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Systems approach to reducing unhealthy weight in Australian adolescents: ACT ‘It’s Your Move!’

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DEAKIN

MAIN MESSAGES

This project was to apply systems thinking to the community-based obesity prevention project among Australian adolescents in three ACT High Schools with three non-intervention comparison schools.

There are early indications of success with two schools showing significant decreases in overweight and obesity prevalence in a very short time frame (2 years)

Some positive changes were seen in obesity related behaviours

Changes likely to impact the health of children were observed in the food system before changes in the systems affecting physical activity.

Measurement of systems and tracking of systems change provides an indication of progress towards healthier school and community environments and may provide evidence of positive change in the short term when considered against the lag times generally expected for behavioural and anthropometric changes.

While thinking at a whole of system level is both challenging and a new way of considering prevention of obesity, this project shows it is possible to build capacity to apply this thinking and demonstrates significant shifts in systems that impact physical activity and dietary behaviours of adolescents are possible.

It is recommended that:

- Systems thinking is used in the development, implementation and evaluation of future community based obesity prevention interventions to continue to build the evidence base for the effectiveness this approach.
- Experiences of key informants from the ACT IYM be used to inform the design, implementation and evaluation of future interventions.
- Changes to food systems be prioritised. Key strategies to target include:
    - Introduction and evaluation of whole food-at-school policies.
    - Encouraging water consumption at the expense of sugar sweetened beverages.
    - Encouraging higher levels of vegetable consumption.
- Future initiatives to improve food environments at school use a multi-dimensional approach, and the support of the wider community should be a key target to meet nutrition-based goals.
- Future intervention efforts assess the readiness of the community for systems change then work with community leaders to engage and lift the capacity of all personnel key to intervention implementation.
- Ongoing evaluation of the targeted systems be prioritised to provide feedback to stakeholders so that effective and timely adaptations can be made.
- Future intervention efforts aim to strengthen existing and create new internal and external partnerships, embed change within the school systems so that they are sustainable and use population monitoring to track changes in obesity prevalence and behavioural change to ensure representativeness of findings.
- Incorporation of health into all curriculum areas so that it is continually reinforced.

EXECUTIVE SUMMARY

Overweight and obesity are major global public health issues. In Australia, prevalence of overweight and obesity has increased over time, with similar trends occurring in United States and United Kingdom. Prevalence among children doubled between1985-1995, and it is estimated that currently one quarter of children and adolescents are overweight or obese. Prevention efforts which have taken a broader, whole-of-community focus and which actively engage with the complexity of real life implementation appear to be the most promising next steps in attempting to prevent childhood obesity. The Australian Capital Territory It's Your Move project (ACT IYM) was a 3-year (2012-2014) community based intervention to reduce unhealthy weight gain among adolescents through comprehensive school and community based systems changes to facilitate healthier lifestyles. The purpose of this report is to provide feedback to stakeholders in the Australian Capital Territory on the design, implementation and findings of the project.

The ACT IYM was based on the successful IYM intervention in Victoria (2005-2008) extended to explicitly include systems thinking methods in intervention design, development and evaluation. Six secondary schools in Canberra, ACT participated in the project. Three intervention schools and three comparison schools were recruited representing a target population of secondary students between 13 and 17 years of age. Intervention initiatives included a full year of preparation and planning and full 2 years elapsed between baseline and follow-up measures (May 2012 – May 2014). The project had the relevant ethics approvals from Deakin HREC (EC 2012-015) and ACT Government Education and Training Directorate (Ref. 2012/00545-1).

Key personnel (principal, lead teachers, lead students) from intervention schools participated in a two-day priority setting workshop that resulted in a generic objective to develop, implement and evaluate a comprehensive Food at School policy in addition to school specific objectives; to increase the number of students using active transport to and from school (Melrose High); to increase physical activity at school (Alfred Deakin High); and to increase mental well-being through improving physical activity and nutrition systems (Calwell High).

All years 7 and 8 students in intervention and comparison schools were invited to participate in baseline measures. The baseline response rate was 56.5% (70.5% intervention and 37.8% comparison). Height and weight were measured and students completed a questionnaire that measured nutrition, physical activity and leisure time behaviours, body image, school, family and home environment, and mental well-being. A School Environment Audit provided insight to potential barriers and enablers to healthy practices in the school environment. System maps provided a diagrammatic model that captured the nutrition and physical activity system changes over the study period.

The weights and heights of adolescents whilst were wearing light clothing and no shoes were measured by trained researchers. Demographic information and parental education level was collected via the consent form while a Turning Point presentation was used for the self-report Adolescent Behaviours, Attitudes and Knowledge Questionnaire. The questionnaire included nutrition behaviours, physical activity (PA) and leisure time behaviours, perceptions of and attitudes about body size, school environment, family and home environment, quality of life and

depressive symptomology.

The three intervention schools agreed on a generic objective to develop, implement and evaluate a comprehensive Food at School policy in addition to a school specific objective:

- Melrose High School - to increase the number of students using active transport to and from school
- Alfred Deakin High School - to increase PA at school.
- Calwell High School - to increase mental well-being through improving PA and nutrition systems.

Overall effects should be interpreted with caution because there were some differences between the two groups at baseline including different response rates and fewer participants in the comparison group. Within the comparison group, BMI-z score was higher at baseline ($p<0.05$) compared to the intervention group. BMI was higher at follow-up ($p<0.05$) in the comparison group relative to the intervention group and overweight and obesity was significantly higher in the comparison group at baseline ($p<0.05$). The full results are reported in the following section and selected within group (intervention and comparison) and the within schools (intervention only) results are summarised in this section.

The **within study group changes** were tested using McNemar's test. This test which used all participants who were measured twice, showed that the **prevalence of overweight and obesity decreased significantly over time within the intervention group** (McNemar's chi2(1) = 8.00; Prob > chi2 = 0.0047) but there was no significant change within the comparison group (Nemar's chi2(1) = 2.00; Prob > chi2 = 0.1573).

Schools' results

At Alfred Deakin High School, there was a decrease in the prevalence of overweight and obesity among students. Alfred Deakin High School implemented numerous changes to the nutritional school environment. There was positive movement in several healthy eating indicators; more students reported that their school encouraged healthy food choices, fewer children drank fruit juice/cordial, more children drank ≥ 4 glasses of water per day, more children ate ≥ 5 serves of vegetables per day and more students knew of healthy eating programs at the school. Alfred Deakin High School had the school specific objective to increase time spent physically active at school. The major initiative was to install a fitness lab and there were many other changes aimed at increasing physical activity. There was an increase in the proportion of students who considered themselves active during recess but a decrease who perceived their school as encouraging organised sport, or encouraged physical activity at lunchtime.

At Melrose High School, the prevalence of overweight and obesity remained stable over the course of the intervention. Melrose High implemented various changes to the school nutrition system including the introduction of a traffic light food policy in the school canteen and school events. There was positive movement in several healthy eating indicators; more students reported that their school encouraged healthy food choices, more children drank ≥ 4 glasses of water per day, more children ate ≥ 5 serves of vegetables per day, fewer children ate packaged snacks and more students knew of healthy eating programs at the school. To encourage

active transport Melrose High embedded a cycle education program in the school curriculum and built a bike compound for student's use. While there was no increase in the proportion of students using active transport to and from school there was an increase in the students who were active at recess and lunchtime.

At Calwell High School, there was a significant decrease in the prevalence of overweight and obesity. Calwell High School reviewed school canteen menus, developed a Healthy Habits cooking class, refocused the food Technology classes on healthy foods and provided a lunchtime soup kitchen. They also reoriented the curriculum so that all subject areas incorporated an element of health. There was positive movement in several healthy eating indicators; more students reported that their school encouraged healthy food choices, more children drank ≥ 4 glasses of water per day, fewer children drank fruit juice/cordial, more children rated as healthy the food and drink choices available at the canteen and more students knew of healthy eating programs at the school. Initiatives to improve physical activity outcomes included changing the outdoors areas and introducing informal exercise opportunities (e.g. Hip Hop class). Indeed at follow-up more students reported knowing of physical activity programs. The proportion of adolescents reporting depressive symptomatology over the study period was stable compared to increases in the other intervention schools.

There was a significant decrease in overweight or obese among the intervention group. However, there was no increase among the comparison group. The generic aim across all schools was to develop, implement and evaluate a comprehensive food at school policy. This aim was partially met in varying degrees by all of the schools. Calwell High School prioritised this aim and this was reflected in the positive changes in the environment, attitudes and some behaviours in relation to healthy diet. Also the proportion of overweight and obese within the school decreased from 29.3% at baseline to 24.4% at follow-up. Alfred Deakin High School was able to implement many changes to the food system at the same time as changes to the PA system and the school recorded a decrease in the prevalence of overweight and obesity from 20.2% to 18.5%. Whereas the implementation of the food@school policy at Melrose was delayed until just before follow-up data collection and the PA initiatives were prioritised. The prevalence of overweight and obesity remained at 28.4% at both time points.

The ACT IYM was community-based intervention that adopted a systems science approach to obesity prevention. Numerous positive outcomes were demonstrated: student attitudes, knowledge and behaviours related to physical activity and nutrition showed some improvements.

Overweight and obesity decreased or remained stable over the study period; a very positive outcome given the increasing prevalence reported in adolescents in other communities.

This project trialled a newly developed method for tracking systems change in the system maps and this formed a novel part of the project that can be used to inform future interventions.

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INTRODUCTION

In Australia, the prevalence of overweight and obesity in children doubled between 1985 and 1995 (11% to 20% for boys and 12% to 22% and for girls) (1, 2). However, from 1996 until the present time the rise has noticeably slowed or plateaued to around a quarter of children being overweight or obese (3).

It is well established that children who are overweight/obese are more likely to experience a range of physical and psychological problems (4). Further, obesity in childhood and adolescence has been related to adult obesity and to increased risks for adverse health in adulthood (5). Increasingly, children and adolescents are considered a high priority target for intervention, as this is a critical time for the development of behaviours that lead to obesity.

Prevention efforts aimed at whole populations and delivered through community-based interventions have been shown to be effective in reducing and preventing childhood obesity (6). A Cochrane review identified successful community-based obesity prevention interventions among children (6) which included two developed by the World Health Organisation Collaborating Centre for Obesity Prevention (WHOCC), Deakin University; Romp and Chomp (RnC) (7) and Be Active Eat Well (BAEW) (8). Another WHOCC project, published after the Cochrane review, was 'It's Your Move!' (IYM) which built directly on the thinking underpinning RnC and BAEW, and demonstrated success in preventing adolescent obesity (9, 10). Although, not specified prior to the projects, each project addressed the complexity surrounding obesity through multi-focused, multi-level interventions that targeted multiple behaviours. Lessons from these interventions included the need to more formally address complexity by applying systems thinking to obesity prevention to integrate across the range of existing community assets as well as creating new efforts.

In this project we considered systems as groups of interconnected elements that are organised in such a way as they achieve something (11). Systems science acknowledges the need for integration and can be used in the development, implementation and evaluation of community-based prevention (12).

The Australian Capital Territory 'It's Your Move!' (ACT IYM) project was a community-based intervention to reduce unhealthy weight gain among adolescents through comprehensive school and community based systems changes to facilitate healthier lifestyles. The project built on the successful IYM intervention in Victoria (2005 to 2008) to include a systems approach (13). The expected longer-term consequences included beneficial and sustainable changes to the obesogenic environments to which adolescents were exposed and subsequent changes in the prevalence of overweight and obesity.

The ACT IYM was a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventative Health, developed by Deakin University's WHOCC for Obesity Prevention and ACT Health.

METHODS

SAMPLE SELECTION

The evaluation involved a repeat measures, quasi-experimental design with assigned study groups (14). The three intervention schools were located south of the

Canberra city centre and chosen by the ACT Health Directorate. Three comparison schools were selected to minimise contamination from the intervention programmes and to ensure comparability to the intervention group. The ACT-IYM programme targeted secondary school students aged 13-17 years (school years 7 to 10). Baseline measures were collected in May 2012 and follow-up in May 2014. The intervention duration was three school years although there were two years between measures. All year 7 and 8 students were invited to participate in baseline measures. The baseline response rate was 56.5% (70.5% intervention and 37.8% comparison) and the follow-up rate 74.5% (88.6% intervention and 76.8% comparison) (Appendix A). Written consent was obtained from the parents/guardians of the student participants and students gave verbal consent on the day of measurement. Ethics approval was given by the Deakin University Human Research Ethics committee (EC 2012-015) and the ACT Government Education and Training Directorate (Ref. 2012/00545-1). Intervention schools received $50,000 during the project and comparison schools $5,000.

STRATEGY DEVELOPMENT

The intervention objectives and implementation strategies were developed during a two-day workshop facilitated by researchers from Deakin University. Workshop participants included key personnel from each intervention school and representatives from ACT Health, ACT Education and Training, and Nutrition Australia. The Analysis Grid for Element Linked to Obesity (ANGELO) workshop was extended to include a systems approach (SYS-ANGELO). This method provided an efficient and flexible way of identifying and prioritising the key determinants within an environment while taking into account gaps in knowledge, community capacity, culturally specific needs and current health promotions that may already be in place (Appendix C).

ANTHROPOMETRY AND SELF-REPORTED STUDENT MEASURES

The weights and heights of adolescents whilst were wearing light clothing and no shoes were measured by trained researchers. Demographic information and parental education level was collected via the consent form while a Turning Point presentation was used for the self-report Adolescent Behaviours, Attitudes and Knowledge Questionnaire (Appendix D). The questionnaire included nutrition behaviours, physical activity (PA) and leisure time behaviours, perceptions of and attitudes about body size, school environment, family and home environment, quality of life and depressive symptomology (Appendix D).

STATISTICAL ANALYSIS

Analyses were conducted using Stata release V.12.0 (StataCorp LP, College Station, Texas, USA). All variables were checked for missing and out-of-range values and cases with outlying (>3 SD from mean) values were removed from relevant analyses. Multivariate outliers were identified using Hadi's method and also removed from the relevant analyses (15). Continuous variables were checked for normality using histograms and calculating skew and kurtosis values; no transformations were needed. A p-value of less than 0.05 was considered statistically significant. In order to maximise power to detect change, overweight and obesity were combined. Similarly, no further stratification by gender was possible as the sample size was too small and lacked the power to detect these differences.

For overall intervention effect, multilevel mixed-effects linear regression analyses were used for continuous variables and Generalized Estimating Equations were used for categorical variables. These methods take into account the repeated nature of the data. Interaction analysis was used to test for intervention effect; study condition (intervention or comparison) by time (baseline and follow-up). If there was no intervention effects the main effects of study condition and time were investigated. All analyses were conducted controlling for gender, age and school. To aid interpretation, predicted margins were calculated after regression analyses.

To test for change within study conditions and within schools relevant repeated measures analyses we used; McNemar's test (16) for dichotomous variables and paired t-tests for continuous variables (unadjusted).

SCHOOLS ENVIRONMENTAL AUDIT

Key informants (KIs) within intervention schools completed the School Environmental Audit (SEA). The SEA collects potential barriers and enablers to healthy practices (Appendix E) and includes three sections: 1) policy, food service, PA, facilities and staff professional development; 2) food service operation, food preparation, pricing and promotion and external facilities such as vending machines and water fountains, and; 3) food, nutrition and PA practices in the curriculum. The SEA was used to provide evidence of systems change within intervention schools. The findings were triangulated with findings from the other data collection methods to provide a more complete picture of systems changes.

SYSTEMS MAPS

The system maps generated through consultation with key stakeholders from the respective intervention schools provided a picture of existing systems elements (i.e. posts, policies, schools culture) and change processes through the study period (Appendix F for questionnaire & Appendices G, H, I, J, K and L for the maps). The pictures show the different intervention foci of each school and the different responses of the system over time (including new committees, policy change, and recruitment of program champions).

The initial systems strategy was developed during the two day workshop. Participants included ACT leadership (Dr Peggy Brown, Director General of ACT Health and Diane Joseph, Deputy Director General ETD) school leadership (school principals and vice principals), leading teachers and students from within each intervention school. In addition representatives from Nutrition Australia supported the schools in intervention development. Participants were presented with the current evidence base about successful interventions and asked to reflect on what was possible, feasible and most likely to have an impact within their schools. Participants then identified potential actions and prioritised those they felt were most applicable within their school context. Each action was then described and a strategy developed with specific reference to the WHO System Building blocks (17). In this way participants were asked to consider what was required to optimise the chance of the intervention succeeding in terms of support from school and community governance and leadership, partners and networks, workforce development, finance and resources and information and intelligence. Participants were also asked to use this framework to consider ways in which strategies could work across multiple levels of action including policy, curriculum, social marketing, programs, activities and events. To support this planning maps of existing system structure were created via

key informant interviews prior to the meeting and introduced to help consider where in the system activities could and should be located for maximum effectiveness.

While a highly involved process this approach received strong and positive feedback from school project officers and school principals that the systems mapping was an accurate representation of the school environment (Appendix M, Table 10) and the process described led to broader interventions.

SCHOOL PROJECT OFFICER REPORTS

The project officers' progress reports provided additional detail of strategies implemented and identified barriers and facilitators encountered during the project.

AIMS AND OBJECTIVES

The three intervention schools agreed on a generic objective to develop, implement and evaluate a comprehensive Food at School policy in addition to a school specific objective:

- Melrose High School - to increase the number of students using active transport to and from school
- Alfred Deakin High School - to increase PA at school.
- Calwell High School - to increase mental well-being through improving PA and nutrition systems.

RESULTS

OVERALL INTERVENTION EFFECT

We first present overall intervention effects comparing the intervention group to the comparison group then consider results amongst the group of intervention schools and finally within each individual school.

Overall effects should be interpreted with caution because there were some differences between the two groups at baseline including different response rates and fewer participants in the comparison group. Within the comparison group, BMI-z score was higher at baseline ($p<0.05$) compared to the intervention group. BMI was higher at follow-up ($p<0.05$) in the comparison group relative to the intervention group and overweight and obesity was significantly higher in the comparison group at baseline ($p<0.05$) (Table 1). This may have introduced some systematic response bias as students in different weight categories may behave differently as a group.

Table 1: Unadjusted baseline and follow-up characteristics of study participants.

	Intervention		*Comparison*	
	Baseline	Follow-up	Baseline	Follow-up
Total n (male%)	486 (48.2)		148 (41.9)	
Age, years (s.d)	13.1 (0.6)	15.1 (0.6)	13.1 (0.6)	15.0 (0.6)
Height, cm (s.d)	160.4 (8.3)	169.0 (8.2)	160.5 (9.3)	168.1 (8.9)
Weight, kg (s.d)	51.2 (10.3)	60.9 (10.9)	52.6 (10.6)	62.0 (11.7)
BMI, kg/m^2 (s.d)	19.9 (3.4)	21.2 (3.2) [b]	20.4 (2.9)	22.0 (3.3)
BMI-z score (s.d)	0.29 (1.04) [a]	0.28 (1.04) [b]	0.52 (0.98)	0.51 (0.98)

	Intervention		*Comparison*	
	Baseline	Follow-up	Baseline	Follow-up
Weight status				
Thin/Normal (%)	75.8	77.4	68.2	69.4
Overweight/Obese (%)	24.2	22.6	31.8 [a]	30.6
Parent Education				
< year 12	18.8		22.4	
Completed year 12	22.2		32.1	
Completed tertiary	59.1		45.5 [a]	

s.d. is standard deviation; BMI is body mass index; [a] Intervention and comparison groups differ at baseline ($p<0.05$); [b] Intervention and comparison groups differ at follow-up ($p<0.05$); [c] Intervention and comparison groups differ at baseline ($p<0.001$)

Table 2 describes the follow-up outcomes of all anthropometric measures. The repeated measures regression analyses tested the effect of the interaction between study condition and wave on anthropometric measures. The full models which were adjusted for age, gender and school showed that the effect of the interaction on weight, height, BMI, BMI-z and proportion of overweight and obese was not statistically significant. This suggests that there were no differences between the intervention and comparison groups in anthropometric measures over time. However, main effects show that both BMI-z ($p=0.01$) and the proportion of overweight and obese ($p=0.037$) were significantly higher in the comparison group compared to the intervention group at the end of the study (Table 2).

It is important to note that the adolescents who were lost to follow-up did not differ significantly for any of the baseline characteristics compared to those that were followed-up (age, height, weight, weight-to-height ratio, BMI, BMI-z score, weight status, or parent education).

Table 2: Influence of condition (comparison versus intervention) and wave (baseline versus follow-up) in anthropometric measurements.

	β Coef.	*P*
Weight (kg)		
Condition x wave	-0.169	0.75
Condition	1.78	0.077
Wave	1.47	0.265
Height (cm)		
Condition x wave	-0.899	0.088
Condition	0.366	.621
Wave	1.373	0.159
BMI		
Condition x wave	0.11	0.45
Condition	0.60	0.06
Wave	0.26	0.054

Table 2: continued	β Coef.	*P*
BMI-z		
Condition x wave	-0.008	0.87
Condition	0.25	0.01
Wave	0.69	0.59
Proportion overweight/obese		
Condition x wave	0.026	0.874
Condition	0.44	0.037
Wave	0.025	0.931

WITHIN STUDY GROUP EFFECTS

The **within study group changes** were tested using McNemar's test. This test which used all participants who were measured twice, showed that the **prevalence of overweight and obesity decreased significantly over time within the intervention group** (McNemar's chi2(1) = 8.00; Prob > chi2 = 0.0047) but there was no significant change within the comparison group (Nemar's chi2(1) = 2.00; Prob > chi2 = 0.1573).

APPLICATION OF SYSTEMS APPROACH

The ACT IYM adopted a systems approach by addressing obesity through integrated, multi-focused, multi-level interventions that targeted multiple behaviours. This project was the first systems-wide community-based obesity prevention project among Australian adolescents, and various findings indicate the success of the systems based approach. Evidence of the success of the systems approach was the physical activity and nutrition intervention activities reported over the intervention period (Appendix M, Tables 11 and 12). The project focused on the need for integrated intervention strategies at various levels in the school and community environments. ACT IYM has demonstrated early success in applying systems thinking to increase multi-level multi strategy intervention activities; from individual level factors such as foods available for consumption at school and physical activity spaces available to students, to community wide activities such as food@school policy and redeveloping school curriculum to incorporate more physical activity.

SCHOOL ENVIRONMENTAL AUDIT (SEA)

The school environmental audits show significant improvement or maintenance from baseline of key recommendations for school canteens, nutrition and physical activity policies, priorities and physical activity programs across the three intervention schools (Appendix Q). The SEAs were completed pre and post intervention so the timing of changes is unknown making it difficult to assess dose response relationships for these shifts in environment.

All schools had internal canteens and over the study period improved their food choices to include access to fruit, reduced fat yoghurts, reductions in fruit drink availability and elimination of non-diet soft drinks. All schools moved to run their

canteens on a not-for-profit basis to remove the requirement to make a profit and so increasing flexibility to trial healthy foods on menus. Additional feedback loops have been created by continual canteen review through both ACT IYM project officers and Nutrition Australia. Every school also now offers an internally operated breakfast program compared to only one externally operated program at baseline. In general, canteen spaces are perceived as inadequate and the canteen service could be further improved to better reflect nutritional messages within the classroom.

INDIVIDUAL SCHOOL RESULTS

Individual school results are presented in the sections following (also see appendix N for Alfred Deakin, Appendix O for Calwell and Appendix P for Melrose). To help interpret the results, these sections also contain a brief overview of some of the strategies used.

ALFRED DEAKIN HIGH SCHOOL

There was a significant decrease in the prevalence of overweight and obesity over the course of the intervention; 20.2% at baseline and 18.5% at follow-up (p=0.046) (Figure 1).

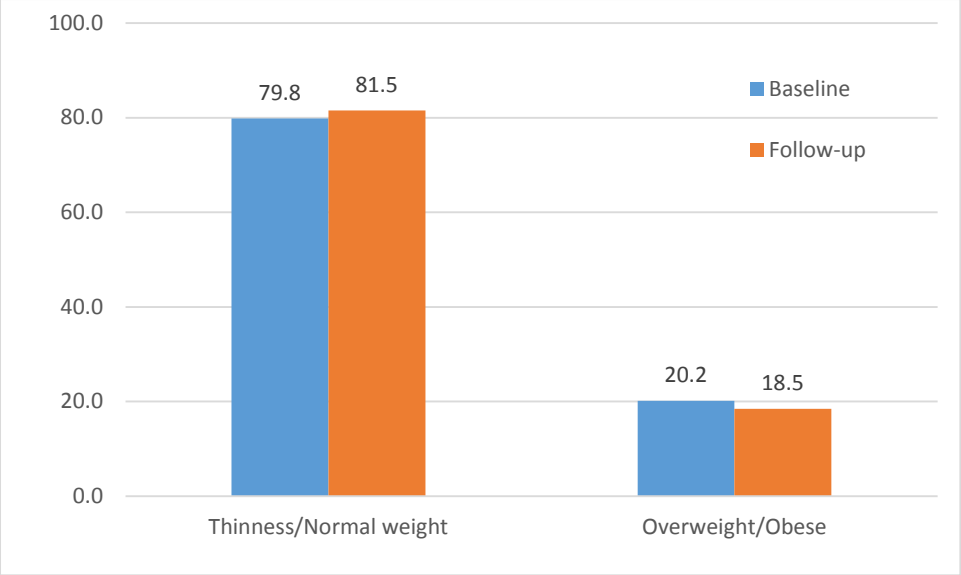

Figure 1 Prevalence of overweight and obese at Alfred Deakin High School

OBJECTIVE 1: TO DEVELOP, IMPLEMENT AND EVALUATE A COMPREHENSIVE FOOD AT SCHOOL POLICY

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve nutritional quality while the systems map for nutrition (Appendix G, Figure 4) created at the beginning of the study gave a pictorial representation of the factors impacting the nutrition system within the school. Together these methods informed the intervention strategies. Actions included cooking classes with better nutritional

messages, the provision of a fusion breakfast program, improving accessibility to water and learning modules to promote nutrition/healthy eating attitudes.

Results from Systems Maps and School Project Officer Interviews

The action plan included the establishment of a new food policy committee which met regularly and consulted with Nutrition Australia and the canteen provider to produce a new school food policy promoting healthy eating. The canteen service showed improvements from baseline in food choices with the availability of reduced fat yoghurt and elimination of non-diet soft drinks. The mandate to make a profit was removed and the traffic light system introduced. Most of these changes were made by June 2013. Other initiatives were the establishment of a vegetable garden in June 2012 although the “Garden to Plate” nutrition classes were cancelled due to lack of staff support. A “Healthy Recipes” initiative was provided by the school canteen, 2 water stations were installed and the school website included healthy eating tips along with a page dedicated to the ACT IYM program. Throughout the study period additional elements were included in the expanded systems map (Appendix G, Figure 5). These additional initiatives included increasing the awareness of healthy foods at school by developing a fundraising policy for school carnivals which allowed only healthy options, a Fruit Friday that involved students handing out fruit and encouraging teachers, particularly males, to act as role models for cooking classes.

Results from Student Survey Data

Despite these initiatives, the student survey data indicated that the proportion of students who perceived their school to encourage healthy food choices significantly decreased from baseline to follow-up ($p<0.001$) as did students rating their teachers as being good models for healthy eating ($p=0.004$). Significantly fewer students purchased their morning tea ($p=0.025$) or lunch ($p=0.025$) from the school canteen at follow-up although only a small proportion of students used the school canteen for morning tea or lunch. There was a significant increase in the proportion of students that did not drink any fruit drink/cordial ($p<0.001$), consumed ≥5 serves of vegetables ($p<0.001$) and who drank ≥4 glasses of water ($p<0.001$) on the last school day at follow-up compared to baseline. Conversely, there was a significant decrease in the proportion of students that did not drink any non-diet soft drink ($p=0.002$), consumed ≥2 serves of fruit ($p=0.046$) and that did not have any packaged snacks ($p=0.005$) on the last school day at follow-up compared to baseline. A number of initiatives were introduced and this resulted in a significant increase in the proportion of students at follow-up reporting an awareness of healthy eating programs compared to baseline ($p=0.008$) (Table 3).

