION
Follow-up with Noah Ivers SMART and MOST methodologies.

Identify opportunities for comparative effectiveness research (CER) designs or factorial designs to be used within school based research.
EVALUATING AND SUSTAINING IMPLEMENTATION.

Evaluating and sustaining interventions within schools were two key focus areas for my fellowship. Although I have been undertaking schools based research for some time, the issue of measuring the fidelity of school personnel’s practices is constantly raised as a barrier to our work. Furthermore, ensuring that our past projects have been sustained within schools is essential if we are to seek investment in future projects. Below is a summary of discussions of these issues.

Measuring schools’ implementation of physical activity policies

One of the biggest challenges facing school-based implementation research is issues surrounding the robust measurement of implementation. To date most studies rely on self-report measures of implementation by school staff via questionnaires, log books and telephone interviews. Given the potential for socially desirable responding the reliability of such measures for implementation trials are problematic. Through my interviews with school-based researchers it became apparent that a number of tools to measure North American schools’ implementation of physical activity policies exists, however to date the validity and reliability of most are unknown. Whilst the appropriateness of these survey instruments to the Australian setting will need to be assessed it provides an opportunity for collaboration on such a project.

Assessing the cost-effectiveness of implementation interventions

As demands on scarce public health resources grow, policy makers need to not only know if interventions are effective but also cost-effective. As a result economic evaluations, ideally based on outcomes of randomized controlled trials, are needed. However, throughout my fellowship this was identified as a significant gap in the literature within school-based research. Whilst cost-effectiveness can be assessed from various perspectives, interviewees suggested that for implementation research it may be beneficial to consider undertaking cost-effectiveness analysis from the perspective of the agency responsible for delivering the
intervention. During my visit with the Harvard School of Public Health this was an area that they had significant expertise in, having conducted a number of cost-effectiveness studies of local or state projects.

*Sustainability of implementation interventions*

Public health programs can only deliver benefits to the community if they have reach and are sustained over time. Therefore, one of the most significant policy questions for all researchers, irrespective of setting, is the sustainability of their intervention.

- **Assessing the sustainability of individual projects**

During a conference seminar I learned of the Program Sustainability Assessment Tool (PSAT) which has been designed to assess the sustainability for a variety of public health programs. PSAT allows programs to assess their capacity for sustainability across eight domains (see Figure 6 below).

![Figure 6: Eight domains of the PSAT][1]

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[1]: Dr Nicole Nathan 2016 Churchill Fellow Final Report
Available as an on-line tool PSAT is a 40 item self-assessment that program staff can undertake and are provided an automated summary report of overall sustainability. Such information can therefore be used in the planning for the sustainability of projects.

- Monitoring the sustainability of projects

Given that maintenance of intervention effects are expected to decrease over time, longer-term follow-up of schools is warranted. Within the United States and Canada there are either national or state monitoring systems in place that can provide longitudinal monitoring of schools’ implementation of health promotion policies and programs. However within Australia there are limited examples of such systems. NSW Health does however have the Population Health Intervention Management System (PHIMS) to track the implementation of healthy eating and physical activity policies and practices in all schools, however this could potentially be strengthened by integrating into Education Department processes.

**ACTION**

Follow-up with Patti-Jean Naylor, Louie Masse and Angie Craddock for school physical activity surveys. Investigate potential to validate one of these tools across jurisdictions.

Explore opportunities of collaboration regarding economic evaluation of school based trials.

Explore the utility of PSAT in Australian school-based projects
CONCLUSIONS AND RECOMMENDATIONS

Each year, millions of dollars are invested by governments internationally to support schools adopt health and education innovations, including physical activity guidelines. Current means of supporting schools with the adoption of policies or guidelines appear to be based on limited evidence and very few have considered the role of theory in supporting intervention strategy selection. My Fellowship has therefore provided me with an immensely valuable opportunity to gain new knowledge particularly in relation to the application of implementation theories and methodologies that I will apply to my work and therefore hopefully advance the field of public health implementation science at a local, state and national level.

It is on this basis that the following recommendations are made to researchers, practitioners and policy makers undertaking implementation research in schools specifically, or where relevant other community-based settings;

- Utilize theoretical frameworks in the planning of implementation interventions and if possible identify how intervention effects are mediated.
- Prior to undertaking any implementation intervention ensure that a comprehensive analysis of barriers/ facilitators, using a theoretical framework, is undertaken.
- Where possible carry out more pragmatic research trials, so that intervention effects under real world conditions can be understood.
- Utilize alternative trial designs that enable two or more intervention strategies to be compared in a head-to-head manner so that policy makers and practitioners can make informed decisions when choosing between implementation interventions.
- Develop validated tools that measure implementation of physical activity policies or programs in schools.
- Conduct cost-effective analysis of all implementation research in schools generally and physical activity programs specifically.
- Monitor and report the sustainability of physical activity policies and programs in schools.
REFERENCES