Results from School Environmental Audit

The internal canteen service showed improvements over time in food choices with the availability of reduced fat yoghurt, elimination of non-diet soft drinks and reducing the need for the canteen to make a profit. However the canteen food preparation space is now seen as very inadequate and while the before school breakfast program has been maintained it has been reduced from five to one day per week.

At baseline the key informant was unaware of any nutrition policies however at follow-up two policies were in place. These included 17 of 18 policy recommendations with the only omission being that no provision was made in relation to the type of food that may be brought from home.

Key changes have also been made in the schools nutritional environment. The school now follows all key recommendations with major improvements to nutrition priorities and practices to promote healthy eating. Support from parents has improved which may be a reflection of the dissemination of health food information to parents which has increased from zero to eight times per year. In addition students can now eat during class and a new vegetable garden has been established.

Table 3: Nutrition items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

Question	Baseline	Follow-up	p
Proportion of students who believe that their school encourages all students to make healthy food choices all of the time/often (%)	50.6	40.7	0.000
Proportion of students who rate teachers as good/very good role models for healthy eating (%)	28.2	24.5	0.004
Proportion of students who usually get their morning tea from the school canteen (%)	5.8	3.7	0.025
Proportion of students who usually get their lunch from the school canteen (%)	5.4	3.3	0.025
Proportion of students who did not have any non-diet soft drink in the last school day (%)	72.2	68.1	0.002
Proportion of students who did not have any fruit drink/cordial in the last school day (%)	41.1	46.1	0.001
Proportion of students who drank 4 or more glasses of water in the last school day (%)	61.0	71.0	0.000
Proportion of students who had ≥2 serves of fruit in the last school day (%)	72.6	71.0	0.046
Proportion of students who had ≥5 serves of vegetables in the last school day (%)	14.1	19.9	0.000
Proportion of students who did not have any packaged snacks in the last school day (%)	23.7	20.3	0.005
Proportion of students who rate the food and drink choices available at the school canteen as healthy or mostly healthy (%)	7.5	7.9	0.317
Proportion of students who know of any healthy eating programs in their school (%)	28.6	31.5	0.008

OBJECTIVE 2: TO INCREASE THE TIME ADOLESCENTS SPEND IN PHYSICAL ACTIVITY AT SCHOOL

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve time spent in PA while the systems map for PA (Appendix H, Figure 6) created at the beginning of the study gave a pictorial representation of the factors impacting the PA system within the school. Taken together these methods informed the intervention strategies and highlighted potential unintended consequences.

Results from Systems Maps and School Project Officer Interviews

The major action for intervention was the building of a fitness lab and offering its facilities during and after teaching hours. Teaching staff were involved in other changes aimed at encouraging PA such as revision of the playground duty roster, introduction of fit talk during PE classes and role modelling healthy behaviour by choosing to walk or ride to school and participate in weekend social fitness activities. To support teachers choosing active transport showers were installed and a safe storage place for staff bikes was provided. For students who did not bring suitable clothing for practical PE classes, physical challenges were introduced that did not require PE attire. Finally, the School invested in a class set of kayaks and bikes open for staff to use on weekends as well as hiring to students to generate income for maintenance and future purchases. Throughout the study period additional elements were included in the expanding systems map (Appendix H, Figure 7). One barrier to systems change was the reduction in support for PA from the Education Directorate. The PE support unit was reduced from five people to one person indicating decreased priority for PA.

Results from Student Survey Data

These positive initiatives did not necessarily translate to students perceiving healthful changes. The survey data showed a significant decrease in the proportion of students who thought their school encouraged organised sport ($p<0.001$) or encouraged students to be physically active at lunch time ($p<0.001$) at follow-up compared to baseline (Table 4). In addition, the proportion of students who rated their teachers as good role models for PA ($p<0.001$) decreased from baseline to follow-up. A high proportion of students knew about PA programs in their school at both time points. The proportion of students who were mostly active at recess time significantly increased ($p=0.025$) while the proportion who were mostly active at lunchtime significantly decreased ($p=0.003$) over time. The percentage of students meeting the screen time guidelines decreased over time ($p=0.000$).

Results from School Environmental Audit

Since baseline the school has created a new physical activity policy to include all key recommendations with SPOs believing these to be very effective. Positive changes in the physical environment were seen from baseline to follow-up with an increase in average time devoted to formal physical education from 210 to 240 minutes per week for both Year 7/8 and 9/10 students. Unfortunately these same year levels saw a reduction from 210 to 60 minutes per week in the average time devoted to organised sport. In addition areas for both indoor and outdoor physical activity and sporting/play equipment are all now deemed very inadequate. Improvements in the levels of physical activity prioritisation, links with community sporting and recreation organisations and teachers as role models have all increased. The school has also fully implemented a cycle/scooter storage program since baseline.

Table 4: Physical activity items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

Question	**Baseline**	**Follow-up**	**p**
Proportion of students who believe that their school encourages organised sport (%)	75.3	51.0	0.000

Question	Baseline	Follow-up	p
Proportion of students who believe that their school encourages students to be physically active at lunch time often/all the time (%)	30.7	15.8	0.000
Proportion of students who rate teachers as very good/good role models for physical activity (%)	47.3	39.8	0.000
Proportion of students who know of any programs in their school for physical activity (%)	82.6	81.7	0.157
Proportion of students who thought they were mostly active at recess time (%)	22.4	24.5	0.025
Proportion of students who thought they were mostly active at lunch time (%)	29.1	25.3	0.003
Proportion of students who met Australian guidelines for maximum daily hours of screen-time (≤2 hours)	45.2	18.8	0.000

MELROSE HIGH SCHOOL

The prevalence of overweight and obesity over the course of the intervention did not change; 71.6% at baseline and 71.6 % at follow-up (Figure 2).

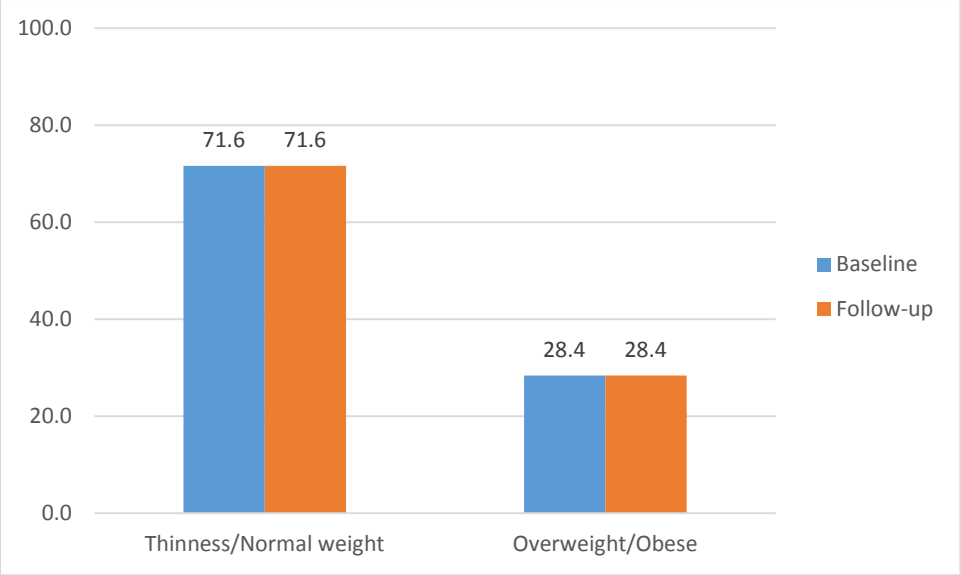

Figure 2 Prevalence of overweight and obese at Melrose High School

OBJECTIVE 1: TO DEVELOP, IMPLEMENT AND EVALUATE A COMPREHENSIVE FOOD AT SCHOOL POLICY

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve nutritional quality while the systems map for nutrition (Appendix I, Figure 8) created at the beginning of the study gave a pictorial representation of the factors impacting the nutrition system within the school. Taken together these methods

informed the intervention strategies and highlighted potential unintended consequences.

Results from Systems Maps and School Project Officer Interviews

Actions to intervene predominantly involved the canteen and included the Canteen Manager liaising with Nutrition Australia in order to switch providers to ensure more amber and green light options in popular pre-packed foods, there was a focus to make a more healthy front of house sale layout and the SRC student body worked with Nutrition Australia to design a canteen menu with new and healthy food choices. Data were collected over a 1-2 month period to monitor changes in sales of green and amber food items, student usage of the canteen and numbers of students leaving the school premises to purchase red foods. An important action was consultation between the SRC, parents, teachers, Nutrition Australia and Metro Canteens in developing the school nutrition policy that was presented to the school board and executive. The expanded systems map (Appendix I, Figure 9) shows that, by mid-2013 there was a commitment to improve food and drink choices in the canteen through linking the canteen with the school community and committing to meet the national nutrition guidelines. These collaborations resulted in establishment of mutual goals and an agreed plan to reduce the number of red foods available at the school canteen. By December 2013, the canteen reduced red foods available from the school canteen from 41 to 9, new menu boards were painted and erected with an ongoing commitment to source greener options available. Nutrition Australia reviewed the Food Technology curriculum and implemented a trial “Food and Me” component in rotation for year 7 and 8 students. The school had also implemented the 40/40/20 Green/Amber/Red foods available for whole school events. “Tap into Water” drinking fountains were donated by departing year 10 students and a new pizza oven was purchased to support the “Baking for Beginners” course in Food Technology as well as healthy eating within the school and at events.

Results from Student Survey Data

A number of positive initiatives were implemented, particularly relating to the canteen and the subsequent survey data reflected these changes. The proportion of students who perceived their school to encourage healthy food choices ($p<0.001$), who rated the food and drinks available at the school canteen as healthy/mostly healthy ($p<0.001$) and who knew of healthy eating programs at their school ($p<0.001$) all significantly increased from baseline to follow-up (Table 5). However, there was a significant decrease in the proportion of students rating their teachers as being good role models for healthy eating ($p<0.001$) at follow-up. Significantly fewer students purchased their morning tea ($p=0.025$) or lunch ($p=0.025$) from the school canteen at follow-up compared to baseline. Although it is important to note that only a small proportion of students used the school canteen for morning tea or lunch overall. Although there was no change over time for fruit drink/cordial consumption, there was a significant increase in the proportion of students who drank ≥4 glasses of water ($p<0.001$) and consumed ≥5 serves of vegetables ($p=0.002$) in the last school day over time. However, there was a significant decrease in the proportion of students who did not have any non-diet soft drink ($p=0.002$) or consume ≥2 serves of vegetables ($p=0.046$) and a significant increase in the consumption of packaged snacks ($p=0.025$) in the last school day at follow-up compared to baseline.

Results from School Environmental Audit

The internal canteen service showed a range of improvements from baseline. These included food choices with the availability of both reduced fat milk and yoghurt, elimination of non-diet soft drinks and fruit drinks. Overall improvements to the canteen included an upgraded food preparation space, increased nutritional value and canteen pricing to encourage healthy food choices. The before school breakfast program reduced from five to one day per week.

The nutrition policy has been updated with improvements to: what foods are made available, restrictions on vending machines and food associations with special events. Further the distribution/awareness of policies and nutritional information to staff/parents has increased from zero to four times per year together and the school canteen operates on a not for profit basis.

In regards to the nutritional environment the level of priority and information to parents for nutrition and promotion of healthy eating has increased, however, the perception of staff as role models for healthy eating has decreased. An interesting aspect is the schools use of colour coded menu boards, a coded online menu and class reviews of food that are published via the schools Facebook page. Since baseline the school has also implemented a vegetable garden.

Table 5: Nutrition items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

	Baseline	**Follow-up**	**p**
Proportion of students who believe that their school encourages all students to make healthy food choices all of the time/often (%)	57.4	69.8	0.000
Proportion of students who rate teachers as good/very good role models for healthy eating (%)	50.6	42.6	0.000
Proportion of students who usually get their morning tea from the school canteen (%)	6.8	3.7	0.025
Proportion of students who usually get their lunch from the school canteen (%)	8.0	4.9	0.025
Proportion of students who did not have any non-diet soft drink in the last school day (%)	68.1	62.0	0.002
Proportion of students who did not have any fruit drink/cordial in the last school day (%)	36.8	36.8	
Proportion of students who drank 4 or more glasses of water in the last school day (%)	60.5	72.2	0.000
Proportion of students who had ≥2 serves of fruit in the last school day (%)	68.1	65.6	0.046
Proportion of students who had ≥5 serves of vegetables in the last school day (%)	8.0	14.1	0.002
Proportion of students who did not have any packaged snacks in the last school day (%)	9.8	13.0	0.025
Proportion of students who rate the food and drink choices available at the school canteen as healthy or mostly healthy (%)	11.7	21.5	0.000

Proportion of students who know of any healthy eating programs in their school (%)	16.6	42.9	0.000

OBJECTIVE 2: TO INCREASE THE NUMBER OF STUDENTS LIVING WITHIN 30 MINUTES WALKING DISTANCE WHO USE ACTIVE TRANSPORT TO AND FROM SCHOOL

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve time spent in PA while the systems map for PA (Appendix J, Figure 10) created at the beginning of the study gave a pictorial representation of the factors impacting the PA system within the school. Taken together these methods informed the intervention strategies and highlighted potential unintended consequences.

Results from Systems Maps and School Project Officer Interviews

The main intervention actions focused on environmental changes designed to encourage active transport. Actions to intervene included implementing and embedding cycle education and active transport into the curriculum, building a bike compound, developing facilities to support active transport, mapping safe cycle routes and the introduction of Peer Ambassadors. Social marketing was used to promote the role of the Peer Ambassadors and the development of cycle bus routes.

By mid-2013 full implementation and integration of cycle education into the curriculum was complete for years 7 and 8 with options for the years 9 and 10 curriculum. Although, the Peer Ambassadors were established, the cycle bus routes and start walking/cycle buses were not. This was due largely to an unfavourable review of "safer walking routes". A bike trailer was purchased to run excursions beyond the school and to promote riding to or from school to destinations approximately 30 minutes ride from the school. One initiative introduced in mid-2013 was the sustainability of the program and resources. Processes were established to identify maintenance issues and all bikes serviced, oiled, adjusted and repaired as necessary as part of Outdoor Education. Another initiative introduced at this time was a fitness program using a modified high intensity interval training with students participating in weekly fitness sessions and purchasing new software applications and equipment (Appendix J, Figure 11).

By the end of 2013, a cycle bus and map had still not been developed due to mapping software issues and the ACT Health Walk and Ride to School safer walking route. A collaboration with ETD Capital Works resulted in a co-designed BMX dirt track being built next to the school with no cost to the school. Another late initiative was a female only class directed towards unfit and overweight girls in years 9 and 10 with a focus on personal fitness using traditional and alternative fitness methods.

Results from Student Survey Data

The survey data with students did not reflect the changes made by the school as there was no increase in the proportion of students using active transport to get to and from school (Table 6). Included in these analyses were only students who contributed data at baseline and follow-up and lived within a 30 minute walk of

school. It is important to note that 57% of students lived outside a 30 minute walk of school (considered an active commuting distance). The proportion of students reporting that their school encouraged organised sport (p<0.001), PA at lunchtime (p<0.001), teachers as good role models for PA (p<0.001) or who were aware of PA programs (p<0.001) all significantly decreased over time. The proportion of students who reported being mostly active at recess (p=0.001) and lunch (p=0.014) time increased from baseline to follow-up. The percentage of students meeting the screen time guidelines decreased over time (p=0.000).

Results from School Environmental Audit

Questions relating to physical activity policies were only answered at baseline, however positive changes in the physical environment were seen from baseline to follow-up with an increase in average time devoted to formal physical education from 180 to 210 minutes per week for both Year 7/8 and 9/10 students. Unfortunately these same year levels saw a reduction from 120 to 0 minutes per week in average time devoted to organised sport. There were improvements in physical activity prioritisation, links with community sporting and recreation organisations and teachers as role models. Further a student cyclist safety program has been fully implemented while the student pedestrian safety program is progressing.

Table 6: Physical activity items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

Question	**Baseline**	**Follow-up**	**p**
Proportion of students who use active transport to get to school (%)	66.7	66.7	1.0
Proportion of students who use active transport to get from school (%)	73.8	66.7	0.08
Proportion of students who believe that their school encourages organised sport often/all the time (%)	77.3	67.5	0.000
Proportion of students who believe that their school encourages students to be physically active at lunch time often/all the time (%)	50.0	31.9	0.000
Proportion of students who rate teachers as very good/good role models for physical activity (%)	66.1	49.1	0.000
Proportion of students who know of any programs in their school for physical activity (%)	87.1	77.3	0.000
Proportion of students who thought they were mostly active at recess time (%)	19.0	26.4	0.001
Proportion of students who thought they were mostly active at lunch time (%)	25.2	28.8	0.014
Proportion of students who met Australian guidelines for maximum daily hours of screen-time (≤2 hours)	40.0	23.9	0.000

CALWELL HIGH SCHOOL

There was a significant decrease in the prevalence of overweight and obesity over the course of the intervention; 29.3% at baseline and 24.4% at follow-up (p=0.046) (Figure 3).

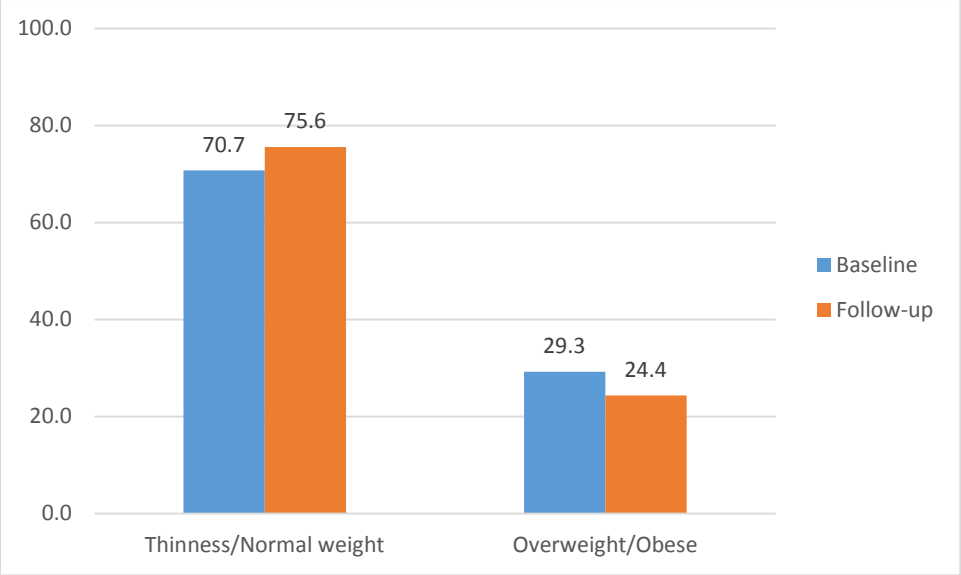

Figure 3 Prevalence of overweight and obese at Calwell High School

OBJECTIVE 1: TO DEVELOP, IMPLEMENT AND EVALUATE A COMPREHENSIVE FOOD AT SCHOOL POLICY

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve nutritional quality while the systems map for nutrition (Appendix K, Figure 12) created at the beginning of the study gave a pictorial representation of the factors impacting the nutrition system within the school. Taken together these methods informed the intervention strategies and highlighted potential unintended consequences.

Results from Systems Maps and School Project Officer Interviews

Mental well-being was expected to improve through promotion of healthy eating and PA through systems changes. Calwell prioritised changing the food system. Actions to intervene in the food system included collaboration between the canteen manager and Nutrition Australia, and incentives to the canteen to change to suppliers for popular pre-packaged foods who provided amber/green options. The front of sales layout was made more healthful, current canteen food choices were evaluated and sales monitored over a 1-2 month period. A group was formed with staff, students, Metro Canteens and the project officers whose focus was on creating a new policy for Health Promoting Schools and Nutrition. The final initiative was to secure funding for a Breakfast Club for five days per week and providing healthy options. This was also seen as a valuable opportunity to discuss food choices, preparation of meals and other relevant information informally with attending staff and students.

Throughout the study period additional initiatives were proposed and included in the expanded systems map (Appendix K, Figure 13). These additional initiatives included beginning a Healthy Habits cooking class, pilot lessons for Food Technology with a focus on healthy food, switching providers for fundraising events from Woolworths to Canberra Milk, Bakers Delight, Yellow Van and Nutrition Australia as well as the introduction of a Soup Kitchen that provides soups and salad rolls for lunch. The principal supported the embedding of health into all areas of the curriculum. A large grid of all subjects was displayed in the staff room and all sections had to incorporate health into the study area. Also, healthier catering practises among staff were encouraged through role modelling green, amber and red options.

Changes to the school leadership early in the intervention period necessitated many revisits to the initial action plan but the methodology allowed for ongoing adaptations. Calwell made sustainable, cost neutral systems change through working within existing systems and forming ongoing networks. Their grant money was untouched until the last six months of the intervention period when they used it to fund a fitness centre.

Results from Student Survey Data

A number of positive initiatives were implemented, particularly relating to the canteen and the survey data subsequently reflected these changes. The proportion of students who perceived their school to encourage healthy food choices ($p<0.001$) significantly increased from baseline to follow-up as did the proportion of students who rated the food and drinks available at the school canteen as healthy/mostly healthy ($p<0.001$) and the proportion of students who knew of healthy eating programs at their school ($p<0.001$) (Table 7). There was also a slight non-significant increase in the proportion of students who rated their teachers as role models for healthy eating. There was little difference at follow-up compared to baseline for non-diet soft drink, fruit and vegetable consumption or the proportion of students that usually get their morning tea or lunch from the school canteen. However, there was a significant increase in the proportion of students who did not drink any fruit juice/cordial ($p=0.008$) and who drank ≥4 glasses of water ($p=0.046$) but there was a significant decrease in the proportion of students that did not have any packaged snacks ($p=0.008$) in the last school day at follow-up compared to baseline.

Results from School Environmental Audit

Positive changes have been made to the internal canteen service since baseline to include the availability of fruit, reduced fat yoghurt, elimination of non-diet soft and fruit drinks and a reduced need for the canteen to make a profit. However, pies/sausage rolls have become available and the canteen food preparation space is now seen as very inadequate. The canteen now promotes healthy food choices and has implemented an internal before school breakfast program. Calwell High was the only school to have an external food service at baseline including a breakfast program. This service has now been discarded possibly due to the school's strong perception that the provider did not offer food of high nutritional value.

Calwell did not have a nutrition policy at baseline whereas now its policy includes most recommendations. The main exceptions being that using unhealthy foods such

as lollies/chocolate frogs as a reward is allowed and that a copy of the nutrition policy is not provided to parents.

The nutritional environment has seen modest changes from baseline with improvements in priorities, promotion of healthy foods at events and support from parents. Students are also allowed to eat during class and the school has established a vegetable garden.

Table 7: Nutrition items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

	Baseline	**Follow-up**	**p**
Proportion of students who believe that their school encourages all students to make healthy food choices all of the time/often (%)	39.0	65.9	0.000
Proportion of students who rate teachers as good/very good role models for healthy eating (%)	24.4	28.1	0.083
Proportion of students who usually get their morning tea from the school canteen (%)	11.0	12.2	0.317
Proportion of students who usually get their lunch from the school canteen (%)	8.5	12.2	0.083
Proportion of students who did not have any non-diet soft drink in the last school day (%)	51.2	53.7	0.157
Proportion of students who did not have any fruit drink/cordial in the last school day (%)	31.7	40.2	0.008
Proportion of students who drank 4 or more glasses of water in the last school day (%)	57.3	62.2	0.046
Proportion of students who had ≥2 serves of fruit in the last school day (%)	69.5	67.1	0.157
Proportion of students who had ≥5 serves of vegetables in the last school day (%)	19.5	17.1	0.157
Proportion of students who did not have any packaged snacks in the last school day (%)	15.9	7.3	0.008
Proportion of students who rate the food and drink choices available at the school canteen as healthy or mostly healthy (%)	2.4	31.7	0.000
Proportion of students who know of any healthy eating programs in their school (%)	17.1	46.3	0.000

OBJECTIVE 2: TO IMPROVE MENTAL WELL-BEING THROUGH IMPROVING PHYSICAL ACTIVITY AND NUTRITION SYSTEMS

Methods and Strategies

The domain for action grid completed at the SYS-ANGELO workshop identified many areas for both development and intervention within the school's systems to improve time spent in PA while the systems map for PA (Appendix L, Figure 14) created at the beginning of the study gave a pictorial representation of the factors

impacting the PA system within the school. Taken together these methods informed the intervention strategies and highlighted potential unintended consequences.

Results from the Systems Maps and School Project Officer Interviews

Calwell chose to focus on the nutrition system first then the physical activity system. The physical and curriculum environments were changed by improving the outdoor areas, introducing less formal exercise opportunities like Hip Hop classes, and the establishment a boys' education program and an outdoor education program (Appendix L, Figure 15). The psychological environment was impacted through changes to the school's values to become a more active school and through teachers modelling active behaviours. Mental well-being of students was measured with both the Short Moods and Feeling Questionnaire (SMFQ) and the Paediatric Quality of Life Inventory (PedsQL).

Results from Student Survey Data

The results from the SMFQ showed that a similar proportion of students at baseline and follow-up reported depressive symptoms (Table 8). The PedsQL measures health-related quality of life (HRQL) and is scaled between zero and 100 where 100 is the highest level of well-being. There was a significant decrease in HRQL scores ($p=0.016$) at follow-up compared to baseline.

Student survey data showed that the proportion of students who believed that their school encouraged organised sport ($p=0.008$) and PA at lunchtime ($p=0.003$) was significantly lower at follow-up than at baseline (Table 9). There was also a significant decrease in the proportion of students who rated their teachers as good role models for PA ($p<0.001$) and who reported that they were active at lunch time ($p=0.002$) at follow-up compared to baseline. Further, at follow-up, there was a significant increase in the proportion of students who were aware of PA programs at their school ($p=0.008$) (Table 9). The percentage of students meeting the screen time guidelines decreased over time ($p=0.000$).

Results from School Environmental Audit

Since baseline, Calwell has developed a new physical activity policy that includes most recommendations based on answers from the SPO. Positive changes in the physical environment were seen with an increase in average time devoted to formal physical education from 120 to 150 minutes per week for both Year 7/8 and 9/10 students. Unlike other intervention schools time devoted to organised sport was maintained at 120 minutes per week. While the school's indoor/outdoor space and sporting/play equipment is adequate perceptions have decreased from very adequate at baseline. The school maintains high levels of physical activity prioritisation, improved links with community sporting and recreation organisations while teachers as role models is still high but decreased from very high. The school has maintained previous programs that included safer road crossing and the bike storage facility.

Table 8: Short Moods and Feeling Questionnaire and Health Related Quality of Life Scores. Unadjusted proportions at baseline and follow-up.

Question	Baseline	Follow-up	p
SMFQ Cut Point 10 (%)	75.6	76.8	0.317
HRQL Summary Score (Mean)	73.6	68.7	0.016

Table 9 Physical activity items from the Adolescent Behaviours, Attitudes and Knowledge Questionnaire. Unadjusted proportions at baseline and follow-up.

Question	Baseline	Follow-up	p
Proportion of students who believe that their school encourages organised sport often/all the time (%)	74.1	64.6	0.008
Proportion of students who believe that their school encourages students to be physically active at lunch time often/all the time (%)	35.4	24.4	0.003
Proportion of students who rate teachers as very good/good role models for physical activity (%)	51.2	32.9	0.000
Proportion of students who know of any programs in their school for physical activity (%)	72.0	80.5	0.008
Proportion of students who thought they were mostly active at recess time (%)	30.5	26.8	0.083
Proportion of students who thought they were mostly active at lunch time (%)	35.4	23.2	0.002
Proportion of students who met Australian guidelines for maximum daily hours of screen-time (≤2 hours)	31.2	9.7	0.000

DISCUSSION

This project was the first systems-wide community-based obesity prevention project among Australian adolescents. The purpose of the ACT IYM project was to reduce unhealthy weight gain among adolescents through a comprehensive school and community based systems changes and to facilitate healthier lifestyles.

The overall purpose was achieved as there was a decrease in the proportion of overweight or obese among the intervention group. However, there was no increase among the comparison group. The generic aim across all schools was to develop, implement and evaluate a comprehensive food at school policy. This aim was partially met in varying degrees by all of the schools. Calwell High School prioritised this aim and this was reflected in the positive changes in the environment, attitudes and some behaviours in relation to healthy diet. Also the proportion of overweight and obese within the school decreased from 29.3% at baseline to 24.4% at follow-up. Alfred Deakin High School was able to implement many changes to the food system at the same time as changes to the PA system and the school recorded a decrease in the prevalence of overweight and obesity from 20.2% to 18.5%. Whereas the

implementation of the food@school policy at Melrose was delayed until just before follow-up data collection and the PA initiatives were prioritised. The prevalence of overweight and obesity remained at 28.4% at both time points.

Overall, there was a decrease in the proportion of students who rated their teachers as very good or good role models for healthy eating and physical activity. Given that all three intervention schools attempted to create healthy food and physical activity school environments for staff as well as students, this finding may be a result of various occurrences. Adolescence is a life period marked by increased independence and development of personal beliefs and attitudes. As such adolescents' age they may become more critical of adults. Evidence from the SEAs contradicts this opinion as it was reported that teachers were good role models for healthy eating and physical activity. Egocentrism has been associated with adolescence and additional effort may be required for healthy role models to be acknowledged and to have lasting impressions. One exception to this finding was Calwell High with approximately a quarter (24.4%) of students at baseline and 28.1% of students at follow-up reported teachers as very good or good role models for healthy eating. Calwell High made significant changes to the school nutrition system including updating all curriculum areas to include health, changing environments, canteen and sports day catering and involved the community through healthy cooking classes. A large proportion of changes occurred early in the intervention, and this may have allowed sufficient time for a lasting impression to be made on students for teachers as healthy role models. It is noted that out of the three intervention schools Calwell High had the lowest percentage of students reporting teachers as good/very good role models for healthy eating at baseline. Changes to staff behaviours may therefore have made more immediate and significant impact on students during the intervention.

The aims specific to each school (mental well-being, active transport and increased PA) were not met in a statistical sense but each experienced substantial barriers to the implementation of initiatives. It must be noted that all schools changed the PA systems within their schools and so succeeded in the first phase. There are always delays between systems changes and measured outcomes so a true picture may not emerge for quite some time from initiation. The system maps developed throughout the ACT IYM project portray the varying implementation times in intervention activities. Components were added to the diagram of nutrition and physical activity systems as intervention activities were initiated and some activities were present in the initial maps, however were not represented later in the intervention. This suggests there is also varying in strength of intervention activities, in other words some lasted and some did not. The system changes are therefore expected to vary in strength and it is recommended that a lag be built into the evaluation for future systems-based interventions to track changes due to varying implementation times.

Systems science was a core component in the development, implementation and evaluation of the ACT IYM. School specific objectives were developed with reference to systems science and the understanding of the need for integrated intervention strategies at various levels in the school and community environments. This key step in the application of systems approach was achieved in the ACT IYM. The school project officers very early on exhibited systems thinking but much of their early energies were directed to building the capacity of other key people to recognise a need for the intervention and to embrace a systems approach before strategies

could be successfully implemented. This capacity building resulted in a substantial lag between the beginning of the development of the policies and initiatives and the implementation. Melrose High in particular experienced a very long lag between development and systems change. Indeed, some integral parts were not implemented (such as safe cycling maps) before follow-up data collection.

Results (Appendix G, H, I, J, K, L) indicated that nutrition and physical activity systems developed over the intervention period. Initial maps for all intervention schools were most simplified at baseline (March 2012) and increased in complexity and detail over the two-year intervention period. For example, Melrose High SPO reported that a visit and presentation from Nutrition Australia lead to staff restrictions on foods consumed in the staff lunchroom, which then impacted positively on the food environment for students at school (Appendix I). System maps were routinely used to identify possible intervention points to improve the physical activity and nutrition systems. Examining components surrounding canteen services, for example, allowed SPOs to identify canteen sales data, organisational structure, and canteen profits as multi-level intervention points for improving the school nutrition system. All SPOs agreed that community engagement was vital to systems change but agreed that parents were very difficult to engage. It was suggested that working in their cluster with the primary schools would be beneficial in changing the culture around nutrition and physical activity so that health can be normalised before reaching high school. Overall system maps served as excellent diagrammatic aids to communicate nutrition and physical activity system changes between researchers and key informants from schools.

It is difficult to compare this project with others as it is the first of its kind but the results can be compared to past community-based interventions. The ACT IYM was based on the success of previous community-based obesity prevention interventions developed by the World Health Organisation Collaborating Centre for Obesity Prevention (7-9). These previous studies shared common features to the ACT IYM in recognising complexity of obesity prevention and the implementation of multi-focused, multi-level interventions that targeted multiple behaviours. One key difference between the current and previous projects was the recognised systems science approach that informed the ACT IYM project.

Two successful Australian interventions set among younger children that resulted in favourable anthropometric outcomes but no consistent pattern of behavioural change were BAEW (8) RnC (7). Similarly, the Victorian IYM saw significant reductions in weight and standardized body mass index between intervention and comparison groups but, again, no consistent pattern of behaviour changes (9). What was striking about this project was the close relationship between capacity building and reduction of overweight and obesity (10). This suggests that effort and resources need to go into assessing the readiness for change and building the capacity of the whole community to promote healthful systems change. The novelty a systems approach and the innovations required in developing, implementing and evaluating this approach call for a lead-in period longer than those required for the more usual community-based interventions.

There were barriers and facilitators identified in the ACT IYM project that served to inhibit or accelerate changes. Nutrition related intervention activities were largely based in the canteen environment and all intervention schools identified the need to

improve the foods sold to students during school hours. A common identified barrier to making changes in school canteens was the involvement of third parties in provision of canteen services with one school project officer travelling interstate to seek approval to improve the foods sold in the school canteen. Changes to school food policies such as foods sold at fundraisers and school events were described as successful, however requiring enforcement and commitment from school project officers to maintain such policies. It is clear that leadership within the school system and passionate champions are key facilitators to intervention activity implementation and compliance.

Physical activity related objectives were enabled by the identification of specific student needs from key stakeholders within the intervention schools. School project Officers noted that student participation in physical activity related initiatives were increased when the needs of students were identified (e.g. a gender specific physical activity program was developed and implemented with popularity amongst students; one other program provided a broad range of activities that students could choose to participate in depending on which activity they were most interested). Third party involvement was an enabler to physical activity related initiatives (e.g. one school developed and implemented an outdoor bike track with the support of local organisations). A barrier to physical activity was the increasing use of technology and devices during school time including for education related purposes as there is an increased risk of time spent sedentary

In general, effective evaluation of the ACT IYM project was limited by the poor and varied response rate between groups (intervention 70.5% and comparison 37.8%) resulting in mismatched groups (Appendix A). Response rates aside, the intervention and comparison groups differed on a number of characteristics. At baseline the comparison group had higher BMI-z scores, higher percentage were categorised as overweight or obese, and a higher level of relative disadvantage compared to intervention group. These differences were to be expected given the differences in the relative socio-economic positions of the two groups (18). Although the exact impact of these differences in sample characteristics on findings presented in this report are not certain, it is expected that adolescents' experiences of intervention activities may be impacted by these differences. Psychological and emotional distress has been found impact disproportionately in overweight and obese compared to normal weight adolescents (19) and this may have affected responses to intervention activities.

During the intervention period, there were implemented various school-based physical activity and nutrition-based programs external to the ACT IYM project. It is possible that positive changes within the nutrition and physical activity systems within comparison schools occurred as a result of participation in concurrent programs. Such changes limit the extent to which the intervention effect of the ACT IYM can be explained – it is difficult to make comparisons and draw conclusions if comparison schools had improved nutrition and physical activity systems as well as intervention schools. In other words, an intervention may have been masked by the presence of other concurrent programs.

Finally, this study was limited by quasi-experimental design. By using pre-existing groups (in assigning entire school to study condition) the internal validity of the study is threatened in that changes due to intervention may in fact be a result of within

school factors. It is acknowledged, however, that the logistical advantages of using this design are numerous.

CONCLUSIONS AND RECOMMENDATIONS

The application of a new and novel approach to prevention obesity appears to have delivered several successful results. Process evaluation of systems maps shows strong movement in the right directions for positive health outcomes including policy change, creation of new and stronger networks, increased awareness of the importance of health and the emergence of leaders for better health within schools and across the sector.

The quantitative findings indicate early success in reducing the prevalence of obesity in some but not all intervention schools. This may be due to the short evaluation time of two years which is at the shorter end of intervention time to expect to see positive health outcomes. The use of systems thinking was challenging in the initial stages though it was clear that substantial capacity was built to engage and deploy this thinking most notably with the Project Officers within each school and with the representative from the Directorate of Health. The tools and techniques developed through this project appear to have strong utility to help coordinate the multiple levels, agencies and strategies required to respond to the challenge of the current evidence base to engage with complexity. The utility of this approach is further demonstrated by the adaptation and extension of the method into primary schools in the ACT.

It is recommended that the schools involved in this intervention be considered as exemplars of trialling for new approaches to obesity prevention. Notably the principals and project officers have developed considerable capacity to use this type of thinking and could provide great support to efforts to disseminate this thinking across the broader scope of schools. In the intervening period systems methods for obesity prevention have advanced significantly and these schools would be perfectly placed to adapt most quickly to new methods.

Recommendations include:

The use of systems thinking can support schools to make changes above and beyond the usual single behaviours, single activity focus of many health promotion activities. It is recommended that systems thinking is used in the development, implementation and evaluation of future community based obesity prevention interventions to continue to build the evidence base for the effectiveness this approach.

It is recommended that changes to food systems be prioritised.

Future intervention efforts aim to strengthen existing and create new internal and external partnerships, embed change within the school systems so that they are sustainable and use population monitoring to track changes in obesity prevalence and behavioural change to ensure representativeness of findings

Sharing of the lessons learned by the staff involved in these efforts will be critical to ensure future efforts have a more comprehensive and efficient approach. It is

recommended that experiences of key informants from the ACT IYM be used to inform the design, implementation and evaluation of future interventions.

Improved food environments are possible via application of Future initiatives to improve food environments at school use a multi-dimensional approach, and the support of the wider community should be a key target to meet nutrition-based goals.

Future intervention efforts assess the readiness of the community for systems change then work with community leaders to engage and lift the capacity of all personnel key to intervention implementation.

Food and physical activity systems are ever evolving and it is recommended that ongoing evaluation of the targeted systems be prioritised to provide feedback to stakeholders so that effective and timely adaptations can be made.

Future intervention efforts should aim to strengthen existing and create new internal and external partnerships, embed change within the school systems so that they are sustainable and use of population monitoring to track changes in obesity prevalence and behavioural change to ensure representativeness of findings.

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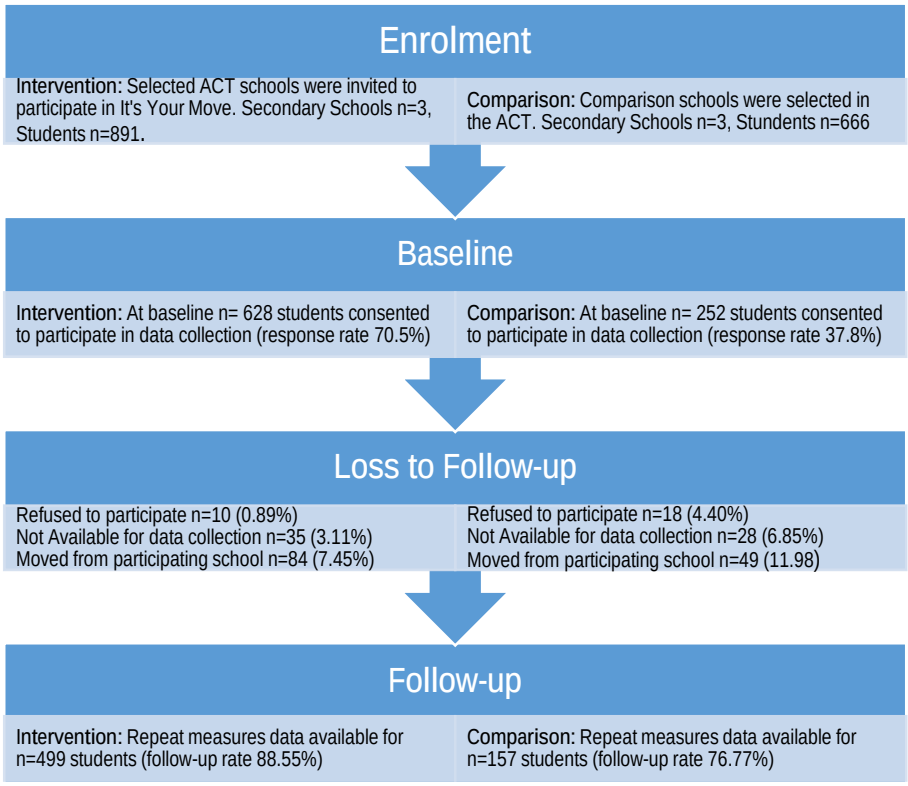
APPENDIX A: FLOW CHART OF PARTICIPANTS



APPENDIX B: METHODS

Systems Approach

The three intervention schools had a generic objective to develop, implement and evaluate a comprehensive Food at School policy in addition to school specific individual objectives:

- Melrose High School's objective was to increase the number of students using active transport to and from school.
- Alfred Deakin High School's objective was to increase physical activity at school.
- Calwell High School's objective was to improve mental well-being through improving physical activity and nutrition systems.

Key personnel from each of the intervention schools (principals, teachers and students) along with representatives from ACT Health, ACT Education and Training, and Nutrition Australia participated in a two-day workshop facilitated by researchers from Deakin University that sought to develop a multi-component intervention targeting key determinants within obesogenic environments. The workshop was a modified version of the Analysis Grid for Element Linked to Obesity (ANGELO) workshop (20). The original ANGELO workshops combined international and local evidence with a community participatory approach to develop an intervention action plan (13). This format was modified to incorporate the WHO Systems building blocks; which include leadership, information, financing/resources, partnerships and workforce development (17). Importantly, the complexity of causes of obesity from individual level through to policy settings and all places in between was recognised. This method provided an efficient and flexible way of identifying and prioritising the key determinants within an environment while taking into account gaps in knowledge, community capacity, culturally specific needs and current health promotions that may already be in place (20). This process also allowed the individual schools to take ownership to implement new initiatives or reframe existing goals in line with their identified objectives.

Anthropometry and Survey Methodology

Weight and height were measured in adolescents using standard methods for the collection of anthropometric data by trained researchers (21). Weight was measured to the nearest 0.05 kg using electronic scales (A&D Personal Precision Scale UC-321) and height was measured to the nearest 0.1 cm using a portable stadiometer (Charder Portable Stadiometer Height Rod HM200P). All measurements were made while the adolescents were wearing light clothing and no shoes. Two measurements were recorded for each parameter with a third measure taken for any resulting discrepancies (>0.1 kg for weight, >0.5 cm for height). The mean of

all the measures recorded was used for analysis. Body mass index (BMI; weight(kg)/height(m^2)) and BMI-z score was calculated using the WHO Reference 2007 (22). The WHO Reference 2007 age-specific BMI cut-offs were also used to classify children's weight status as healthy weight, overweight and obese.

Demographic information and parental education level was collected from the completed consent form while a Turning Point presentation was used for the self-report Adolescent Behaviours, Attitudes and Knowledge Questionnaire, a Pediatric Quality of Life Inventory 4.0 (generic module for 13- to 18-year-olds) (PedsQL) (23, 24) and a Shortened Moods and Feelings Questionnaire (25). The questionnaire was administered by a trained researcher and responses collected using Keepad Interactive technology. The questionnaire included questions about nutrition behaviours, PA and leisure time behaviours, perceptions of and attitudes about body size, school environment, family and home environment, quality of life and depressive symptomology.

APPENDIX C: DOMAIN FOR ACTION GRID – SYS-ANGELO

Domain for action: food at school						
Actions	**Description**	**Leadership**	**Information**	**Financing**	**Partnerships**	**Workforce development**
Policy						
Curriculum						
Social marketing						
Programs						
Events						
Other						

Domain for action: informal physical activity						
Actions	**Description**	**Leadership**	**Information**	**Financing**	**Partnerships**	**Workforce development**
Policy						
Curriculum						
Social marketing						
Programs						
Events						
Other						

Domain for action: active transport						
Actions	**Description**	**Leadership**	**Information**	**Financing**	**Partnerships**	**Workforce development**
Policy						
Curriculum						
Social marketing						
Programs						
Events						
Other						

Domain for action: mental well-being						
Actions	**Description**	**Leadership**	**Information**	**Financing**	**Partnerships**	**Workforce development**
Policy						
Curriculum						
Social marketing						
Programs						
Events						
Other						

APPENDIX D: ADOLESCENT BEHAVIOURS, ATTITUDES AND KNOWLEDGE QUESTIONNAIRE

1. What is today's date? ☐☐ / ☐☐ / ☐☐☐☐ (D D / M M / Y Y Y Y)

2. What is the name of your school? _____

3. Which year are you in?
   - 7 ☐
   - 8 ☐
   - 9 ☐
   - 10 ☐

4. With which ethnic group do you most associate?
   - European Australian ☐
   - Indian ☐
   - Chinese ☐
   - Indigenous Australian ☐
   - Other ☐

5. Were you born in Australia?
   - Yes ☐
   - No ☐

6. I am
   - Male ☐
   - Female ☐

7. What is your date of birth? ☐☐ / ☐☐ / ☐☐☐☐ (D D / M M / Y Y Y Y)

8. Please estimate your height (cm) _____

9. Please estimate your weight (kg) _____

10. On school days, where do you usually get your breakfast from?
    - Home ☐
    - School canteen ☐
    - Shop (outside school) ☐
    - From friends ☐
    - I don't eat breakfast ☐

11. In the last 5 school days, on how many days did you have something to eat for **breakfast** before school started?
    Number (0 to 5) _____

12.	Where do you usually get your **morning tea** for recess from?	Home School canteen Shop (outside school) From friends I don't eat morning tea	☐ ☐ ☐ ☐ ☐
13.	In the last 5 school days, on how many days did you eat at morning recess/interval?	Number 0 to 5	_____
14.	Where do you usually get your **lunch** from?	Home School canteen Shop (outside school) From friends I don't eat lunch	☐ ☐ ☐ ☐ ☐
15.	In the last 5 school days, on how many days did you eat lunch at lunchtime?	Number 0 to 5	_____
16.	How many serves of **fruit** did you eat on the last school day (including time spent at home)? (a serve = 1 apple, 1 banana, 1 mandarin or 1 cup of diced fruit)	Number of serves	_____
17.	How many serves of **vegetables** did you eat on the last school day (including time spent at home)? (1 serve = ½ cup cooked vegetables or 1 cup of raw vegetables/salad)	Number of serves	_____
18.	On the last school day (including time spent at home), how many glasses of regular (non diet) **soft drinks** or **energy drinks** did you consume? (Soft drinks = Coke, Sprite, Fanta and Energy drinks = Red Bull, Mother etc.) (1 x glass = 250ml). Refer to picture board.	Number of glasses	_____
19.	On the last school day (including time spent at home), how many glasses of **fruit drinks** or **cordial** did you consume? (Such as Ribena, Cottees, Sports drinks) (1 x glass = 250ml). Refer to picture board.	Number of glasses	_____
20.	On the last school day (including time spent at home), how many glasses of plain **water** did you consume? (1 x glass = 250ml). Refer to picture board.	Number of glasses	_____
22.	How many serves of **packaged snacks** (e.g. potato chips, muesli bars, roll-ups, twisties,		_____

	cheezels etc) did you eat on the last school day (including time spent at home)? Refer to picture board.	Number of serves	_____
23.	How often do you usually eat food from a **takeaway**? (e.g. McDonalds, KFC, Subway, fried chicken, fish and chips, hamburgers, Chinese takeaway)	Once a month or less 2-3 times a month Once a week 2-3 times a week Most days	☐ ☐ ☐ ☐ ☐
24.	On the last school day did you use active transport **TO** school? (e.g. walk, bike, scooter, skateboard, etc.)	Yes No	☐ ☐
25.	On the last school day did you use active transport **FROM** school? (e.g. walk, bike, scooter, skateboard, etc.)	Yes No	☐ ☐
26.	How long does/would it take you to walk from home to your school?	Less than 15 minutes 15-30 minutes More than 30 minutes	☐ ☐ ☐
27.	On the last school day, what did you do most of the time at morning recess/interval (apart from eating)?	Mostly just sat down Mostly stood or walked around Mostly played active games	☐ ☐ ☐
28.	On the last school day, what did you do most of the time at lunchtime (apart from eating)?	Mostly just sat down Mostly stood or walked around Mostly played active games	☐ ☐ ☐
29.	On the last school day, did you do sport, dance, or play games in which you were active?	Yes No	☐ ☐
30.	**On the last school day**, how many hours did you watch **TV, videos** or **DVDs** in your free time? (e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc)	Hours	_____
31.	**Last Saturday**, how many hours did you spend watching **TV, videos** or **DVDs**?		

(e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc) Hours

32. **Last Sunday**, how many hours did you spend watching **TV, videos** or **DVDs**? (e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc) Hours

33. **During the school week**, do your parents (or caregivers) limit the amount of TV you are allowed to watch? (including videos and DVDs)

No limits, I can watch for as long as I like	
Yes, but not very strict limits	
Yes, strict limits	

34. Do you have a **TV** in your bedroom?

Yes	
No	

35. **On the last school day**, how many hours did you **play video games, electronic games** or use the **computer** (not for homework)? (e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc) Hours

36. **Last Saturday**, how many hours did you spend **playing video games** or **using the computer** (not for homework)? (e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc) Hours

37. **Last Sunday**, how many hours did you spend **playing video games** or using the **computer** (not for homework)? (e.g. 30 min= 0.5 hours; 60 min=1 hour; 90 min= 1.5 hour; 120 min=2 hours etc) Hours

38. Do you have a computer/game console in your bedroom (e.g. ipad, wii, Xbox, Playstation, DS etc)?

Yes	
No	

39. How would you describe your **BODY WEIGHT**?

Very underweight	
Slightly underweight	
About the right weight	
Slightly overweight	

	Very overweight	
40. How do you feel about your **BODY WEIGHT**?	Very happy	
	Happy	
	In between / OK	
	Unhappy	
	Very unhappy	
41. How do you feel about your **BODY SHAPE**?	Very happy	
	Happy	
	In between / OK	
	Unhappy	
	Very unhappy	
42. Which of these statements most closely applies to you? I am…	Trying to lose weight	
	Trying to gain weight	
	Trying to stay at my current weight	
	Not doing anything about my weight	
43. Which of the following statements most closely applies to you? I am…	Trying to gain muscle size	
	Trying to stay at the same muscle size	
	Not doing anything about my muscles	

For each question, please check where on the scale from 1 to 5 best describes your answer

	N/A	1 not at all	2	3	4	5 a lot
44. How much does your mother (or female caregiver) encourage you to eat healthy foods? (N/A - if don't live with mother or female caregiver)						
45. How much does your father (or male caregiver) encourage you to eat healthy foods? (N/A - if you don't live with father or male caregiver)						
46. How much does your mother (or female caregiver) encourage you to be physically active or play sports?						

	(N/A - if you don't live with mother or female caregiver)						
47.	How much does your father (or male caregiver) encourage you to be physically active or play sports? (N/A - Don't live with father or male caregiver)						
48.	How much does your school encourage ALL students play organised sport?						
49.	How much does your school encourage ALL students to be physically active at lunchtime?						
50.	How much does your school encourage students to make healthy food choices?						

		1 Very good	2	3	4	5 Poor
51.	How do you rate the teachers at your school as role models for being physically active?					
52.	How do you rate the teachers at your school as role models for healthy eating?					

		1 Healthy	2	3	4	**5** **UN-** healthy
53.	How do you rate the food and drink choices available at your school canteen?					

54.	Do you know of any programs in your school that are about healthy eating?	Don't know Yes No	

If yes, do you think that these programs are good? Why?

_____
_____
_____
_____

_____
_____

55.	Do you know of any programs in your school that are about doing more physical activity?	Don't know Yes No	☐ ☐ ☐

If yes, do you think that these programs are good? Why?

_____
_____
_____
_____
_____
_____
_____

This following section is about how you might have been feeling or acting recently

For each question, please check how much you have felt or acted this way *in the past two weeks.*

If a sentence was true about you most of the time, check TRUE

If it was only sometimes true, check SOMETIMES

If the sentence was not true about you, check NOT TRUE

		TRUE	SOME-TIMES	NOT TRUE
1.	I felt miserable or unhappy			
2.	I didn't enjoy anything at all			
3.	I felt so tired I just sat around and did nothing			
4.	I was very restless			
5.	I felt I was no good anymore			
6.	I cried a lot			
7.	I found it hard to think properly of concentrate			
8.	I hated myself			
9.	I was a bad person			
10.	I felt lonely			
11.	I thought nobody really loved me			
12.	I thought I could never be as good as other kids			
13.	I did everything wrong			

*In the **LAST MONTH**, how much of a **problem** has this been for you (please circle your answer) …*

About My Health and Activities (PROBLEMS WITH…)	Never	**Almost Never**	Some-times	**Often**	Almost Always
1. It is difficult for me to walk more than 100 metres	0	1	2	3	4
2. It is difficult for me to run	0	1	2	3	4
3. It is difficult for me to play sport or do exercise	0	1	2	3	4
4. It is difficult for me to lift something heavy	0	1	2	3	4
5. It is difficult for me to have a bath or shower by myself	0	1	2	3	4
6. It is difficult for me to help around the house	0	1	2	3	4

7. I get aches and pains	0	1	2	3	4
8. I have low energy	0	1	2	3	4

About My Feelings (PROBLEMS WITH…)	Never	**Almost Never**	Some-times	**Often**	Almost Always
1. I feel afraid or scared	0	1	2	3	4
2. I feel sad	0	1	2	3	4
3. I feel angry	0	1	2	3	4
4. I have trouble sleeping	0	1	2	3	4
5. I worry about what will happen to me	0	1	2	3	4

How I Get Along with Others (PROBLEMS WITH…)	Never	**Almost Never**	Some-times	**Often**	Almost Always
1. I have trouble getting along with other teenagers	0	1	2	3	4
2. Other teenagers do not want to be my friend	0	1	2	3	4
3. Other teenagers tease me	0	1	2	3	4
4. I cannot do things that other people my age can do	0	1	2	3	4
5. It is hard to keep up with other teenagers	0	1	2	3	4

About School (problems with…)	Never	**Almost Never**	Some-times	**Often**	Almost Always
1. It is hard to pay attention in class	0	1	2	3	4
2. I forget things	0	1	2	3	4
3. I have trouble keeping up with my school work	0	1	2	3	4
4. I am away from school because I feel sick	0	1	2	3	4
5. I am away from school to go to the doctor or hospital	0	1	2	3	4

END OF QUESTIONNAIRE

THANK YOU

APPENDIX E: SCHOOL ENVIRONMENTAL AUDIT

Instructions for secondary school environment questionnaire

Ensure that the school has received/signed the organisation consent form

- Please request a quiet area to conduct the questionnaire, for example an empty class room/office/staff room etc
- This questionnaire requires input from 1-3 staff members (3 is ideal) who have some knowledge in nutrition/physical activity or areas related to this (e.g. health and well being)
- Your job is to facilitate and open the discussion regarding the questions below. Read out the questions and allow the teachers to discuss their answer and reach a consensus between them– the consensus answer is the one which is recorded by the facilitator in the questionnaire below.
- Please collect any written policies such as nutrition policies, physical activity policies, and any canteen menus available.
- Once the interview has concluded, please write down anything of note or factors of relevance in the notes pages following the questionnaire. For example, the school does not have their own oval, the teachers were rushed /distracted/didn't want to be there, the principal was present and perhaps influenced answers…anything which might be relevant or influence answers in the questionnaire.
- Any questions, please phone Lynne Millar (03) 5227 8420 or Narelle Robertson (03) 5227 8425.

SECTION A – DEMOGRAPHICS

1) Please complete the following using block letters in the space provided

   a) School Name

   b) School Suburb

   c) School Postcode

2) What are your positions?

   ☐ Principal

   ☐ Vice Principal

   ☐ Teacher

   ☐ Other

SECTION B – THE INTERNAL CANTEEN SERVICE

1) Does your school currently have an internal canteen service where children order foods/beverages?

Yes ☐ **No** ☐ If **no** go to **Section C, pg. 5**

2) Does the canteen service have a breakfast program (breakfast menu) before school?

Yes ☐ **No** ☐ **Don't know** ☐ If **yes** how many **days/week**?

3) Are the following foods and beverages available from the school canteen?

		Yes	**No**	**Don't know**
Fruit		☐	☐	☐
Milk	Full fat	☐	☐	☐
	Reduced fat	☐	☐	☐
Yoghurt	Full fat	☐	☐	☐
	Reduced fat	☐	☐	☐
Filled Rolls/Sandwiches		☐	☐	☐
Lollies/Chocolate		☐	☐	☐
Hot Chips		☐	☐	☐
Crisps		☐	☐	☐
Pies/sausage rolls/pasties		☐	☐	☐
Non-diet soft drinks		☐	☐	☐
Fruit juice (100%)		☐	☐	☐

Fruit drink	☐	☐	☐
Energy/sports drinks	☐	☐	☐

4) Is making a significant profit for the school an important part of the canteen service?

Yes ☐ **No** ☐ **Don't know** ☐

5) Is the canteen service contracted to a commercial operator?

Yes ☐ **No** ☐ **Don't know** ☐

6) There is adequate is the space in the canteen for food preparation?

- ☐ Very inadequate
- ☐ Inadequate
- ☐ Unsure
- ☐ Adequate
- ☐ Very adequate

7) Indicate your level of agreement/disagreement with the following statement:

"**Our canteen service mainly provides foods with high nutritional value**"

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neither agree nor disagree
- ☐ Agree
- ☐ Strongly agree

8) Does the canteen have a pricing policy that encourages sale of healthy food choices at reduced cost?

Yes ☐ **No** ☐ **Don't know** ☐

9) Does the canteen routinely promote and advertise healthy food choices (e.g. highlighted healthy foods on menu, offer taste testing opportunities for new food)?

Yes ☐ **No** ☐ **Don't know** ☐

If **yes, in what way?**

_____

_____

_____

10) Is the canteen menu reviewed on a regular basis?

Yes ☐ **No** ☐ **Don't know** ☐

If **yes, by whom?**

11) Do the foods provided by the canteen service reflect classroom food and nutrition messages?

☐ Not at all

☐ Partially

☐ Fully

☐ Don't know

SECTION C – THE EXTERNAL FOOD SERVICE

1) Does your school currently have an external food service where children order foods/beverages that are supplied by an external provider? This is distinct from an internally

operated food service (e.g. local shop).

Yes ☐ **No** ☐ If **no** go to S**ection D, pg. 6**

2) Does the school have a breakfast program (breakfast menu)?

Yes	**No**	**Don't know**
☐	☐	☐

↓

If yes how many days/week?

3) Are the following foods and beverages available from the external food service?

	Yes	**No**	**Don't know**
Fruit	☐	☐	☐
Milk	☐ Full fat	☐	☐
	☐ Reduced fat	☐	☐
Yoghurt	☐ Full fat	☐	☐
	☐ Reduced fat	☐	☐
Filled Rolls/Sandwiches	☐	☐	☐
Lollies/Chocolate	☐	☐	☐

Hot Chips	☐	☐	☐
Crisps	☐	☐	☐
Pies/sausage rolls/pasties	☐	☐	☐
Non-diet soft drinks	☐	☐	☐
Fruit juice (100%)	☐	☐	☐
Fruit drink	☐	☐	☐
Energy/sports drinks	☐	☐	☐

Indicate your level of agreement/disagreement with the following statement:

"**Our external food service mainly provides foods with high nutritional value**"

☐ Strongly disagree

☐ Disagree

☐ Neither agree nor disagree

☐ Agree

☐ Strongly agree

4) Does the external food service have a pricing policy that encourages sale of healthy food choices at reduced cost?

Yes ☐ **No** ☐ **Don't know** ☐

5) Does the external food service routinely promote and advertise healthy food choices (e.g. highlighted healthy foods on menu, offer taste testing opportunities for new food?)

Yes ☐ **No** ☐ **Don't know** ☐

6) Is the external food service menu reviewed on a regular basis?

Yes ☐ **No** ☐ **Don't know** ☐

7) Do the foods provided by the external food service reflect classroom food and nutrition messages?

☐ Not at all

☐ Partially

☐ Fully

☐ Don't know

SECTION D – SCHOOL FOOD/NUTRITION POLICY(IES)

1) Does your school have a written policy(ies) promoting healthy eating?

Yes ☐ **No** ☐ **Don't know** ☐

↓ ↓

Go to **Section E, pg. 7**

2) How many?

Does this policy(ies) include:	Yes	No	Don't know
a. What foods are made available in the canteen?	☐	☐	☐
b. The availability of water?	☐	☐	☐
c. Restricting access to stores and food outlets?	☐	☐	☐
d. Vending machines at school?	☐	☐	☐
e. Food association with fundraising?	☐	☐	☐
f. Food association with special events (e.g. sports days)?	☐	☐	☐
g. Setting aside adequate time for children to eat lunch?	☐	☐	☐
h. The type of food that may be brought from home?	☐	☐	☐
i. Teaching focussing on food and nutrition in the curriculum?	☐	☐	☐
j. Distribution of information to parents about healthy food and eating?	☐	☐	☐
k. Staff acting as role models in the area of healthy eating?	☐	☐	☐
l. Encouraging children to adopt healthy eating behaviours?	☐	☐	☐
m. Operating the school food service not for profit?	☐	☐	☐
n. Using food as a reward? (eg chocolate frogs, lollies)	☐	☐	☐

3) How effective have the policies been on overall healthy eating?

- ☐ Not effective
- ☐ Moderately effective
- ☐ Very effective
- ☐ Don't know

4) What proportion of teachers do you think are aware of these policies?

- ☐ All or almost all
- ☐ Most
- ☐ About half
- ☐ Some
- ☐ Very few or none
- ☐ School doesn't have a written policy
- ☐ Don't know

5) What proportion of parents do you think are aware of these policies?

- ☐ All or almost all
- ☐ Most
- ☐ About half
- ☐ Some
- ☐ Very few or none
- ☐ School doesn't have a written policy
- ☐ Don't know

6) Is a copy of the policy(ies) provided to parents? **Yes** ☐ **No** ☐ **Don't know** ☐

SECTION E – THE NUTRITION ENVIRONMENT

	Very Poor	Poor	Moderate	Good	Don't Know
Rate the level of priority for nutrition at your school	☐	☐	☐	☐	☐
Rate your school's practices and policies for the promotion of healthy eating	☐	☐	☐	☐	☐
Rate the extent to which teachers at your school act as role models by eating healthy foods	☐	☐	☐	☐	☐
Rate the promotion of healthy foods at your school's social/sporting events	☐	☐	☐	☐	☐
Rate the level of support for healthy eating provided by parents at your school	☐	☐	☐	☐	☐

1) About how often in the school year, does your school give information to the parents about healthy food and eating (at school events, in newsletters etc)?
times ☐ Don't know

2) Does your school have vending machines that serve food?

Yes ☐ **No** ☐ **Don't know** ☐

↓ ↓ ↓

Go to **Question 8, pg. 8**

If **yes** how many?

3) Would you consider that more than half of the foods in the vending machines are healthy?

Yes ☐ **No** ☐ **Don't know** ☐

4) Does your school have vending machines that serve drinks?

Yes ☐ **No** ☐ **Don't know** ☐

↓ ↓

Go to **Question 10 pg. 8**

5) Would you consider that more than half of the drinks in the vending machines are healthy?

Yes ☐ **No** ☐ **Don't know** ☐

6) In the last 12 months have any **sporting, social or cultural events** been sponsored by soft-drink, fast food or confectionary companies?

Yes ☐ **No** ☐ **Don't know** ☐

↓

If **yes** how many in the last 12 months?

7) In the last 12 months have any fundraising events been sponsored by soft-drink, fast food or confectionary companies?

Yes ☐ **No** ☐ **Don't know** ☐

↓

If **yes** how many in the last 12 months?

8) Which students are allowed to leave the school grounds during the school day? (Without special permission). Choose all that apply.

- ☐ Year 7
- ☐ Year 8
- ☐ Year 9
- ☐ Year 10
- ☐ None of the students are permitted to leave (**go to question 12**)
- ☐ Don't know

9) At what times during the day were the students permitted to leave the school grounds? (Without special permission). Choose all that apply.

- ☐ During lunch
- ☐ During morning and afternoon tea/intervals
- ☐ Other times
- ☐ Don't know

10) How close is the nearest milk bar to your school?

- ☐ Within 100 metres
- ☐ 100m to 500m
- ☐ 500m to 1000m
- ☐ More than 1000m
- ☐ Don't know

11) How close is the nearest takeaway/fast food outlet to your school?

- ☐ Within 100 metres
- ☐ 100m to 500m
- ☐ 500m to 1000m
- ☐ More than 1000m
- ☐ Don't know

12) Are students allowed to drink water in the classroom during class time?

Yes ☐ **No** ☐ **Don’t know** ☐

13) Are students allowed to eat in the classroom during class?

Yes ☐ **No** ☐ **Don’t know** ☐

14) Does your school have a vegetable garden?

Yes ☐ **No** ☐ **Don’t know** ☐

SECTION F – PHYSICAL ACTIVITY POLICY (IES)

1) Does your school have a written policy(ies) promoting physical activity?

Yes ☐ **No** ☐ **Don't know** ☐

↓ ↓

Go to **Section G, pg. 10**

2) How many?

3) Does this policy(ies) include:

	Yes	**No**
a) Promoting the use of school grounds during 'out of school hours'?	☐	☐
b) Providing access to sports equipment?	☐	☐
c) Promoting cycling/walking to school?	☐	☐
d) Encouraging participation in sports and physical education?	☐	☐
e) Ensuring the use of hats for outside breaks?	☐	☐
f) Teaching focused on physical activity in the curriculum	☐	☐

4) How effective have the policies been on overall promotion of physical activity?

- ☐ Not effective
- ☐ Moderately effective
- ☐ Very effective
- ☐ Don’t know

5) What proportion of teachers do you think are aware of these policies?

- ☐ All or almost all
- ☐ Most
- ☐ About half
- ☐ Some
- ☐ Very few or none
- ☐ School doesn’t have a written policy
- ☐ Don’t know

6) What proportion of parents do you think are aware of these policies?

- ☐ All or almost all
- ☐ Most
- ☐ About half
- ☐ Some
- ☐ Very few or none
- ☐ School doesn’t have a written policy
- ☐ Don’t know

7) Is a copy of the policy(ies) provided to parents? **Yes** ☐ **No** ☐ **Don’t know** ☐

SECTION G – THE PHYSICAL ACTIVITY ENVIRONMENT

1) On average how many hours a week are devoted to **formal physical education classes** for the following year levels:

a) Year 7-8 hours minutes/week

b) Year 9-10 hours minutes/week

2) On average how many hours a week are devoted to **organised sports** (martial arts, swimming, athletics, etc) for the following year levels:

a) Year 7-8 hours minutes/week

b) Year 9-10 hours minutes/week

How adequate are the following at your school?

	Very inadequate	**Inadequate**	**Adequate**	**Very adequate**
Area for **indoor** physical activity?	☐	☐	☐	☐
Area for **outdoor** physical activity?	☐	☐	☐	☐
The sporting and active play equipment?	☐	☐	☐	☐

Rate the following at your school:

	Very low	Low	Moderate	High	Very high	Don't know
Level of priority for physical activity	☐	☐	☐	☐	☐	☐
Strength of the link that the school has with community sporting and recreation organisations and facilities?	☐	☐	☐	☐	☐	☐
Extent to which teachers at your school act as role models by being physically active?	☐	☐	☐	☐	☐	☐

3) To what degree have the following programs or strategies been implemented in and around your school?

	Fully or largely implemented	Partly implemented	Minimally or not implemented	Don't know
a) Student pedestrian safety program	☐	☐	☐	☐
b) Student cyclist safety program	☐	☐	☐	☐
c) Safe houses	☐	☐	☐	☐
d) Reducing traffic congestion outside school	☐	☐	☐	☐

e) Safer road crossing	☐	☐	☐	☐
f) Cycle/scooter storage	☐	☐	☐	☐

END OF QUESTIONNAIRE

Please check over your answers and make sure that you haven't missed any questions.

THANK YOU!

Office use only

Notes

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX F: SYSTEMS MAPS QUESTIONNAIRE

Thinking about the opportunities to be ***physically active*** in your school:

What are the connections between ***leadership and governance*** in increasing ***physical activity in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What is the role of ***the workforce*** in increasing ***physical activity in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What are the ***partnerships*** that in increasing ***physical activity in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What is the role of ***finance*** in increasing ***physical activity in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What have I missed?

Thinking about the opportunities for ***healthy nutrition*** in your school:

What are the connections between ***leadership and governance*** in increasing ***healthy nutrition in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What is the role of ***the workforce*** in increasing ***healthy nutrition in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

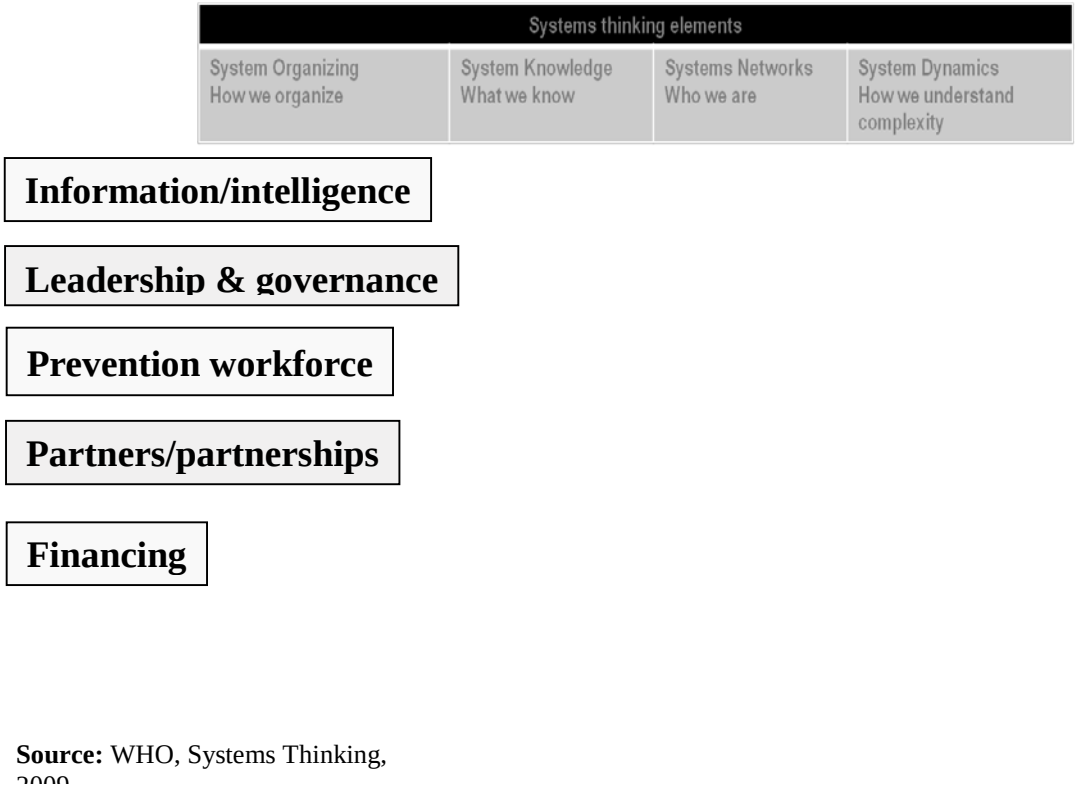
What are the ***partnerships*** that in increasing ***healthy nutrition in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What is the role of ***finance*** in increasing ***healthy nutrition in*** your school?

- How is this organised?
- Who are the key players and how do they work together?
- What sort of information changes hands?
- What sort of data is collected to measure this?
- What would it take to change these arrangements?

What have I missed?



Source: WHO, Systems Thinking, 2009

APPENDIX G: ALFRED DEAKIN HIGH SCHOOL NUTRITION SYSTEMS MAP

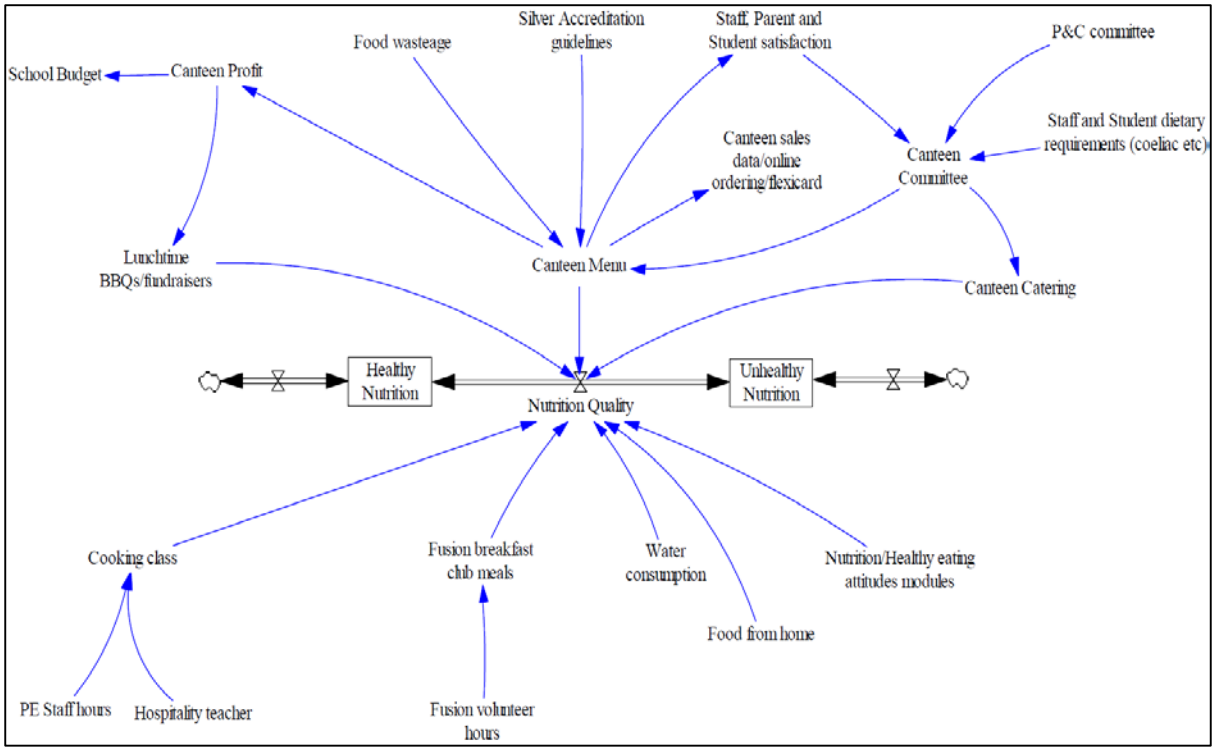


Figure 4: **Alfred Deakin High School Nutrition Time 1** (March 2012)

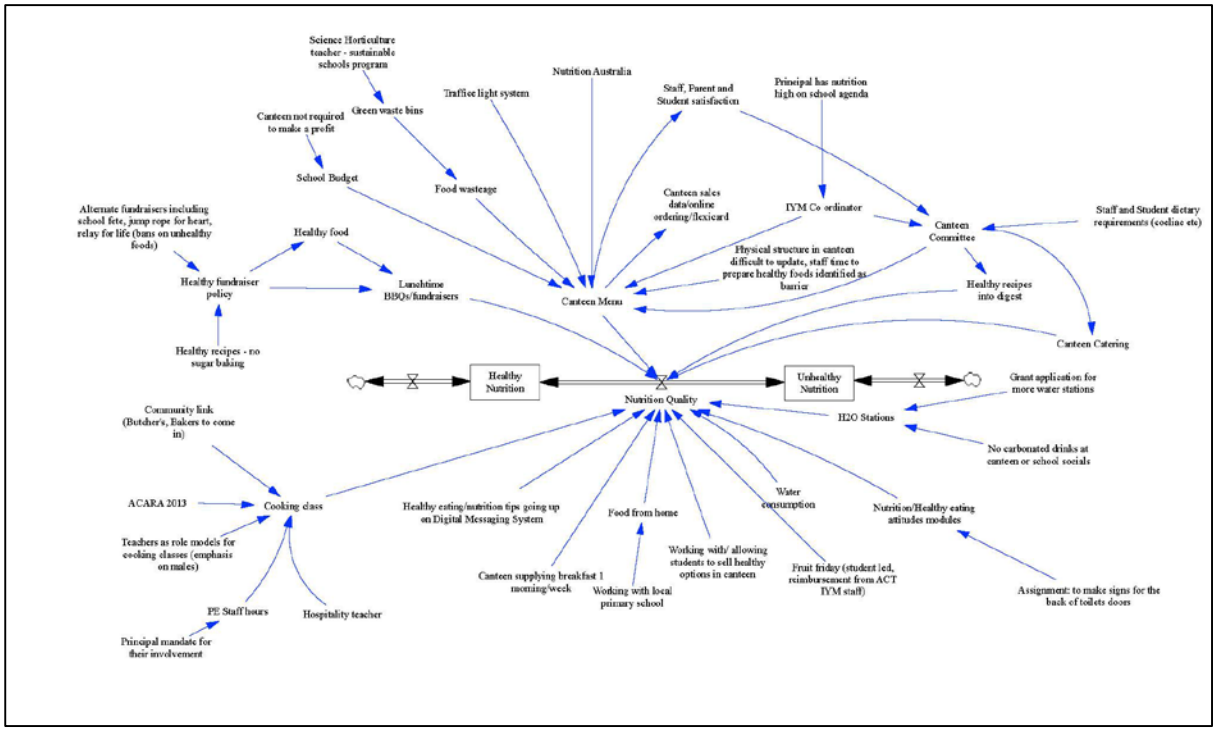


Figure 5: **Alfred Deakin High School Nutrition Time 3** (October 2014)

APPENDIX H: ALFRED DEAKIN HIGH SCHOOL PHYSICAL ACTIVITY SYSTEMS MAP

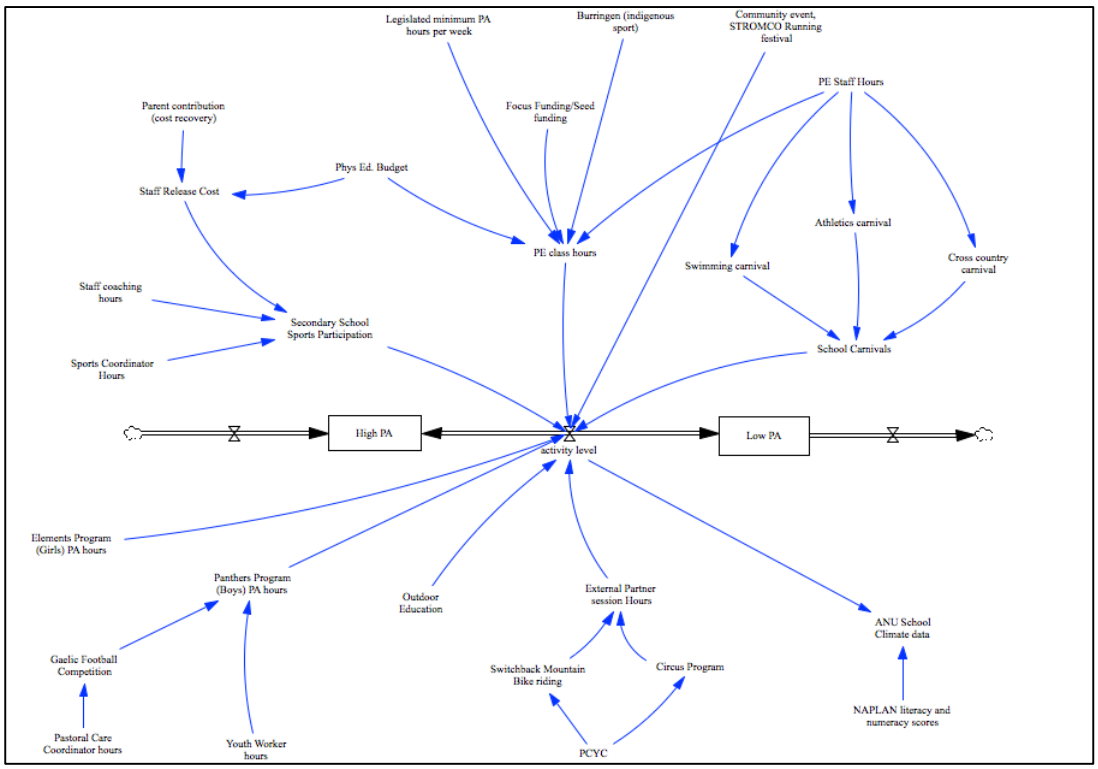


Figure 6: Alfred Deakin High School Physical Activity Time 1 (March 2012)

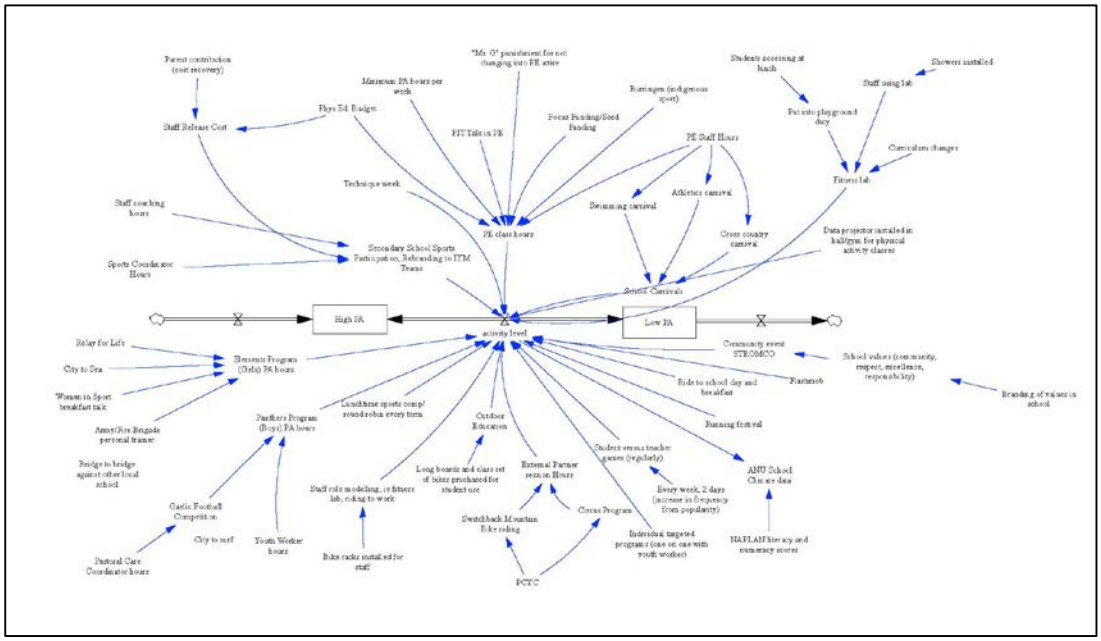


Figure *7: Alfred Deakin High School Physical Activity Time 3 (October 2014)*

APPENDIX I: MELROSE HIGH SCHOOL NUTRITION SYSTEMS MAP

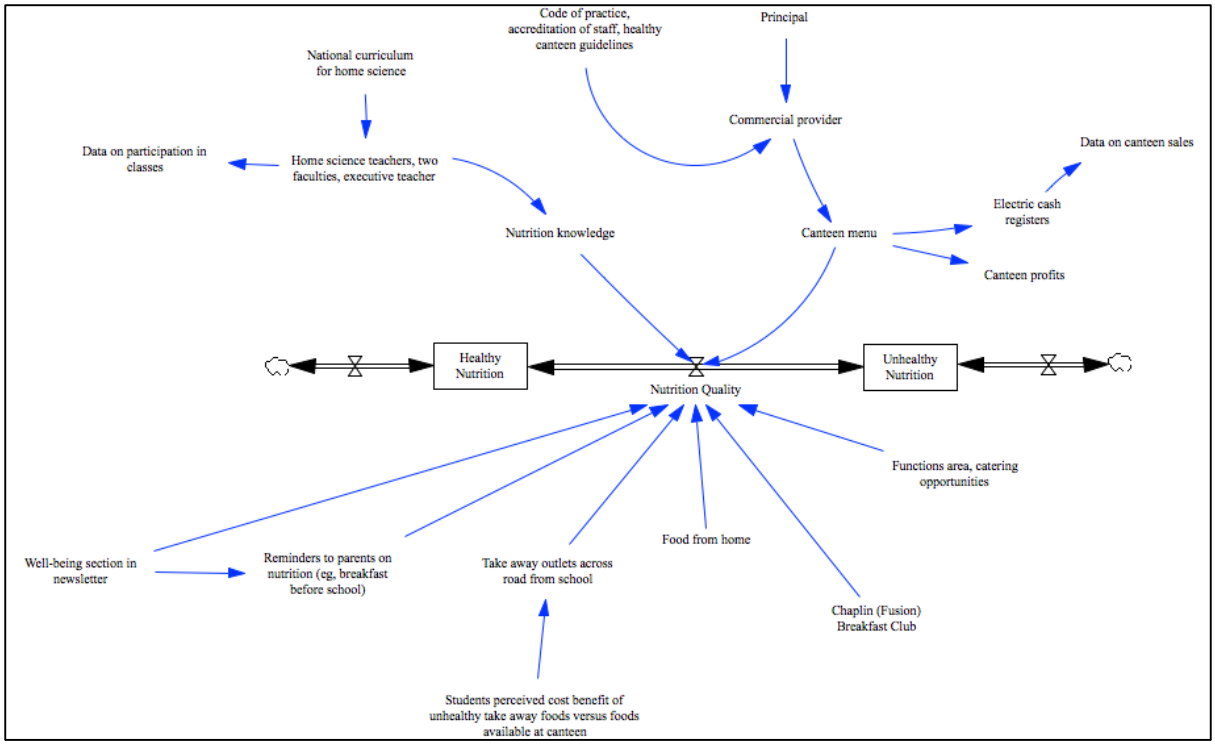


Figure 8: Melrose High School Nutrition Time 1 (March 2012)

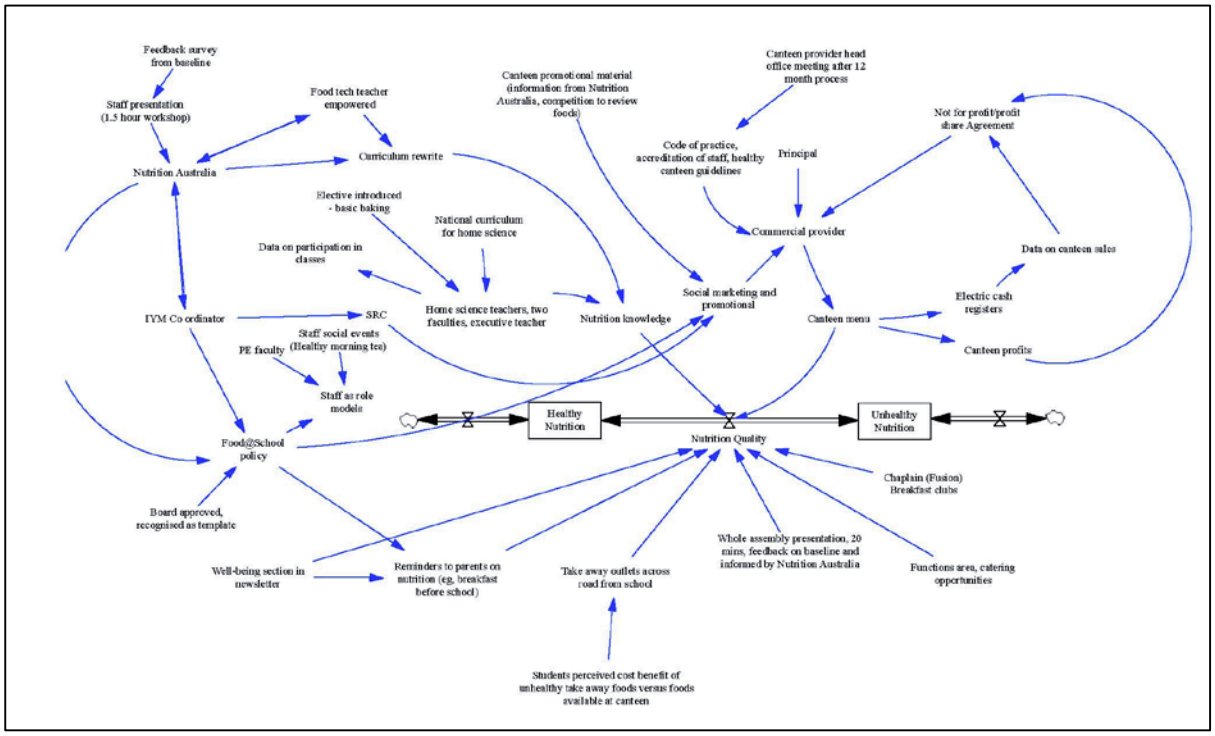


Figure 9: Melrose High School Nutrition Time 3 (October 2014)

APPENDIX J: MELROSE HIGH SCHOOL ACTIVE TRANSPORT SYSTEMS MAP

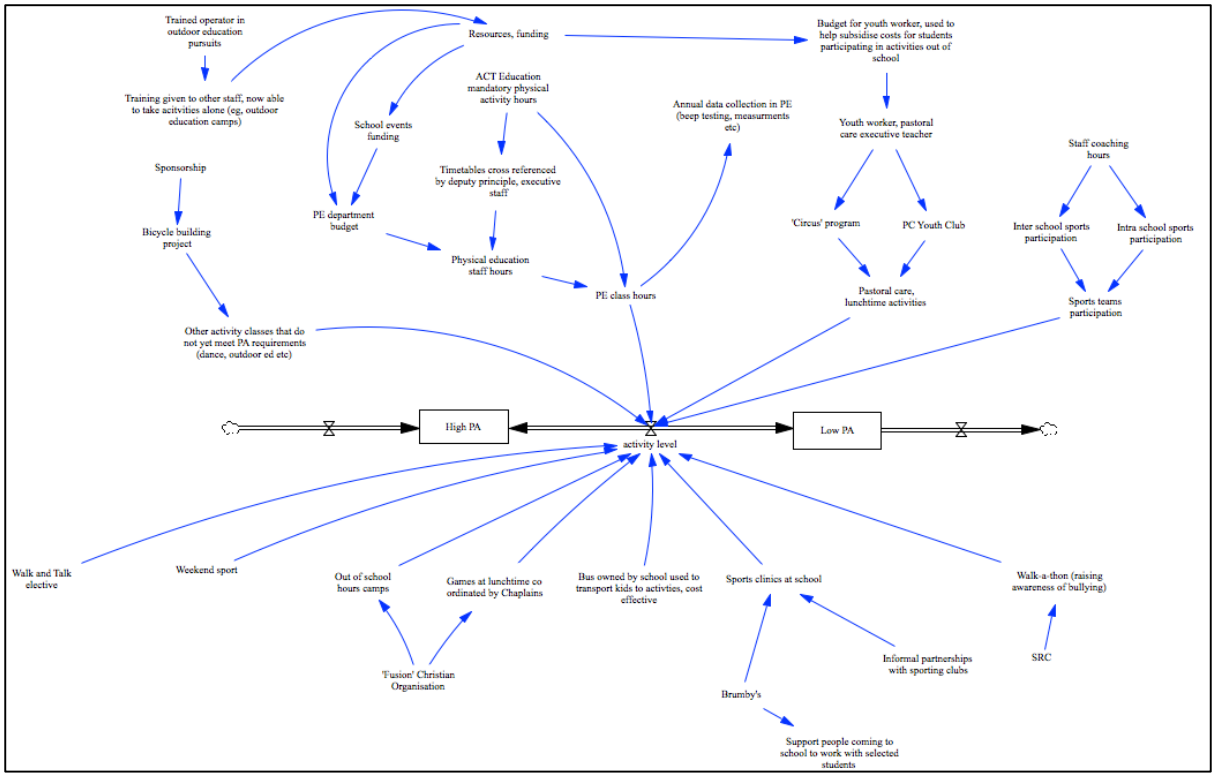


Figure 10: Melrose High School Active Transport Time 1 (March 2012)

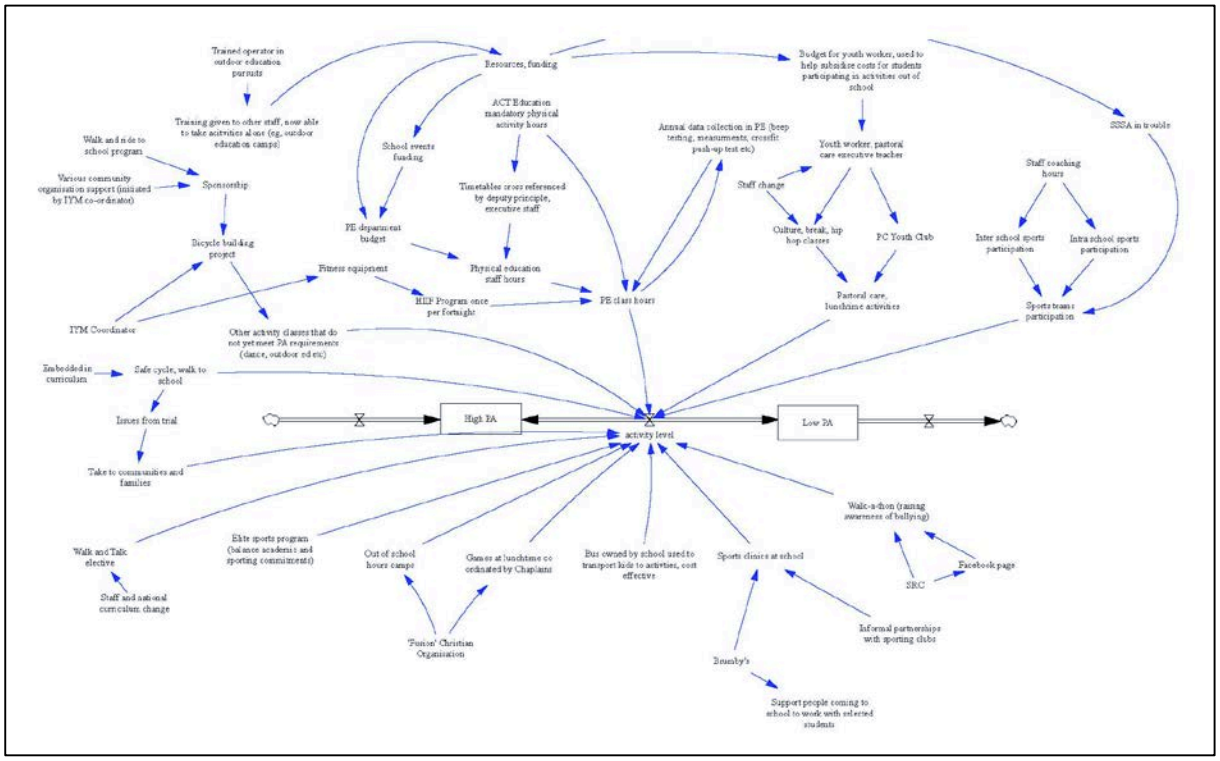


Figure 11: Melrose High School Active Transport Time 3 (October 2014)

APPENDIX K: CALWELL HIGH SCHOOL NUTRITION SYTEMS MAP

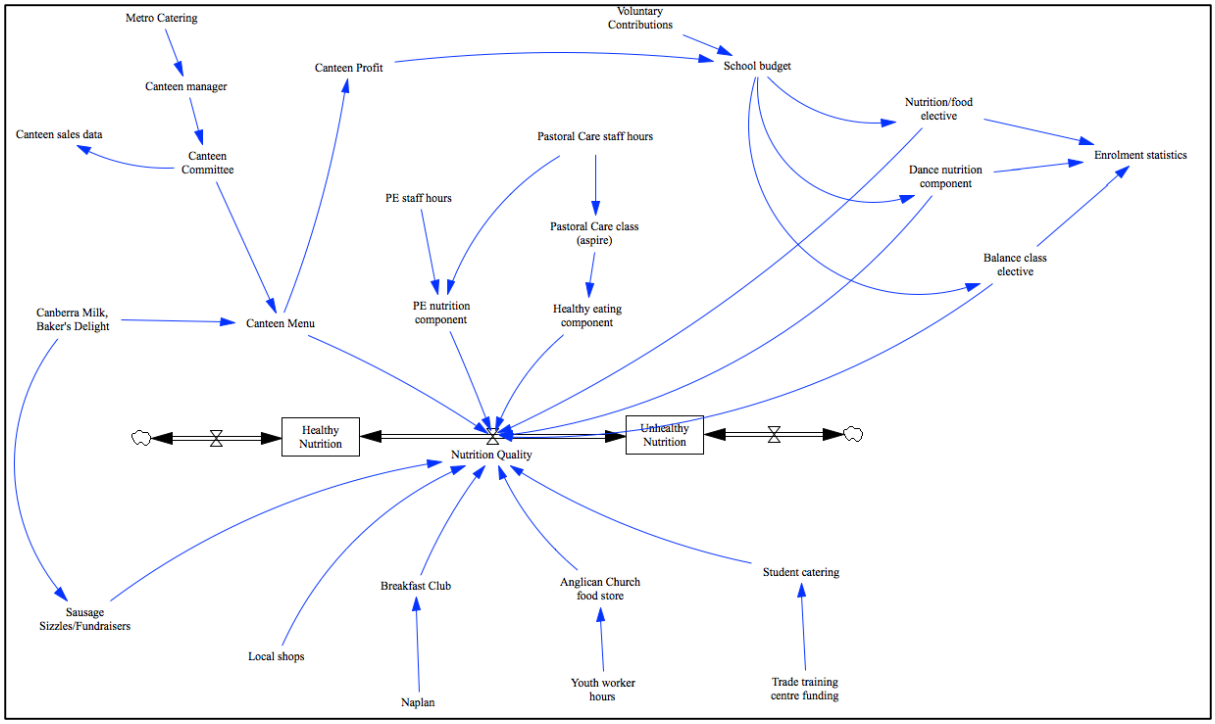


Figure 12: Calwell High School Nutrition Time 1 (March 2012)

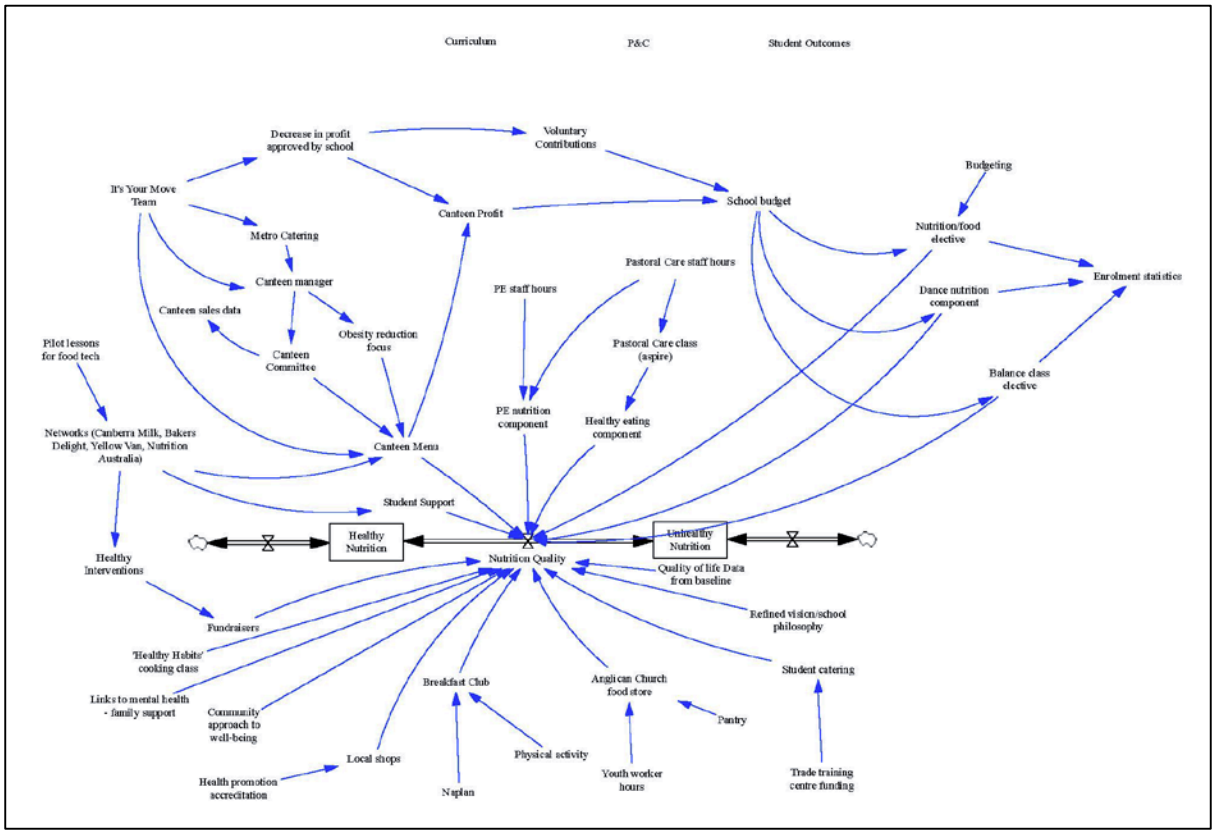


Figure 13: Calwell High School Nutrition Time 3 (October 2014)

APPENDIX L: CALWELL HIGH SCHOOL PHYSICAL ACTIVITY SYSTEMS MAP

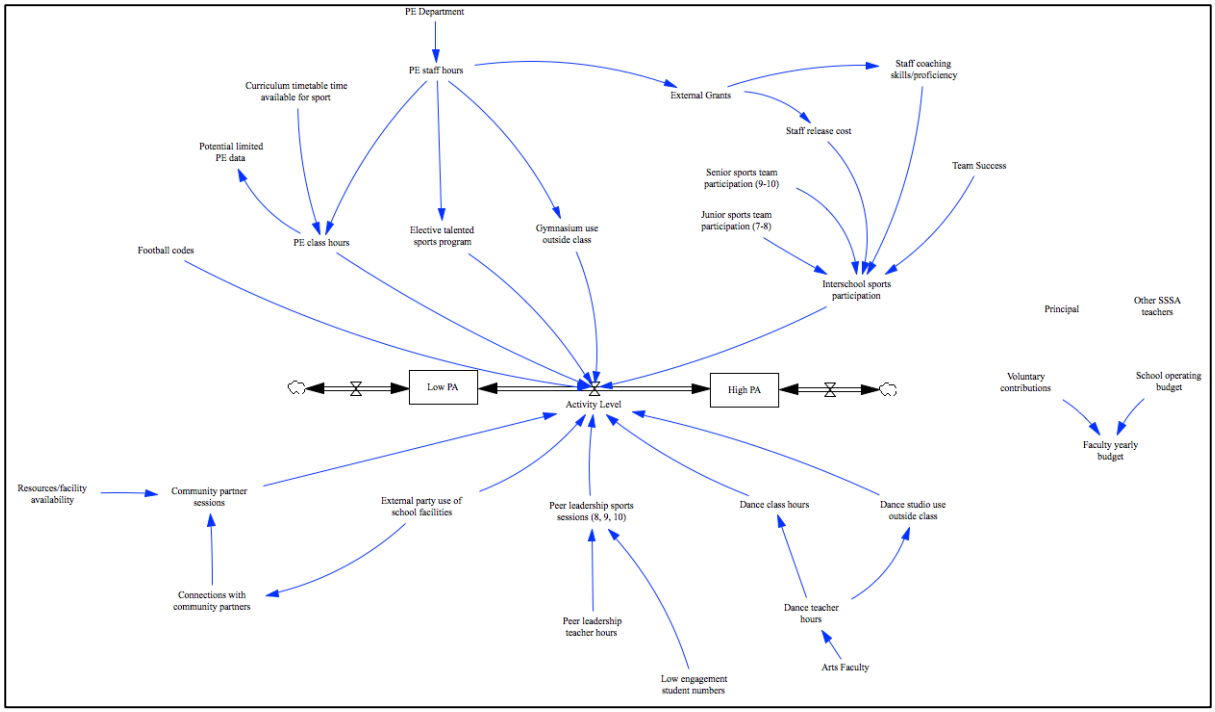


Figure 14: Calwell High School Physical Activity Time 1 (March 2012)

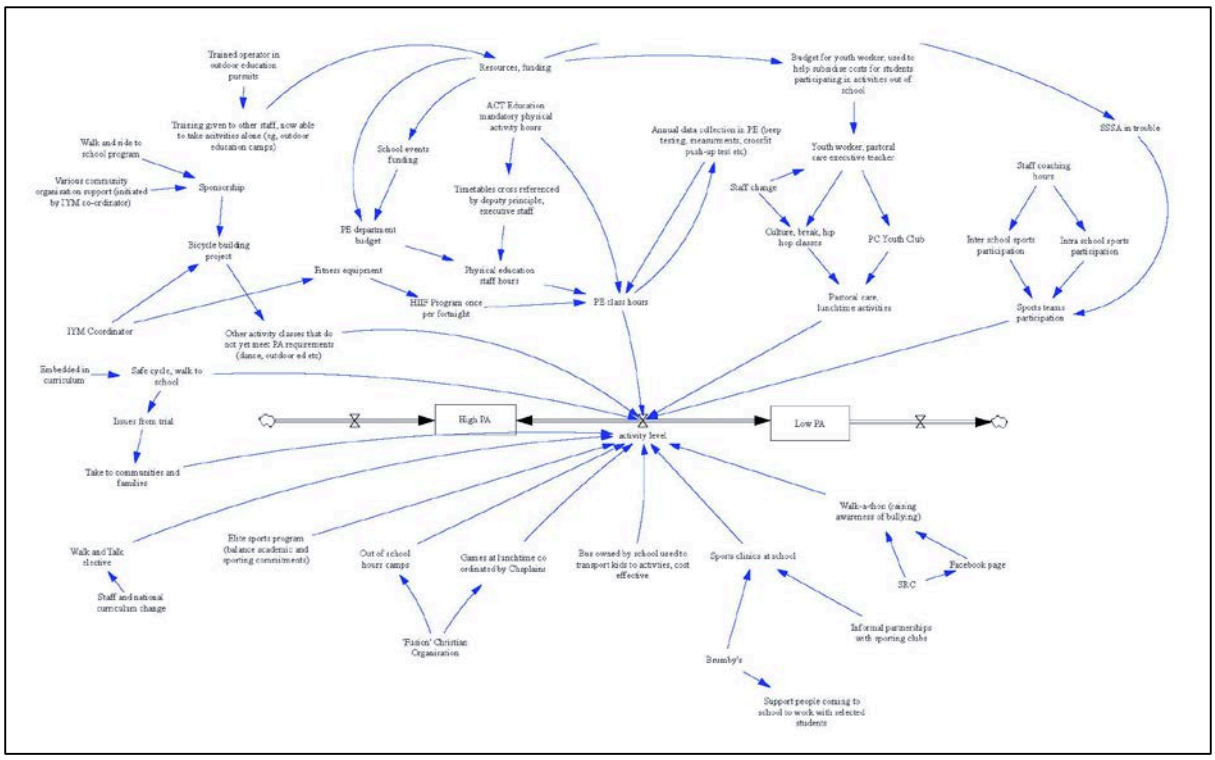


Figure 15: Calwell High School Physical Activity Time 3 (October 2014)

APPENDIX M: ACT-IYM ACTION PLAN OUTLINE AND NUTRITION AND PHYSICAL ACTIVITY RELATED ACTIVITY SUMMARY

Table 10: ACT It's Your Move Action Plan outline.

Objectives	Key strategies
1. To implement and evaluate a comprehensive food@school policy	• Implement Healthy Food@School policy, which aims to provide positive food and drink culture in the school environment • Implement the traffic light system to categorise foods sold at school, based on nutritional value • Access nutrition advisory services through Nutrition Australia
2a. To increase the time adolescents spend in physical activity at school	• Develop physical activity programs and events in school • School physical activity policies (minimum activity involvement etc) • Leadership, student/teacher role models • Promotion of physical activity through school media (PA system announcements, newsletters, notices) • Change school environment to promote physical activity • Increase access to physical activity equipment during school time
2b. To significantly increase the proportion of adolescents living within 30 minutes walking distance who use active transport to and from school	• Develop and implement cycling based programs into school curriculum • Development of cycling events in school • Parent education (cycling safety etc) • Promotion of cycling through school based media, newsletters, assemblies • Peer ambassadors for active travel • Change school environment for promotion of active travel (bike shed, safe route planning etc) • Develop active travel events in school (ride to school day, end of term ride day etc) • Partnership programs (sponsorship, incentives to use active travel etc)
2c. To increase mental well-being through promotion of physical activity and nutrition systems	• School motto development based on mental-well being, physical activity and nutrition • Mental health objectives incorporated into school curriculum • Well-being promotion through school media (assembly presentations, posters, newsletters etc) • Mental well-being focus for school events • Partnership programs (pastoral care, beyond blue etc)

Table 11: Intervention schools nutrition related activity summary.

Category	Description	Number of schools that implemented activity	Objective #
Policies	Developed a food@school policy	3/3	#1
	Collaborated with Nutrition Australia who approved school nutrition system	1/3	#1
	Banned (complete or partial) all unhealthy foods (chocolates, cake stall) sold at schools, including canteen, fundraisers, sports days, food technology, catering etc.	3/3	#1
Programs	Held an after school healthy cooking program for student's families	1/3	#1, #2c
	Held a weekly soup van	1/3	#1, #2c
	Conducted a healthy breakfast program (Fusion breakfast club etc)	3/3	#1
	Developed curriculum to focus on healthy foods	3/3	#1
	Provided nutritious meals to families experiencing difficulties	1/3	#1, #2c
Activities	Formed partnerships that provided healthy foods or nutrition knowledge to the schools (Canberra Milk, Bakers Delight, Yellow Van, Nutrition Australia)	1/3	#1
	Developed agreements with local food outlets regarding restrictions on students purchasing 'red' foods before and during school hours	2/3	#1
	Had student led nutrition activities, reimbursed by ACT IYM (Fruit Friday etc)	1/3	#1
	Held initiatives to encourage staff to demonstrate healthy eating (healthy morning tea provided etc)	1/3	#1
	Included nutritional promotional material in newsletter	3/3	#1
	Involved students in nutritional aspects of canteen (competition reviewing foods, developing menu boards, weekly specials on healthy meal option	1/3	#1
Infrastructure and Equipment	Installed new water fountains	1/3	#1
	Handed out water bottles to students and encouraged to bring to class	1/3	#1
	Implemented a vegetable garden	1/3	#1
	Renovated to improve student's kitchen/cooking space	1/3	#1, #2c
	Improved school canteen space to support healthy eating	2/3	#1
	Introduced green waste bins for food wastage	1/3	#1

Table 12: Intervention schools physical activity related activity summary.

Category	Description	Comments	Objective #
Policies	Implemented physical activity policies	0/3	NA
Programs	Developed curriculum to incorporate more physical activity	3/3	#2a, #2b, #2c
	Conducted lunchtime programs	1/3	#2a
	Conducted before/after school programs	3/3	#2a, #2b, #2c
	Introduced elite sports program to balance academic and sport	1/3	#2b
Activities	Participated in community sports events, specialised sports days (eg, Bridge to Bridge, City to Surf, Relay for Life, staff versus student games, ride your bike to school day)	3/3	#2a, #2b, #2c
Infrastructure and Equipment	Developed and implemented a new physical activity space	2/3	#2a, #2b
	Purchased new physical activity equipment	2/3	#2a, #2b
	Redeveloped locker rooms for students	1/3	#2a
	Redeveloped locker rooms for staff	1/3	#2a

AUSTRALIAN CAPITAL TERRITORY IT'S YOUR MOVE!

ADOLESCENT OBESITY PREVENTION PROJECT

A summary of follow-up findings: Alfred Deakin

Feedback Comparison Secondary Schools

Introduction

The Australian Capital Territory 'It's Your Move!' (ACT IYM) project was a community based intervention to reduce unhealthy weight gain among adolescents through comprehensive school and community based approaches to facilitate healthier lifestyles. The project was based on the successful 'It's Your Move' intervention in Victoria Australia from 2005 to 2008. The ACT IYM was a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventative Health, developed by Deakin University's WHO Collaborating Centre for Obesity Prevention and ACT Health. The project was conducted from 2012—2014 and involved 6 secondary schools (3 intervention, 3 comparison) in Canberra, Australian Capital Territory, Australia. There were 656 students; 296 males and 338 females, who participated in two rounds of data collection. The average age of students at baseline was 13 years at baseline and 15 years at follow-up. This summary report provides feedback on some of the key findings of this important research.

Using a capacity building and whole-of-systems approach, ACT IYM aimed to facilitate healthier nutrition and physical activity systems in schools, to promote healthy weight among adolescents aged 13—17 years. The ACT IYM also aimed to improve the capacity of families, schools and community organisations to sustain the promotion of healthy eating and physical activity. Additionally, Alfred Deakin had the specific objective to increase the time adolescents spend physically active at school.

The interventions and action plans were developed by key stakeholders from intervention schools, in conjunction with researchers from Deakin University and representatives from ACT Government Health Directorate. Interventions were developed as a part of a 2 day workshop, and included developing and implementing a healthy food at school policy, community capacity building within schools and community organisations, social marketing and programs aimed at improving food and increasing physical activity.

This report shows study results for Alfred Deakin, intervention schools and comparison schools combined (receiving no IYM intervention). Intervention data regarding the schools was collected using surveys, height and weight measurements, and interviews conducted with students and key staff members within the schools. The layout of the report follows the objectives of the program with added information about depressive symptomatology and quality of life.

Please note, all figures in this summary are based on unadjusted data and so no statistical interpretations are offered. Findings from detailed statistical analyses will be reported elsewhere. Your schools data was included in the overall intervention data as well as being presented alone.

We hope that you find the feedback informative and useful. Feel free to contact us with your comments or suggestions.

DEAKIN UNIVERSITY: ALFRED DEAKIN FOLLOW-UP SUMMARY REPORT

JUNE, 2014

WELCOME

Dear Principal,

Your school is one of 6 secondary schools that participated in the ACT It's Your Move (ACT IYM) project; a community-based program aimed at improving the health and wellbeing of adolescents in the community. Your school was involved as an intervention school.

This summary report is designed to provide feedback to participating schools on follow-up key findings of this important research. This report contains information relating to students' physical activity and nutrition—both at school and home. It also contains information relating to student perceptions about teacher role modelling and the canteen at your school . We hope you find the feedback informative and useful.

This summary report is tailored to your school's objectives, and presents raw data that has not been statistically manipulated. Therefore no comparisons can be made.

Again, we thank you for your commitment to this important research.

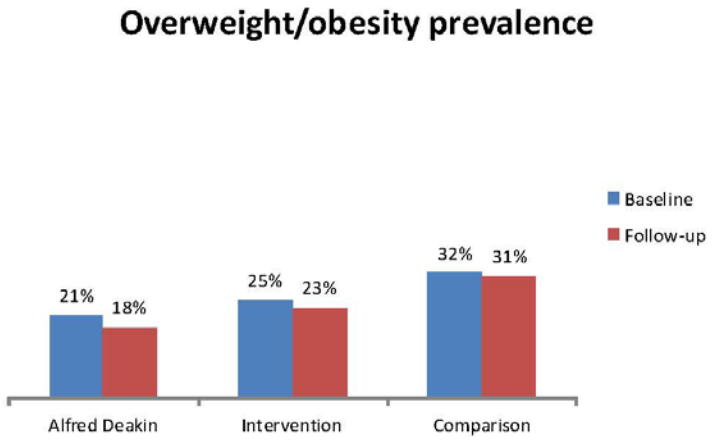
Professor Steve Allender on behalf of the Deakin University Evaluation Team.

ALFRED DEAKIN HIGH SCHOOL ACT-IYM PROJECT OBJECTIVES

Objective 1: to develop, implement & evaluate a comprehensive food@school policy

Objective 2: to increase the time adolescents spend in physical activity at school

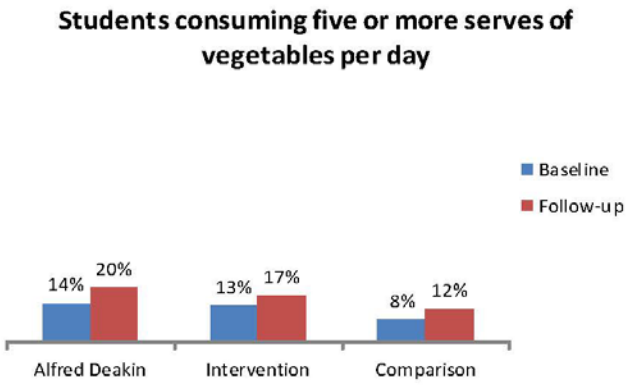
FOLLOW-UP FINDINGS FROM THE ACT-IYM PROJECT



The total prevalence of overweight/obesity for intervention schools at follow-up was 23%. The proportion of overweight/obesity among students in comparison schools was 31% at follow-up. IYM! Intervention schools in Victoria had a 2008 follow-up prevalence of 27% overweight/obesity. Alfred Deakin students at follow-up had a prevalence of 18% overweight/obesity.

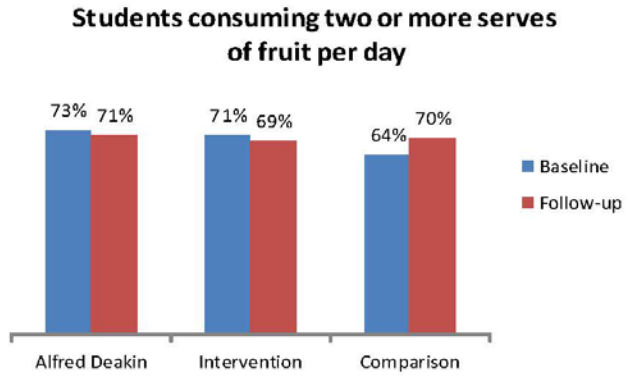
FIGURE 1. PREVELANCE OF OVERWEIGHT AND OBESITY

FOOD AND DRINK



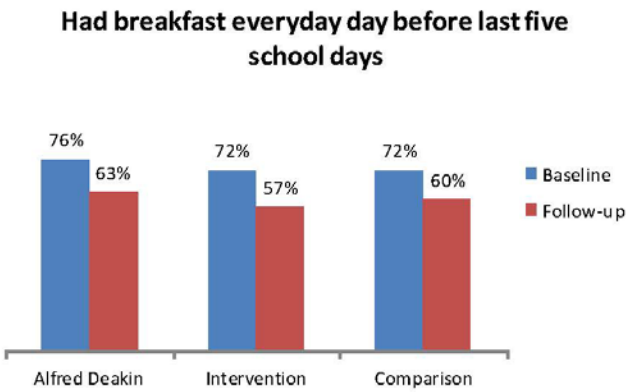
Current Australian guidelines recommend five serves of vegetables per day. Alfred Deakin had 20% of students who ate five or more serves of vegetables per day at follow-up. Intervention schools had a combined average of 17% of students consuming five or more vegetable servings per day

FIGURE 2. 5 OR MORE SERVES OF VEGETABLES PER DAY



Current Australian guidelines recommend two serves of fruit per day. Alfred Deakin had 71% of students who ate 2 or more serves of fruit per day at follow-up. All interventions schools had an average of 69% of students consuming 2 or more serves of fruit per day (see figure 3).

FIGURE 3. 2 OR MORE SERVES OF FRUIT PER DAY



There were 63% of students from Alfred Deakin who consumed breakfast everyday of the last five school days at follow-up. There were 57% of students at all intervention schools combined that consumed breakfast everyday (see figure 4).

FIGURE 4. BREAKFAST

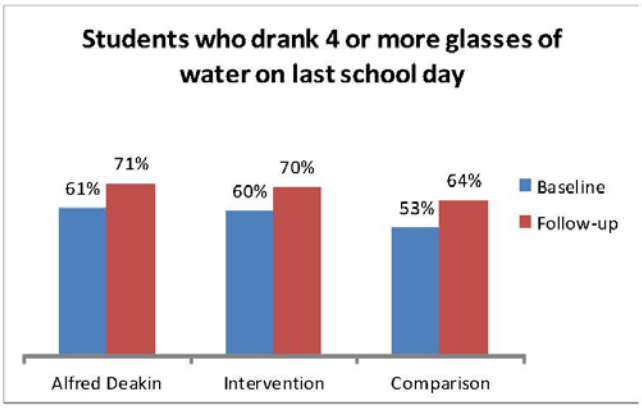


FIGURE 5. WATER

At follow-up, the number of students who drank four or more glasses of water on the last school day was 71%. Intervention schools combined had an average of 70% of students consuming four or more glasses on the last school day, and 64% in control schools (see figure 5).

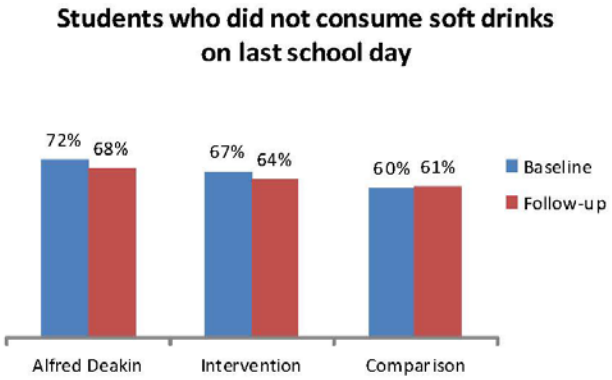


FIGURE 6. NON-DIET SOFT DRINKS

At follow-up, 68% of students at Alfred Deakin did not consume soft drinks on the last school day (see figure 6). For intervention and comparison schools they were 64% and 61% of students who did not consume any soft drinks on the last school day at follow-up.

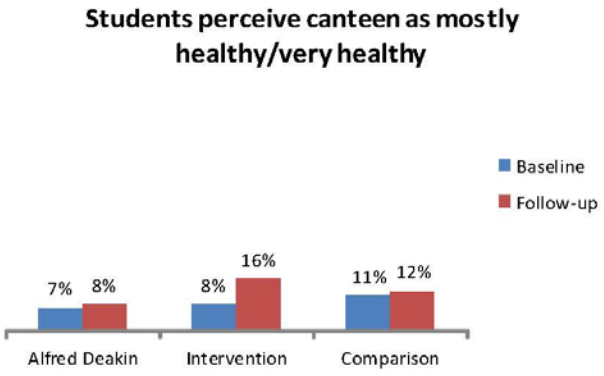
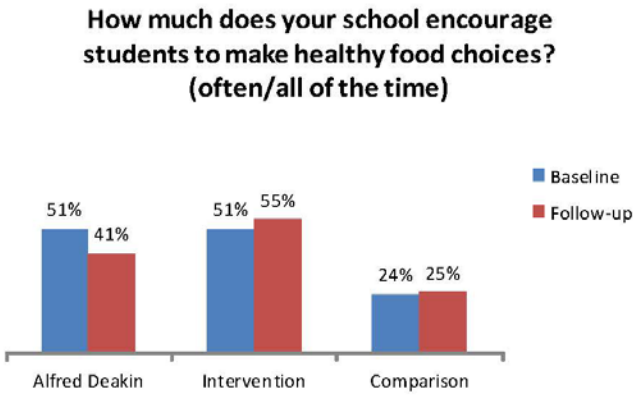


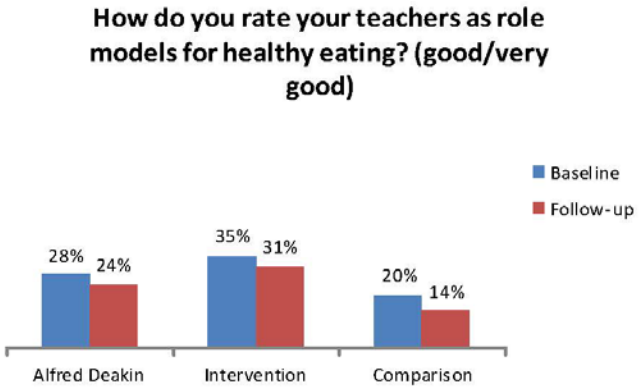
FIGURE 7. STUDENT RATING OF THE CANTEEN

There were 8% of students at Alfred Deakin that perceived food and drink choices at the school canteen as mostly healthy or very healthy at follow-up (see figure 7). In intervention schools combined there were 16% of students who perceived the canteen as mostly healthy or very healthy. In comparison schools this proportion was 12%.



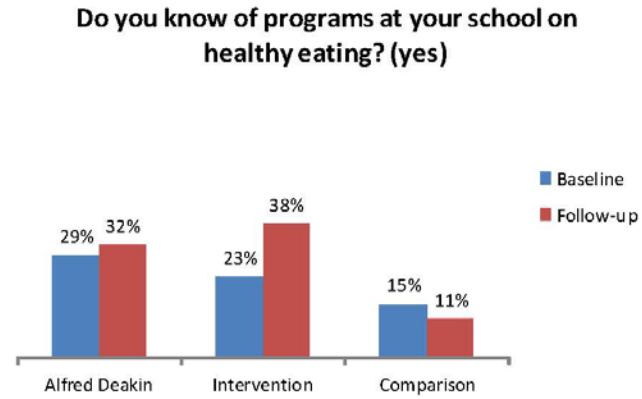
There were 41% of Alfred Deakin students who perceived their school to encourage healthy food choices all of the time or often at follow-up, 55% in intervention schools and 25% in comparison schools (see figure 8).

FIGURE 8. SCHOOL ENCOURAGEMENT OF HEALTHY EATING



There were 24% of Alfred Deakin students who reported the teachers at school as good or very good role models for healthy eating at follow-up (see Figure 9). This proportion was 31% in intervention schools and 14% in comparison schools.

FIGURE 9. TEACHERS AS ROLE MODELS OF HEALTHY



At follow-up, 32% of students at Alfred Deakin knew about programs at school based on healthy eating (see figure 10). There were 38% of students at intervention schools and 11% of students in comparison schools, who knew of programs on healthy eating at follow-up.

FIGURE 10. SCHOOL PROGRAMS ABOUT HEALTHY EATING

PHYSICAL ACTIVITY

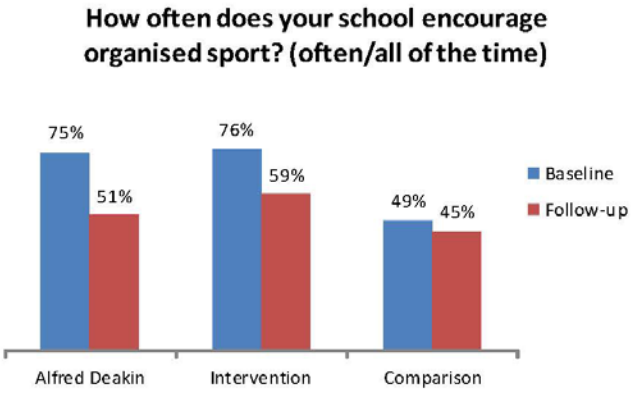


FIGURE 11. SCHOOL ENCOURAGEMENT OF PHYSICAL

Just over half (51%) of students at Alfred Deakin reported that their school encouraged all students to play organised sport often or all of the time at follow-up (see figure 11). The proportion of students who indicated their school encouraged organised sport often/all of the time in intervention schools was 59% and in comparison schools it was 45%.

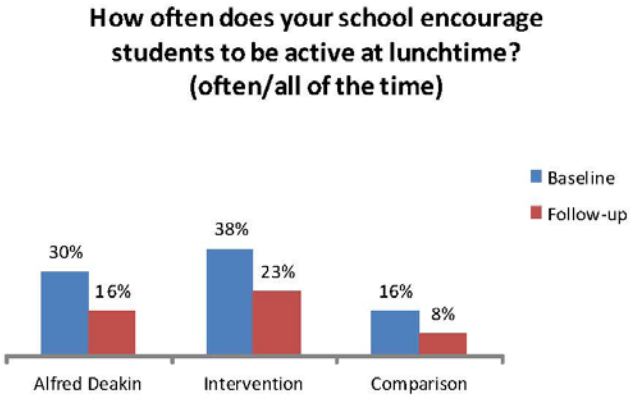


FIGURE 12. SCHOOL ENCOURAGEMENT OF PHYSICAL ACTIVITY AT LUNCHTIME

There were 16% of students at follow-up at Alfred Deakin who reported that their school encouraged all students to be physically active at lunchtime often or all of the time, 23% in intervention schools combined and 8% in comparison schools (see figure 12).

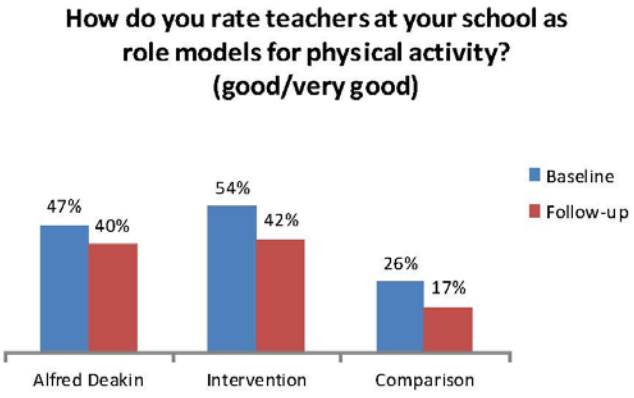
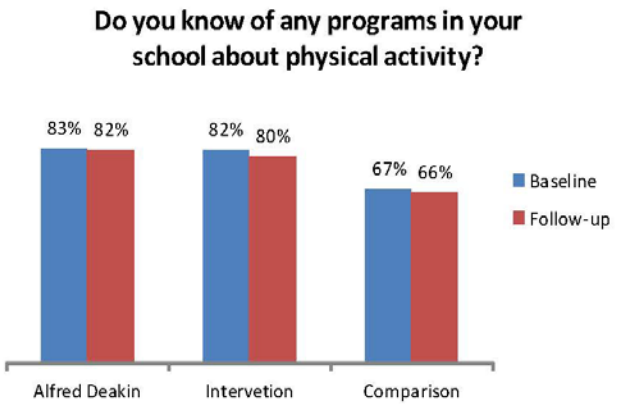


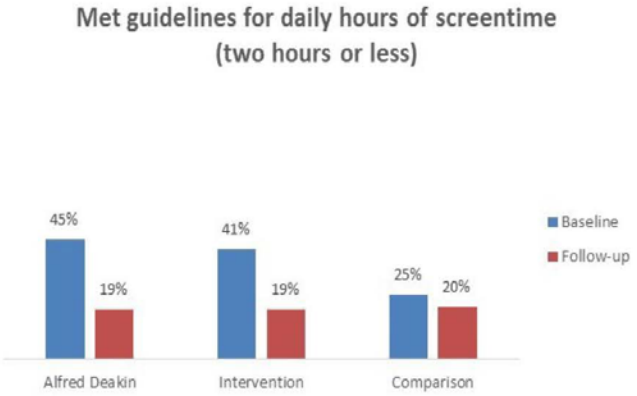
FIGURE 13. TEACHERS AS ROLE MODELS OF PHYSICAL ACTIVITY

There were 40% of students at follow-up at Alfred Deakin who rated their teachers as being very good/good for being physically active, 42% in intervention schools and 17% in comparison (see figure 13).



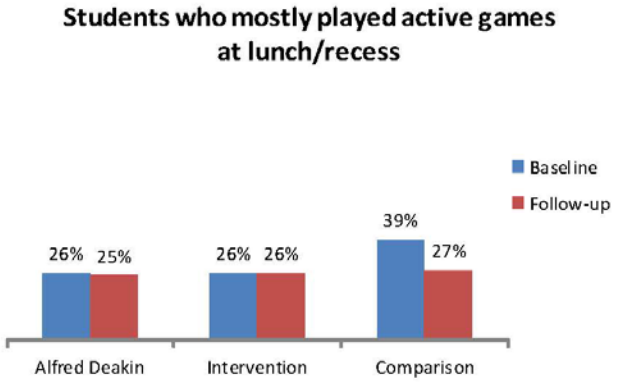
The percentage of students at Alfred Deakin who knew about programs in their school that are about doing more physical activity was 83%. The combined average of students in intervention schools was 80% and 66% in comparison schools (see figure 14).

FIGURE 14. SCHOOL PROGRAMS ABOUT PHYSICAL ACTIVITY



At follow-up 19% of students met guidelines for daily hours of sedentary behaviour (two hours or less per day). There were 19% of students in interventions schools combined and 20% in comparison schools who met these guidelines at follow-up (see figure 15).

FIGURE 15. MET RECOMMENDATIONS FOR DAILY HOURS OF SEDENTARY BEHAVIOUR



There were 25% of students at follow-up attending Alfred Deakin who mostly played active games at recess/ lunchtime (see figure 16). Similar proportions were found in intervention schools combined (26%) and comparison schools (27%).

FIGURE 16. WHAT STUDENTS DID MOST OF THE TIME AT MORNING RECESS & LUNCHTIME

MENTAL HEALTH

The Short Mood and Feelings Questionnaire contains 13 statements relating to mood states, asking participants to indicate how they might have been feeling in the last two weeks. Statements such as 'I felt so tired I just sat around and did nothing' were used. Scores 10 and above indicate depressive symptoms. (see Table 1). Previous studies have reported that 20% of Australian adolescents suffer from depressed mood at any given time.

TABLE 1. SHORT MOOD AND FEELINGS QUESTIONNAIRE

	Baseline (%)	Follow-up (%)
No depressive symptomology	82	77
Depressive symptomology	18	23

TABLE 2. PEDSQL—PEDIATRIC QUALITY OF LIFE

	Baseline (mean)	Follow-up (mean)
Global HRQoL	77	74

The Pediatric Quality of Life (PedsQL) Inventory gives the participant's self-perception of health and well-being in a variety of domains including physical, emotional and social health, and school functioning. A global overall Health Related Quality of Life (HRQoL) score is also reported (see Table 2). Scales are scored 1-100, with 100 being indicating highest Quality of Life. The Victorian IYM study found mean Global HRQoL to be 79.0 (Standard Deviation= ±10.7) in secondary school students.

SUMMARY POINTS

This follow-up data shows that on average:

- The prevalence of overweight/obesity at follow-up among Alfred Deakin students was 18%
- At follow-up, majority (80%) of Alfred Deakin students did not meet recommendations for daily intake of vegetables however a high proportion (71%) of students met recommendations for daily fruit intake
- Water intake for students at follow-up was good, and the proportion of Alfred Deakin students who did not consume any soft drinks on the last school day was also good (68%)
- Student's perception of canteen as mostly/very healthy was low at both baseline and follow-up. A review of the canteen food choices could be beneficial.
- Students perception as teachers as positive role models for healthy eating and physical activity was low
- A high proportion (82%) of Alfred Deakin students know of programs in school about physical activity
- However a high proportion of students (84%) exceeded daily recommendations for screen based behaviour, and a quarter of students reported playing active games at lunchtime and recess.

This program is a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventive Health

These findings represent an emerging picture about the nutrition and physical activity behaviours and environment in your school.

If you have any questions please don't hesitate to contact us.

Contact us: **Deakin University**

The Deakin University Evaluation Team

Deakin University, Waterfront Campus, Geelong

Phone: (03) 5227 8420, Fax: (03) 5227 8376

Email: lynne.millar@deakin.edu.au

WHO Collaborating Centre for Obesity Prevention

AUSTRALIAN CAPITAL TERRITORY IT'S YOUR MOVE!

ADOLESCENT OBESITY PREVENTION PROJECT

A summary of follow-up findings: Calwell High

Introduction

The Australian Capital Territory 'It's Your Move!' (ACT IYM) project was a community based intervention to reduce unhealthy weight gain among adolescents through comprehensive school and community based approaches to facilitate healthier lifestyles. The project was based on the successful 'It's Your Move' intervention in Victoria Australia from 2005 to 2008. The ACT IYM was a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventative Health, developed by Deakin University's WHO Collaborating Centre for Obesity Prevention and ACT Health. The project was conducted from 2012—2014 and involved 6 secondary schools (3 intervention, 3 comparison) in Canberra, Australian Capital Territory, Australia. There were 656 students; 296 males and 338 females, who participated in two rounds of data collection. The average age of students at baseline was 13 years at baseline and 15 years at follow-up. This summary report provides feedback on some of the key findings of this important research.

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The interventions and action plans were developed by key stakeholders from intervention schools, in conjunction with researchers from Deakin University and representatives from ACT Government Health Directorate. Interventions were developed as a part of a 2 day workshop, and included developing and implementing a healthy food at school policy, community capacity building within schools and community organisations, social marketing and programs aimed at improving food and increasing physical activity.

This report shows study results for Calwell High, intervention schools and comparison schools combined (receiving no IYM intervention). Intervention data regarding the schools was collected using surveys, height and weight measurements, and interviews conducted with students and key staff members within the schools. The layout of the report follows the objectives of the program with added information about depressive symptomatology and quality of life.

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We hope that you find the feedback informative and useful. Feel free to contact us with your comments or suggestions.

DEAKIN UNIVERSITY: CALWELL FOLLOW-UP SUMMARY REPORT

JUNE, 2014

WELCOME

Dear Principal,

Your school is one of 6 secondary schools that participated in the ACT It's Your Move (ACT IYM) project; a community-based program aimed at improving the health and wellbeing of adolescents in the community. Your school was involved as an intervention school.

This summary report is designed to provide feedback to participating schools on follow-up key findings of this important research. This report contains information relating to students' physical activity and nutrition—both at school and home. It also contains information relating to student perceptions about teacher role modelling and the canteen at your school . We hope you find the feedback informative and useful.

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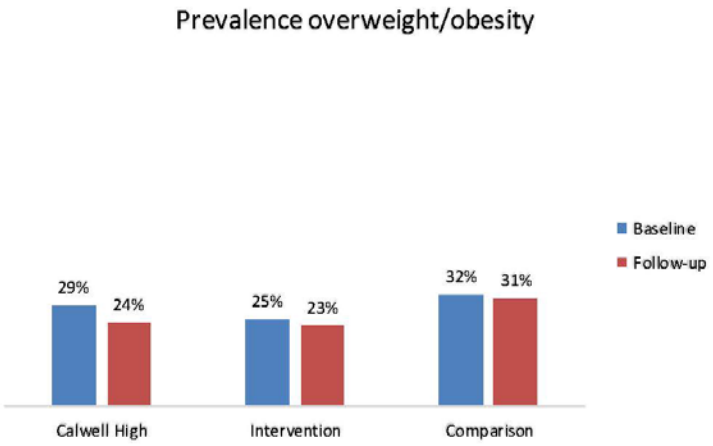
Professor Steve Allender on behalf of the Deakin University Evaluation Team.

CALWELL HIGH SCHOOL ACT-IYM PROJECT OBJECTIVES

Objective 1: to develop, implement & evaluate a comprehensive food@school policy

Objective 2: to increase mental well-being through promotion of physical activity and nutrition systems

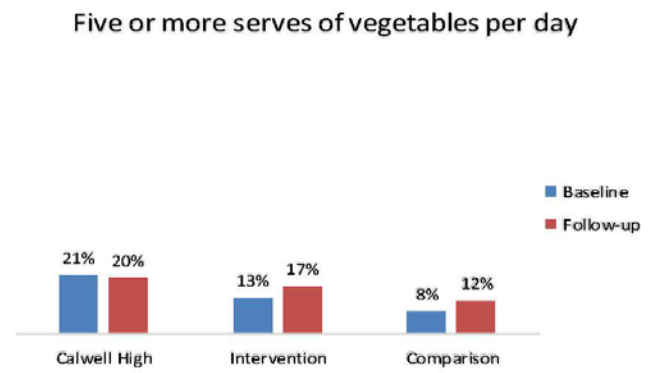
FOLLOW-UP FINDINGS FROM THE ACT-IYM PROJECT



The total prevalence of overweight/obesity for intervention schools at follow-up was 23%. The proportion of overweight/obesity among students in comparison schools was 31% at follow-up. IYM! Intervention schools in Victoria had a 2008 follow-up prevalence of 27% overweight/obesity. Calwell High students at follow-up had a prevalence of 24% overweight/obesity.

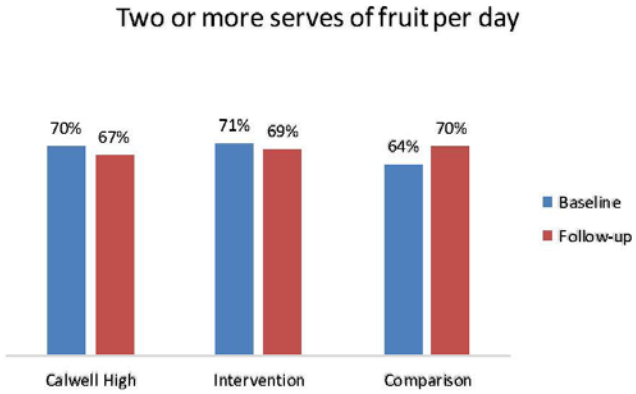
FIGURE 1. PREVELANCE OF OVERWEIGHT AND OBESITY

FOOD AND DRINK



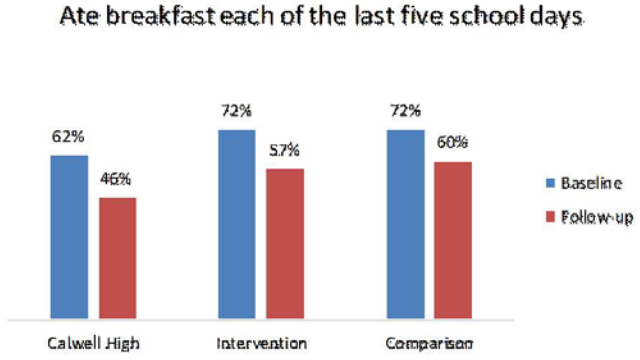
Current Australian guidelines recommend five serves of vegetables per day. Calwell High had 20% of students who ate five or more serves of vegetables per day at follow-up. Intervention schools had a combined average of 17% of students consuming five or more vegetable servings per day

FIGURE 2. 5 OR MORE SERVES OF VEGETABLES PER DAY



Current Australian guidelines recommend two serves of fruit per day. Calwell High had 67% of students who ate 2 or more serves of fruit per day at follow-up. All interventions schools had an average of 69% of students consuming 2 or more serves of fruit per day (see figure 3).

FIGURE 3. 2 OR MORE SERVES OF FRUIT PER DAY



There were 46% of students from Calwell High who consumed breakfast everyday of the last five school days at follow-up. There were 57% of students at all intervention schools combined that consumed breakfast everyday (see figure 4).

FIGURE 4. BREAKFAST

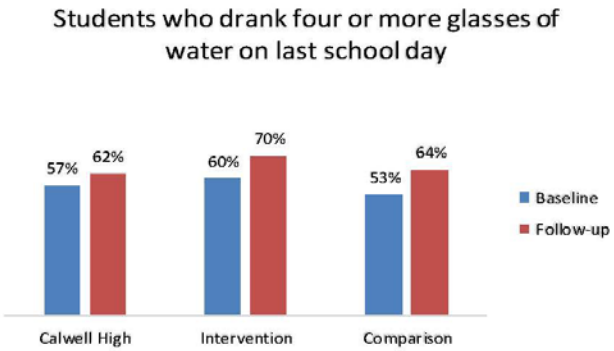


FIGURE 5. WATER

At follow-up, the number of students who drank four or more glasses of water on the last school day was 62%. Intervention schools combined had an average of 70% of students consuming four or more glasses on the last school day, and 64% in control schools (see figure 5).

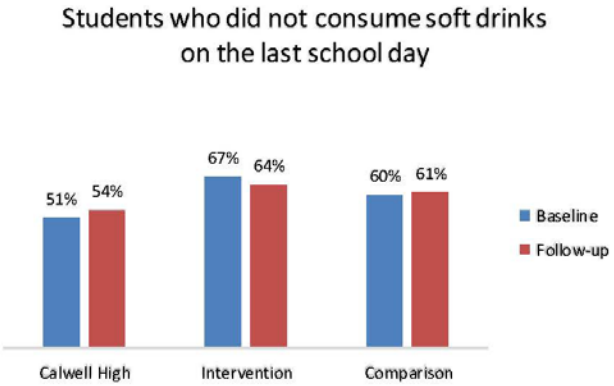


FIGURE 6. NON-DIET SOFT DRINKS

At follow-up, just over half (54%) of students at Calwell High did not consume soft drinks on the last school day (see figure 6). For intervention and comparison schools they were 64% and 61% of students who did not consume any soft drinks on the last school day at follow-up.

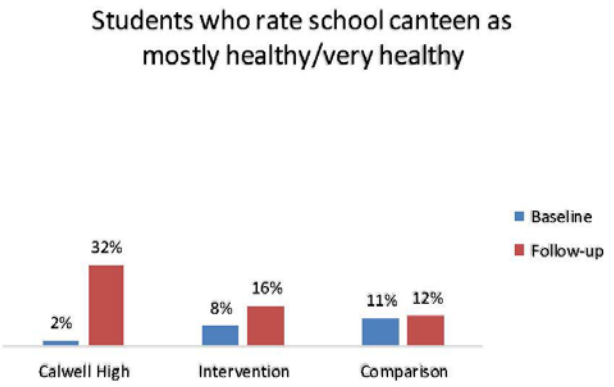
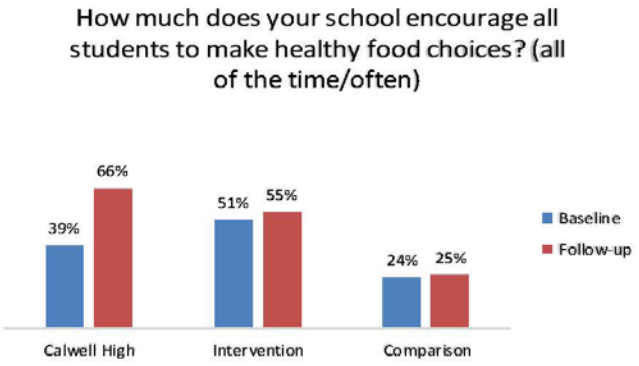


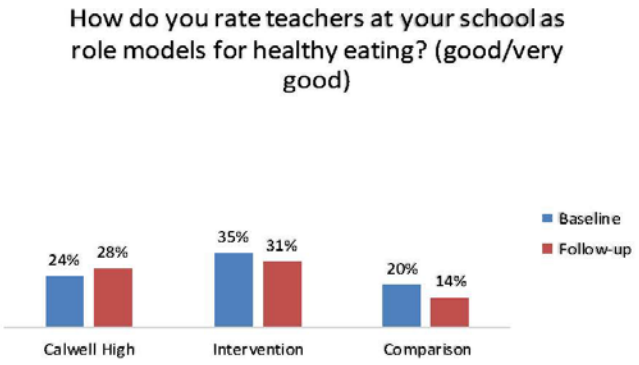
FIGURE 7. STUDENT RATING OF THE CANTEEN

There were 32% of students at Calwell High that perceived food and drink choices at the school canteen as mostly healthy or very healthy at follow-up (see figure 7). In intervention schools combined there were 16% of students who perceived the canteen as mostly healthy or very healthy. In comparison schools this proportion was 12%.



There were 66% of Calwell High students who perceived their school to encourage healthy food choices all of the time or often at follow-up, 55% in intervention schools and 25% in comparison schools (see figure 8).

FIGURE 8. SCHOOL ENCOURAGEMENT OF HEALTHY EATING



There were 28% of Calwell High students who reported the teachers at school as good or very good role models for healthy eating at follow-up (see Figure 9). This proportion was 31% in intervention schools and 14% in comparison schools.

FIGURE 9. TEACHERS AS ROLE MODELS OF HEALTHY

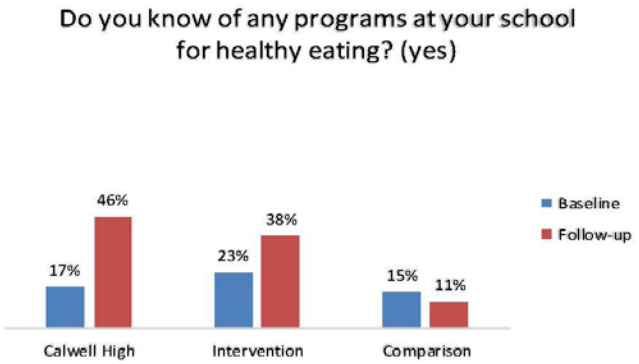


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FIGURE 10. SCHOOL PROGRAMS ABOUT HEALTHY EATING

PHYSICAL ACTIVITY

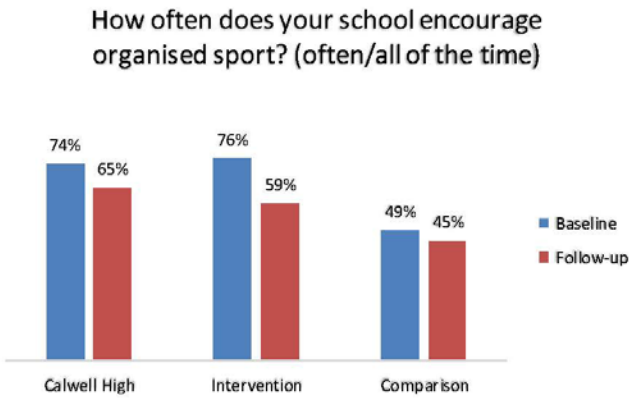

FIGURE 11. SCHOOL ENCOURAGEMENT OF PHYSICAL

There were 65% of students at Calwell High who reported that their school encouraged all students to play organised sport often or all of the time at follow-up (see figure 11). The proportion of students who indicated their school encouraged organised sport often/all of the time in intervention schools was 59% and in comparison schools it was 45%.

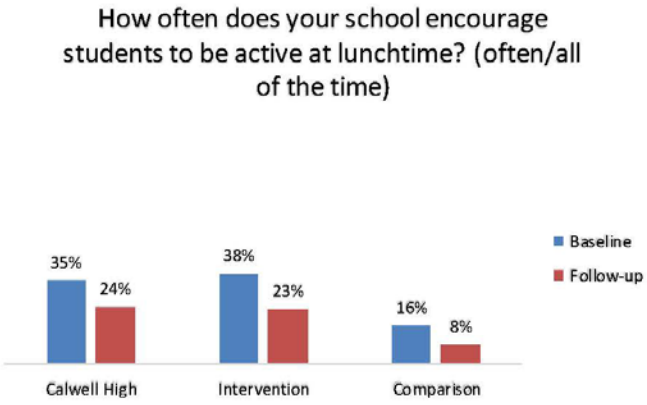

FIGURE 12. SCHOOL ENCOURAGEMENT OF PHYSICAL ACTIVITY AT LUNCHTIME

There were 24% of students at follow-up at Calwell High who reported that their school encouraged all students to be physically active at lunchtime often or all of the time, 23% in intervention schools combined and 8% in comparison schools (see figure 12).

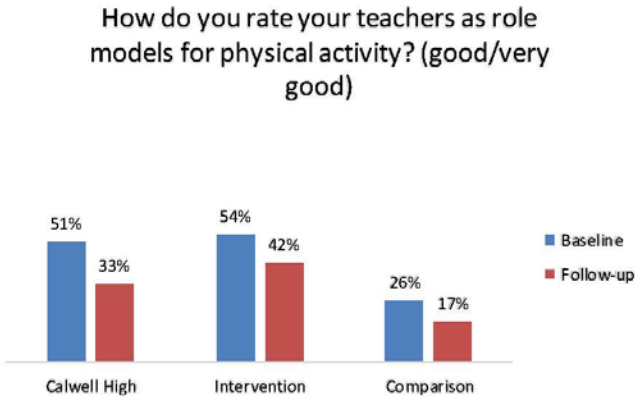

FIGURE 13. TEACHERS AS ROLE MODELS OF PHYSICAL ACTIVITY

There were 33% of students at follow-up at Calwell High who rated their teachers as being very good/good for being physically active, 42% in intervention schools and 17% in comparison (see figure 13).

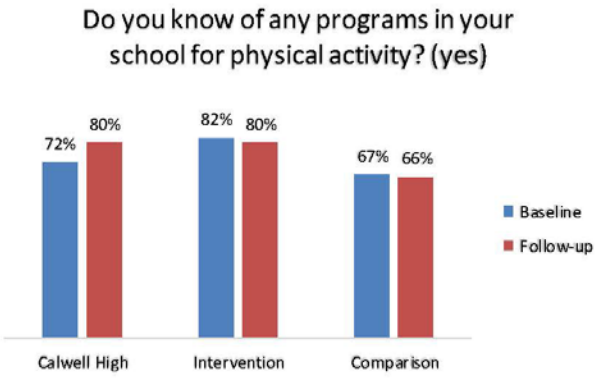

FIGURE 14. SCHOOL PROGRAMS ABOUT PHYSICAL

The percentage of students at Calwell High who knew about programs in their school that are about doing more physical activity was 80%. The combined average of students in intervention schools was 80% and 66% in comparison schools (see figure 14).

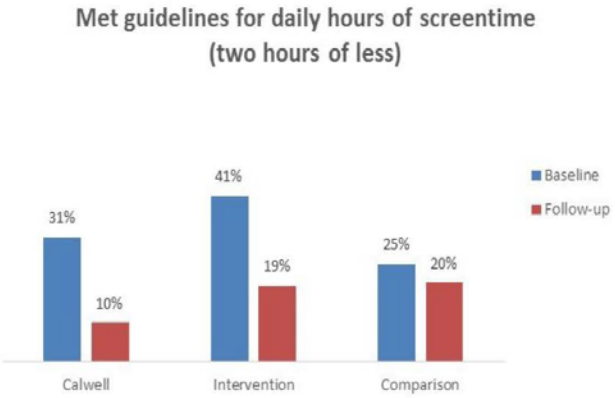

FIGURE 15. MET RECOMMENDATIONS FOR DAILY HOURS OF SCREENTIME

At follow-up 10% of students met guidelines for daily hours of sedentary behaviour (two hours or less per day). There were 19% of students in interventions schools combined and 20% in comparison schools who met these guidelines at follow-up (see figure 15).

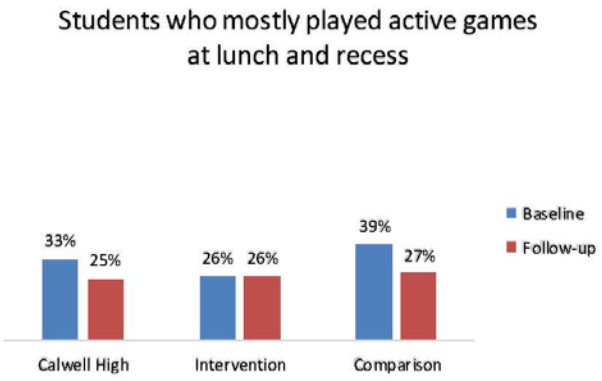

FIGURE 16. PLAYED ACTIVE GAMES AT MORNING RECESS & LUNCHTIME

There were 25% of students at follow-up attending Calwell High who mostly played active games at recess/ lunchtime (see figure 16). Similar proportions were found in intervention schools combined (26%) and comparison schools (27%).

MENTAL HEALTH

The Short Mood and Feelings Questionnaire contains 13 statements relating to mood states, asking participants to indicate how they might have been feeling in the last two weeks. Statements such as 'I felt so tired I just sat around and did nothing' were used. Scores 10 and above indicate depressive symptoms. (see Table 1). Previous studies have reported that 20% of Australian adolescents suffer from depressed mood at any given time.

TABLE 1. SHORT MOOD AND FEELINGS QUESTIONNAIRE

	Baseline (%)	Follow-up (%)
No depressive symptomology	76	77
Depressive symptomology	24	23

TABLE 2. PEDSQL—PEDIATRIC QUALITY OF LIFE

	Baseline (mean)	Follow-up (mean)
Global HRQoL	74	69

The Pediatric Quality of Life (PedsQL) Inventory gives the participant's self-perception of health and well-being in a variety of domains including physical, emotional and social health, and school functioning. A global overall Health Related Quality of Life (HRQoL) score is also reported (see Table 2). Scales are scored 1-100, with 100 being indicating highest Quality of Life. The Victorian IYM study found mean Global HRQoL to be 79.0 (Standard Deviation= ±10.7) in secondary school students.

SUMMARY POINTS

This follow-up data shows that on average:

- The prevalence of overweight/obesity at follow-up among Calwell High students was 24%
- At follow-up, majority (80%) of Calwell High students did not meet recommendations for daily intake of vegetables however a high proportion (67%) of students met recommendations for daily fruit intake
- Water intake for students at follow-up was good, and half (54%) of Calwell High students did not consume any soft drinks on the last school day
- Student's perception of canteen as mostly/very healthy was low at both baseline and follow-up. A review of the canteen food choices could be beneficial.
- Student's perception as teachers as positive role models for healthy eating and physical activity was low
- A high proportion (80%) of Calwell High students know of programs in school about physical activity
- However a high proportion of students (93%) exceeded daily recommendations for screen based behaviour, and a quarter of students reported playing active games at lunchtime and recess.

This program is a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventive Health

These findings represent an emerging picture about the nutrition and physical activity behaviours and environment in your school.

If you have any questions please don't hesitate to contact us.

Contact us: **Deakin University**

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Email: lynne.millar@deakin.edu.au

WHO Collaborating Centre for Obesity Prevention

AUSTRALIAN CAPITAL TERRITORY IT'S YOUR MOVE!

ADOLESCENT OBESITY PREVENTION PROJECT

A summary of follow-up findings: Melrose High

Feedback Comparison Secondary Schools

Introduction

The Australian Capital Territory 'It's Your Move!' (ACT IYM) project was a community based intervention to reduce unhealthy weight gain among adolescents through comprehensive school and community based approaches to facilitate healthier lifestyles. The project was based on the successful 'It's Your Move' intervention in Victoria Australia from 2005 to 2008. The ACT IYM was a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventative Health, developed by Deakin University's WHO Collaborating Centre for Obesity Prevention and ACT Health. The project was conducted from 2012—2014 and involved 6 secondary schools (3 intervention, 3 comparison) in Canberra, Australian Capital Territory, Australia. There were 656 students; 296 males and 338 females, who participated in two rounds of data collection. The average age of students at baseline was 13 years at baseline and 15 years at follow-up. This summary report provides feedback on some of the key findings of this important research.

Using a capacity building and whole-of-systems approach, ACT IYM aimed to facilitate healthier nutrition and physical activity systems in schools, to promote healthy weight among adolescents aged 13—17 years. The ACT IYM also aimed to improve the capacity of families, schools and community organisations to sustain the promotion of healthy eating and physical activity. Additionally, Alfred Deakin had the specific objective to increase the time adolescents spend physically active at school.

The interventions and action plans were developed by key stakeholders from intervention schools, in conjunction with researchers from Deakin University and representatives from ACT Government Health Directorate. Interventions were developed as a part of a 2 day workshop, and included developing and implementing a healthy food at school policy, community capacity building within schools and community organisations, social marketing and programs aimed at improving food and increasing physical activity.

This report shows study results for Melrose High, intervention schools and comparison schools combined (receiving no IYM intervention). Intervention data regarding the schools was collected using surveys, height and weight measurements, and interviews conducted with students and key staff members within the schools. The layout of the report follows the objectives of the program with added information about depressive symptomatology and quality of life.

Please note, all figures in this summary are based on unadjusted data and so no statistical interpretations are offered. Findings from detailed statistical analyses will be reported elsewhere. Your schools data was included in the overall intervention data as well as being presented alone.

We hope that you find the feedback informative and useful. Feel free to contact us with your comments or suggestions.

DEAKIN UNIVERSITY: MELROSE FOLLOW-UP SUMMARY REPORT

JUNE, 2014

WELCOME

Dear Principal,

Your school is one of 6 secondary schools that participated in the ACT It's Your Move (ACT IYM) project; a community-based program aimed at improving the health and wellbeing of adolescents in the community. Your school was involved as an intervention school.

This summary report is designed to provide feedback to participating schools on follow-up key findings of this important research. This report contains information relating to students' physical activity and nutrition—both at school and home. It also contains information relating to student perceptions about teacher role modelling and the canteen at your school . We hope you find the feedback informative and useful.

This summary report is tailored to your school's objectives, and presents raw data that has not been statistically manipulated. Therefore no comparisons can be made.

Again, we thank you for your commitment to this important research.

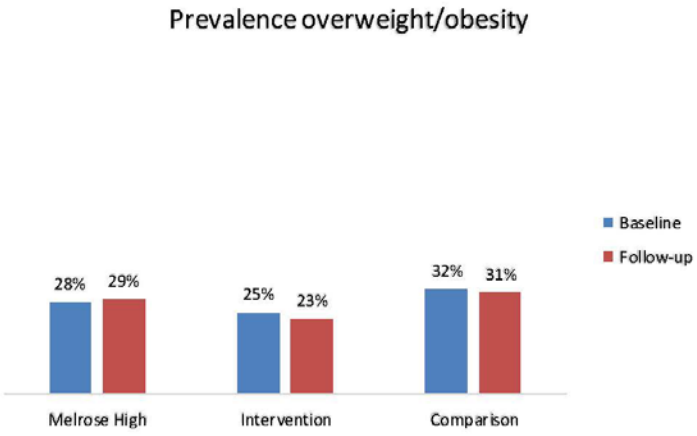
Professor Steve Allender on behalf of the Deakin University Evaluation Team.

MELROSE HIGH SCHOOL ACT-IYM PROJECT OBJECTIVES

Objective 1: to develop, implement & evaluate a comprehensive food@school policy

Objective 2: to significantly increase the proportion of adolescents living within 30 minutes walking distance who use active transport to and from school

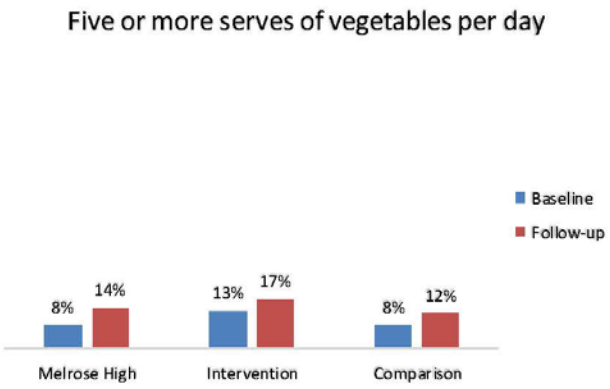
FOLLOW-UP FINDINGS FROM THE ACT-IYM PROJECT



The total prevalence of overweight/obesity for intervention schools at follow-up was 23%. The proportion of overweight/obesity among students in comparison schools was 31% at follow-up. IYM! Intervention schools in Victoria had a 2008 follow-up prevalence of 27% overweight/obesity. Melrose High students at follow-up had a prevalence of 29% overweight/obesity.

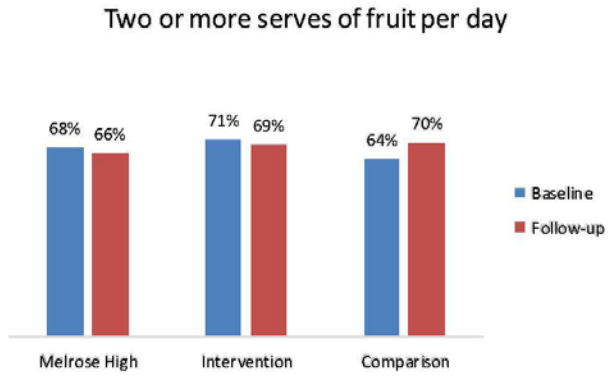
FIGURE 1. PREVELANCE OF OVERWEIGHT AND OBESITY

FOOD AND DRINK



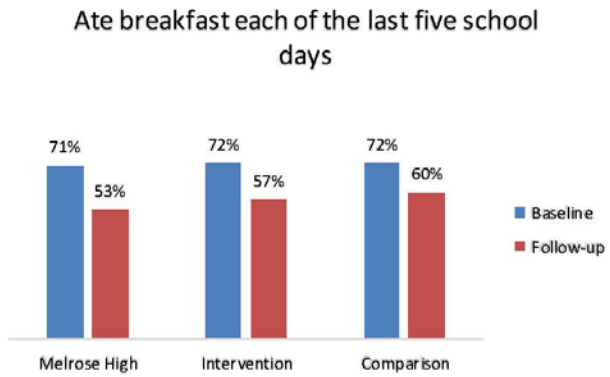
Current Australian guidelines recommend five serves of vegetables per day. Melrose High had 14% of students who ate five or more serves of vegetables per day at follow-up. Intervention schools had a combined average of 17% of students consuming five or more vegetable servings per day

FIGURE 2. 5 OR MORE SERVES OF VEGETABLES PER DAY



Current Australian guidelines recommend two serves of fruit per day. Melrose High had 66% of students who ate 2 or more serves of fruit per day at follow-up. All interventions schools had an average of 69% of students consuming 2 or more serves of fruit per day (see figure 3).

FIGURE 3. 2 OR MORE SERVES OF FRUIT PER DAY



There were 53% of students from Melrose High who consumed breakfast everyday of the last five school days at follow-up. There were 57% of students at all intervention schools combined that consumed breakfast everyday (see figure 4).

FIGURE 4. BREAKFAST

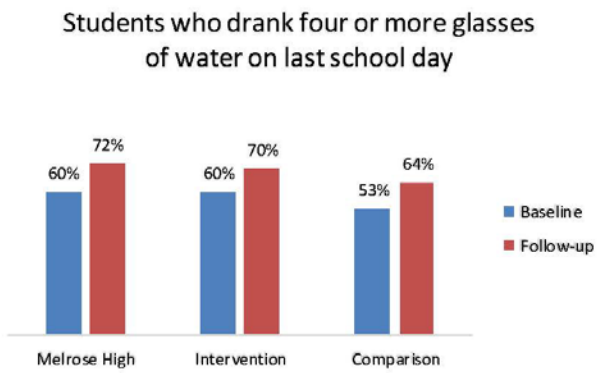


FIGURE 5. WATER

At follow-up, the number of students who drank four or more glasses of water on the last school day was 72%. Intervention schools combined had an average of 70% of students consuming four or more glasses on the last school day, and 64% in control schools (see figure 5).

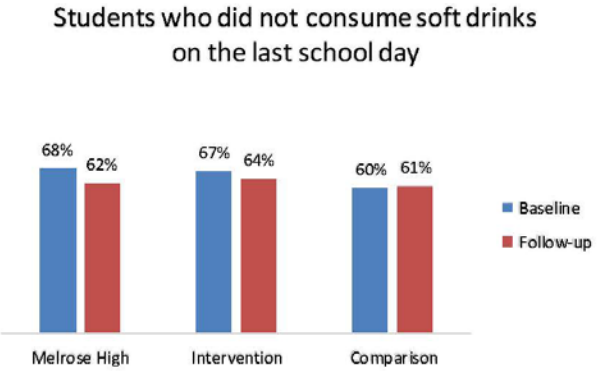


FIGURE 6. NON-DIET SOFT DRINKS

At follow-up, 62% of students at Melrose High did not consume soft drinks on the last school day (see figure 6). For intervention and comparison schools they were 64% and 61% of students who did not consume any soft drinks on the last school day at follow-up.

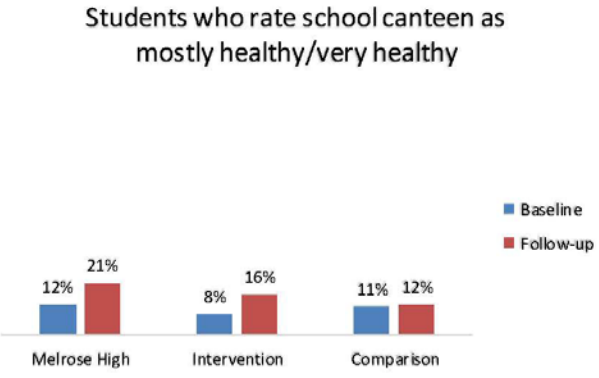
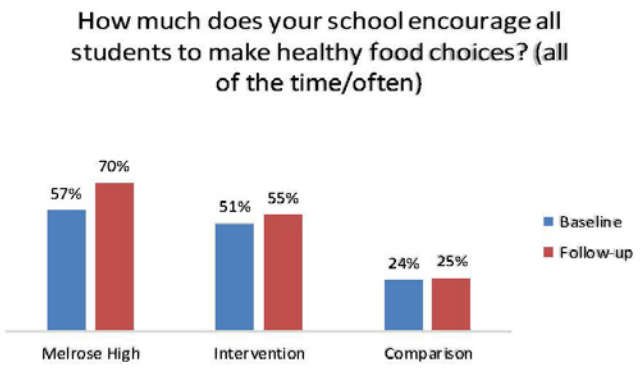


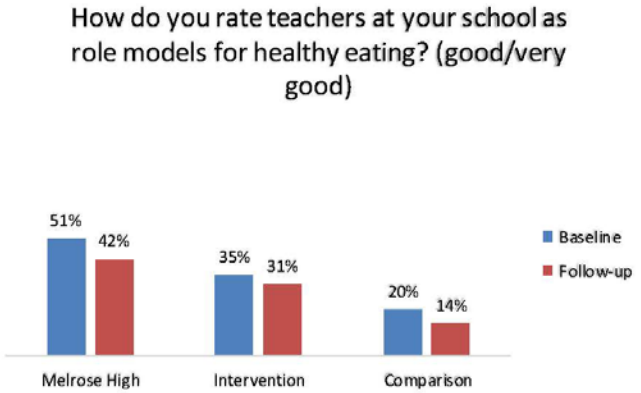
FIGURE 7. STUDENT RATING OF THE CANTEEN

There were 21% of students at Melrose High that perceived food and drink choices at the school canteen as mostly healthy or very healthy at follow-up (see figure 7). In intervention schools combined there were 16% of students who perceived the canteen as mostly healthy or very healthy. In comparison schools this proportion was 12%.



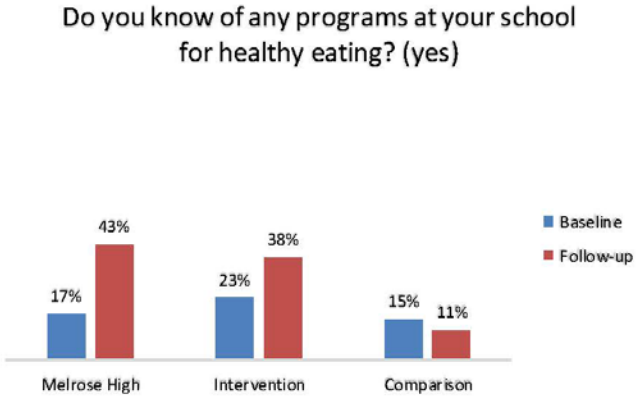
There were 70% of Melrose High students who perceived their school to encourage healthy food choices all of the time or often at follow-up, 55% in intervention schools and 25% in comparison schools (see figure 8).

FIGURE 8. SCHOOL ENCOURAGEMENT OF HEALTHY EATING



There were 42% of Melrose High students who reported the teachers at school as good or very good role models for healthy eating at follow-up (see Figure 9). This proportion was 31% in intervention schools and 14% in comparison schools.

FIGURE 9. TEACHERS AS ROLE MODELS OF HEALTHY



At follow-up, 43% of students at Melrose High knew about programs at school based on healthy eating (see figure 10). There were 38% of students at intervention schools and 11% of students in comparison schools, who knew of programs on healthy eating at follow-up.

FIGURE 10. SCHOOL PROGRAMS ABOUT HEALTHY EATING

PHYSICAL ACTIVITY

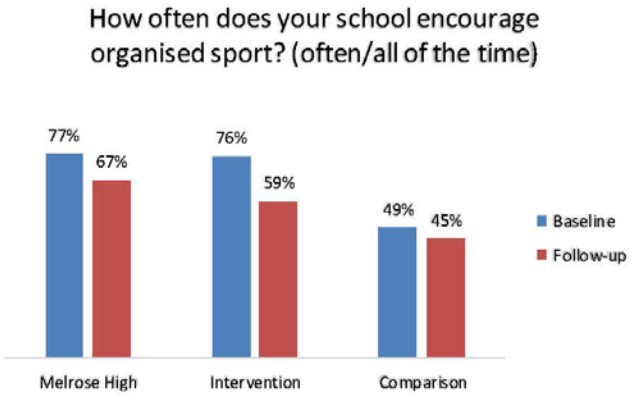


FIGURE 11. SCHOOL ENCOURAGEMENT OF PHYSICAL

There were 67% of students at Melrose High who reported that their school encouraged all students to play organised sport often or all of the time at follow-up (see figure 11). The proportion of students who indicated their school encouraged organised sport often/all of the time in intervention schools was 59% and in comparison schools it was 45%.

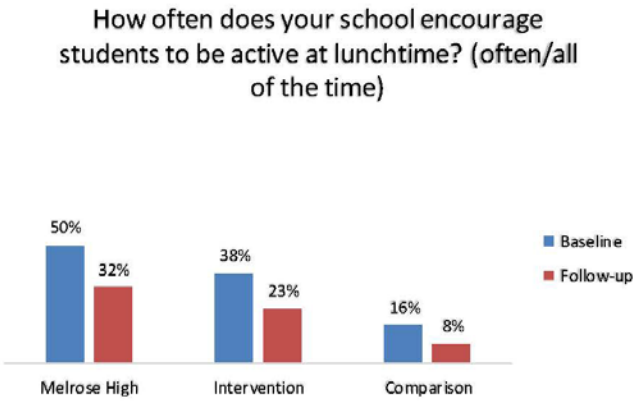


FIGURE 12. SCHOOL ENCOURAGEMENT OF PHYSICAL ACTIVITY AT LUNCHTIME

There were 32% of students at follow-up at Melrose High who reported that their school encouraged all students to be physically active at lunchtime often or all of the time, 23% in intervention schools combined and 8% in comparison schools (see figure 12).

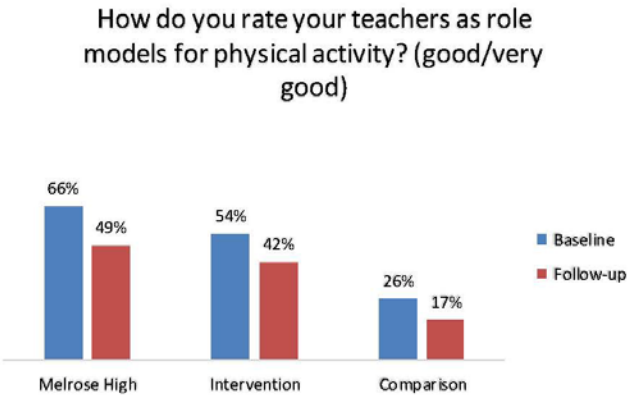
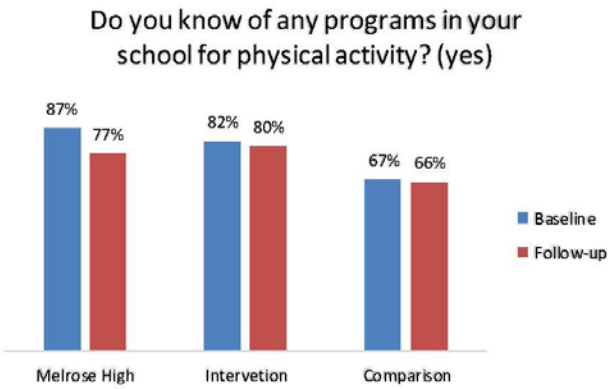


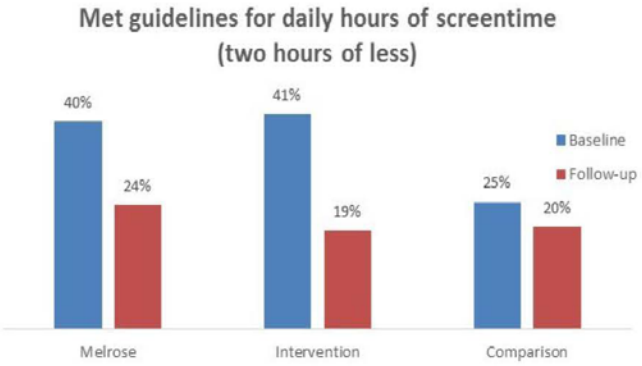
FIGURE 13. TEACHERS AS ROLE MODELS OF PHYSICAL ACTIVITY

There were 49% of students at follow-up at Melrose High who rated their teachers as being very good/good for being physically active, 42% in intervention schools and 17% in comparison (see figure 13).



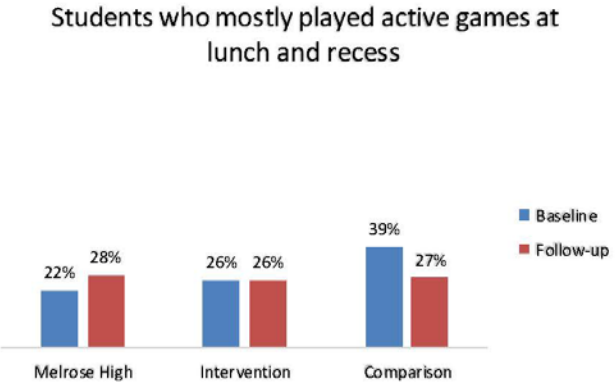
The percentage of students at Melrose High who knew about programs in their school that are about doing more physical activity was 77%. The combined average of students in intervention schools was 80% and 66% in comparison schools (see figure 14).

FIGURE 14. SCHOOL PROGRAMS ABOUT PHYSICAL ACTIVITY



At follow-up 24% of students met the guidelines for daily hours of sedentary behaviour (two hours or less per day). There were 19% of students in interventions schools combined and 20% in comparison schools who met these guidelines at follow-up (see figure 15).

FIGURE 15. MET RECOMMENDATIONS FOR DAILY HOURS OF SEDENTARY BEHAVIOUR



There were 28% of students at follow-up attending Melrose High who mostly played active games at recess/ lunchtime (see figure 16). Similar proportions were found in intervention schools combined (26%) and comparison schools (27%).

FIGURE 16. MOSTLEY PLAYED ACTIVE GAMES AT MORNING RECESS & LUNCHTIME

MENTAL HEALTH

The Short Mood and Feelings Questionnaire contains 13 statements relating to mood states, asking participants to indicate how they might have been feeling in the last two weeks. Statements such as 'I felt so tired I just sat around and did nothing' were used. Scores 10 and above indicate depressive symptoms. (see Table 1). Previous studies have reported that 20% of Australian adolescents suffer from depressed mood at any given time.

TABLE 1. SHORT MOOD AND FEELINGS QUESTIONNAIRE

	Baseline (%)	Follow-up (%)
No depressive symptomology	89	79
Depressive symptomology	11	21

The Pediatric Quality of Life (PedsQL) Inventory gives the participant's self-perception of health and well-being in a variety of domains including physical, emotional and social health, and school functioning. A global overall Health Related Quality of Life (HRQoL) score is also reported (see Table 2). Scales are scored 1-100, with 100 being indicating highest Quality of Life. The Victorian IYM study found mean Global HRQoL to be 79.0 (Standard Deviation= ±10.7) in secondary school students.

TABLE 2. PEDSQL—PEDIATRIC QUALITY OF LIFE

	Baseline (mean)	Follow-up (mean)
Global HRQoL	77	73

SUMMARY POINTS

This follow-up data shows that on average:

- The prevalence of overweight/obesity at follow-up among Melrose High students was 29%
- At follow-up, majority (86%) of Melrose High students did not meet recommendations for daily intake of vegetables however a high proportion (66%) of students met recommendations for daily fruit intake
- Water intake for students at follow-up was good, and the proportion of Melrose High students who did not consume any soft drinks on the last school day was also good (62%)
- Student's perception of canteen as mostly/very healthy was low at both baseline and follow-up. A review of the canteen food choices could be beneficial.
- Approximately half (49%) of Melrose High students perceive teachers as positive role models for physical activity
- A high proportion (77%) of Melrose High students know of programs in school about physical activity
- However a high proportion of students (81%) exceeded daily recommendations for screen based behaviour, and just over a quarter (28%) of students reported playing active games at lunchtime and recess.

This program is a joint Australian, State and Territory Government initiative under the National Partnership Agreement on Preventive Health

These findings represent an emerging picture about the nutrition and physical activity behaviours and environment in your school.

If you have any questions please don't hesitate to contact us.

Contact us: **Deakin University**

The Deakin University Evaluation Team

Deakin University, Waterfront Campus, Geelong

Phone: (03) 5227 8420, Fax: (03) 5227 8376

Email: lynne.millar@deakin.edu.au

WHO Collaborating Centre for Obesity Prevention

APPENDIX Q: SCHOOL ENVIRONMENTAL AUDIT RESULTS TABLE

SCHOOL ENVIRONMENTAL AUDIT QUESTIONNAIRE		
	Intervention Schools	
THE INTERNAL CANTEEN SERVICE	Baseline	Follow-up
Internal canteen (% yes)	100	100
Breakfast program before school (% yes)	66.7	100
Breakfast program before school (days per week)	5	1
Canteen availability – Fruit (% yes)	66.7	100
Canteen availability – Milk full fat (% yes)	100	100
Canteen availability – Milk reduced fat (% yes)	0	33.3
Canteen availability – Yoghurt full fat (% yes)	66.7	66.7
Canteen availability – Yoghurt reduced fat (% yes)	0	100
Canteen availability – Filled rolls/Sandwiches (% yes)	100	100
Canteen availability – Lollies/Chocolate (% yes)	100	100
Canteen availability – Hot chips (% yes)	66.7	66.7
Canteen availability – Crisps (% yes)	100	100
Canteen availability – Pies/Sausage rolls/Pasties (% yes)	66.7	100
Canteen availability – Non-diet soft drinks (% yes)	66.7	0
Canteen availability – Fruit juice (100%) (% yes)	100	100
Canteen availability – Fruit drink (% yes)	100	33.3
Canteen availability – Energy/Sports drinks (% yes)	66.7	66.7
Canteen profit importance (% yes)	100	0
Canteen commercially contracted (% yes)	66.7	66.7
Canteen food preparation space adequacy (adequate to very adequate) M: adeq→v.adeq, A/C: v.adeq→v.inadeq	100	33.3
Canteen provides high nutritional value (agree to strongly agree) M: disagr→s.agr, A: disagr → disagr C: agr→agr	33.3	66.7
Canteen pricing policy to encourage healthy food choices (% yes) M: d.know→yes, A: d.know→ no C: no→no	0	33.3

Canteen promote/advertise healthy food choices (% yes)	66.7	100
How does the canteen promote/advertise healthy food choices		
Canteen menu reviewed regularly (% yes)	100	100
Canteen service reflects classroom food and nutrition messages (% fully) M: part→fully, A: part→ no C: part→part	0	33.3
THE EXTERNAL FOOD SERVICE (one school only had an external food service	Baseline	Follow-up
External canteen (% yes) Calwell only school at baseline	33.3	0
External breakfast program before school (% yes)	33.3	na
Breakfast program before school – days per week	2	na
External food service availability – Fruit (% yes)	100	na
External food service availability – Milk full fat (% yes)	100	na
External food service availability – Milk reduced fat (% yes)	100	na
External food service availability – Yoghurt full fat (% yes)	100	na
External food service availability – Yoghurt reduced fat (% yes)	100	na
External food service availability – Filled rolls/Sandwiches (% yes)	100	na
External food service availability – Lollies/Chocolate (% yes)	100	na
External food service availability – Hot chips (% yes)	100	na
External food service availability – Crisps (% yes)	100	na
External food service availability – Pies/Sausage rolls/Pasties (% yes)	100	na
External food service availability – Non-diet soft drinks (% yes)	100	na
External food service availability – Fruit juice (100%) (% yes)	100	na
External food service availability – Fruit drink (% yes)	100	na
External food service availability – Energy/Sports drinks (% yes)	100	na
External food service provides high nutritional value (% strongly disagree)	100	na
External food service pricing policy to encourage healthy food choices (% don't know)	100	na
External food service promote/advertise healthy food choices (% don't know)	100	na

THE EXTERNAL FOOD SERVICE (one school only had an external food service (continued)	Baseline	Follow-up
External food service menu reviewed regularly (% don't know)	100	na
External food service menu reflects classroom food and nutrition messages (% yes)	100	na
SCHOOL FOOD/NUTRITION POLICY(IES)	Baseline	Follow-up
Have written policy(ies) promoting healthy eating (% yes)	33.3	100
Number of written policy(ies) promoting healthy eating? Baseline - M: don't know but answered, A/C: no baseline information	1	1.5 ± 0.7
Policy includes – What foods are made available (% yes)	0	100
Policy includes – Availability of water (% yes)	100	100
Policy includes – Restricting access to stores and food outlets (% yes)	100	100
Policy includes – Vending machines at school (% yes)	0	100
Policy includes – Food association with fundraising (% yes)	100	100
Policy includes – Food association with special events (e.g. sports days) (% yes)	0	100
Policy includes – Setting aside adequate time for children to eat lunch (% yes)	100	50
Policy includes – The type of food that may be brought from home (% yes)	0	0
Policy includes – Teaching focussing on food and nutrition in the curriculum (% yes)	100	100
Policy includes – Distribution of information to parents about healthy food and eating (% yes)	0	100
Policy includes – Staff acting as role models in the area of healthy eating (% yes)	100	100
Policy includes – Encouraging children to adopt healthy eating behaviours (% yes)	0	100
Policy includes – Operating the school food service not for profit (% yes)	0	100
Policy includes – Using food as a reward (eg chocolate frogs, lollies) (% yes)	100	66.7
Effectiveness of policies on overall healthy eating (% moderate-high)	0	100
Proportion of teachers aware of the nutrition policy(ies) (% most to all)	0	100
Proportion of parents aware of the nutrition policy(ies) (% All or almost all)	0	66.7
Is a copy of the policy(ies) provided to parents (% yes)	0	66.7

THE NUTRITION ENVIRONMENT	Baseline	Follow-up
Rate the level of priority for nutrition at your school (% moderate to good) M: poor→mod, A/C: mod→good	66.7	100
Rate your school's practices and policies for the promotion of healthy eating (% moderate to good) poor→mod, A: poor→good, C: mod→mod	33.3	100
Rate the extent to which teachers at your school act as role models by eating healthy foods (% moderate to good) M: mod→poor, A: mod→mod, C: good→good	100	66.6
Rate the promotion of healthy foods at your school's social/sporting events (% moderate to good) M: v.poor→mod, A: poor→mod, C: mod→good	33.3	100
Rate the level of support for healthy eating provided by parents at your school (% moderate to good) M: poor→poor, A: poor→good, C: poor→mod	0	66.7
How often is information provided to the parents about healthy food and eating M: 0→4, A: 0→8, C: ?→2	0	2-8 times
Does your school have vending machines that serve food (% yes)	0	0
Are more than half of the foods in the vending machines are healthy	na	na
Does your school have vending machines that serve drinks (% yes)	na	0
In the last 12 months have any sporting, social or cultural events been sponsored by soft-drink, fast food or confectionary companies (% yes)	0	0
In the last 12 months have any fundraising events been sponsored by soft-drink, fast food or confectionary companies (% yes)	100	0
How many in the last 12 months have any fundraising events been sponsored by soft-drink, fast food or confectionary companies	3 events	
Are students are allowed to leave the school grounds during the school day (% permitted to leave)	0	0
Are students allowed to drink water in the classroom during class time (% yes)	100	100
Are students allowed to eat in the classroom during class (% yes)	0	66.7
Does your school have a vegetable garden? (% yes)	0	100

PHYSICAL ACTIVITY POLICY (IES)	Baseline	Follow-up
Does your school have a written policy(ies) promoting physical activity (% yes) M: yes→no, A/C: no→yes	33.3	66.7
Number of physical activity policies. M: baseline policy, A/C: follow-up policies.	1	1
Policy includes – Promoting the use of school grounds during 'out of school hours' (% yes)	0	100
Policy includes – Providing access to sports equipment (% yes)	100	100
Policy includes – Promoting cycling/walking to school (% yes)	0	100
Policy includes – Encouraging participation in sports and physical education (% yes)	100	100
Policy includes – Ensuring the use of hats for outside breaks (% yes)	0	0
Policy includes – Teaching focused on physical activity in the curriculum (% yes)	100	100
How effective have the policies been on overall promotion of physical activity – (% moderate to very effective)	100	100
What proportion of teachers do you think are aware of these policies – (% most to all)	100	100
What proportion of parents do you think are aware of these policies – (% most to all)	100	50
Is a copy of the policy(ies) provided to parents (% yes)	0	50
THE PHYSICAL ACTIVITY ENVIRONMENT	Baseline	Follow-up
Legend: M: Melrose High, A: Alfred Deakin, C: Calwell High		
Average time (minutes) devoted to formal physical education classes – Year 7-8 M: 180→210, A: 210→240, C: 120→150	170 ± 46	200 ± 46
Average time (minutes) devoted to formal physical education classes – Year 9-10 M: 180→210, A: 210→240, C: 120→150	170 ± 46	200 ± 46
Average time (minutes) devoted to organised sports – Year 7-8 M: 120→0, A: 210→60, C: 120→120	150 ± 52	60 ± 60
Average time (minutes) devoted to organised sports – Year 9-10 M: 120→0, A: 210→60, C: 120→120	150 ± 52	60 ± 60
How adequate is the area(s) for indoor physical activity at your school (% Adequate – very adequate) M: v.adeq→v.adeq, A: v.adep→v.inadeq, C: v.adeq→adeq	100	66.7
How adequate is the area(s) for outdoor physical activity at your school (% Adequate – very adequate) M: adeq→adeq, A: v.adep→v.inadeq, C: v.adeq→adeq	100	66.7
How adequate is the sporting and active play equipment at your school (% Adequate – very adequate) M: adeq→adeq, A: v.adep→v.inadeq, C: v.adeq→adeq	100	66.7

THE PHYSICAL ACTIVITY ENVIRONMENT (Continued)	Baseline	Follow-up
Rate the level of priority for physical activity at your school (% high - very high) M: mod→high, A: high→v.high, C: high→high	66.7	100
Rate the strength of the link that the school has with community sporting and recreation organisations and facilities (% high - very high) M: mod→high, A: mod→high, C: mod→high	0	100
Rate the Extent to which teachers at your school act as role models by being physically active (% high - very high) M: high→v.high, A: high→v.high, C: v.high→high	100	100
Implementation of student pedestrian safety program (% fully or largely implemented) M: n.impl→p.impl, A: n.impl→n.impl, C: f.impl→n.impl	33.3	0
Implementation of student cyclist safety program (% fully or largely implemented) M: n.impl→f.impl, A: n.impl→n.impl, C: d.know→n.impl	0	33.3
Implementation of student safe houses program (% fully or largely implemented) M: n.impl→d.know, A: n.impl→na, C: d.know→n.impl	0	0
Implementation reduction of traffic congestion outside school program (% fully or largely implemented) M: n.impl→n.impl, A: n.impl→f.impl, C: d.know→n.impl	0	33.3
Implementation of safer road crossing program (% fully or largely implemented) M: p.impl→n.impl, A: n.impl→n.impl, C: f.impl→f.impl	33.3	33.3
Implementation of cycle/scooter storage program (% fully or largely implemented) M: f.impl→f.impl, A: n.impl→f.impl, C: f.impl→f.impl	66.7	100