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**APPLE Schools: Transforming school communities
to benefit disadvantaged children**

What is APPLE Schools?

A Project Promoting healthy Living for Everyone in Schools

- Leverages Comprehensive School Health approach:
 - ✓ Ecologic approach
 - ✓ Population-based intervention
- Targets elementary schools in disadvantaged communities to embed healthy habits around:
 - ✓ Mental wellness, physical activity, healthy eating
- Reaches more than 21,000 students annually in 74 schools across AB, BC, NWT, and MB
- <http://www.appleschools.ca>



100K

youth in
vulnerable
schools

74

Schools
across four
provinces

\$8

ROI for
every \$1
invested

35%

increase in
physical
activity

40%

less likely
to become
obese

Where does APPLE Schools play?

School community ecosystem



School health champion:
a volunteer school staff member,
bridges the gap between APPLE
Schools and the school community



Core Committee:
community stakeholders
act as advisors



School health facilitator:
a person hired by the school district to
support program implementation

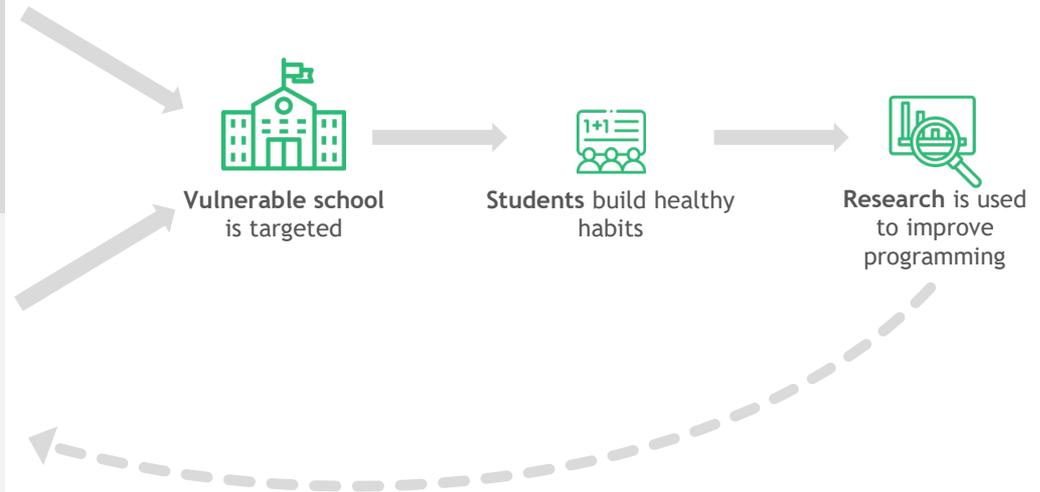
APPLE School ecosystem



School health mentor:
an APPLE Schools employee who
supports program implementation



APPLE Schools programming:
professional learning resources,
funding, ongoing support, etc.



From readiness to maintenance: what goes into building the culture at an APPLE school

	School Readiness	Year 1	Year 2	Year 3	Year 4+ (Maintenance)
School Selection	School is selected by school authority				
School Health Facilitator (SHF)	SHF is hired	SHF in place with a minimum of 0.5 FTE	SHF in place with a minimum of 0.5 FTE	SHF in place with a minimum of 0.2 FTE	Transition to an identified in-school health champion (0 FTE)
Resources	Resources provided to support implementation: i. Professional learning	Resources provided to support implementation: i. Staffing ii. Materials iii. Professional learning iv. Funds for action plan	Resources provided to support implementation: i. Staffing ii. Materials iii. Professional learning iv. Funds for action plan	Resources provided to support implementation: i. Staffing ii. Materials iii. Professional learning iv. Funds for action plan	Resources provided to support implementation: i. Materials ii. Professional learning iii. Funds for action plan
Implementation	Project information shared with community and commitment formalized	Vision and action plan developed by school committee	Action plan assessed and adjusted Policy developed by school committee	Action plan and policy assessed and adjusted	Action plan and policy assessed and adjusted Health goals embedded into school plan
Evaluation	Formal baseline data collected Report provided	Ongoing school assessment	Ongoing school assessment and formal data collected Report provided	Ongoing school assessment	Ongoing school assessment and formal data collected Report provided

Research in APPLE Schools

- Annual or bi-annual surveys
 - ✓ Knowledge, attitude, and self-efficacy
 - ✓ Dietary intake, physical activity, sedentary activity, sleep
 - ✓ Mental health and wellbeing
 - ✓ Step counts, heights and weights

Annual reports to schools with tailored recommendations

- ✓ School-specific action plans

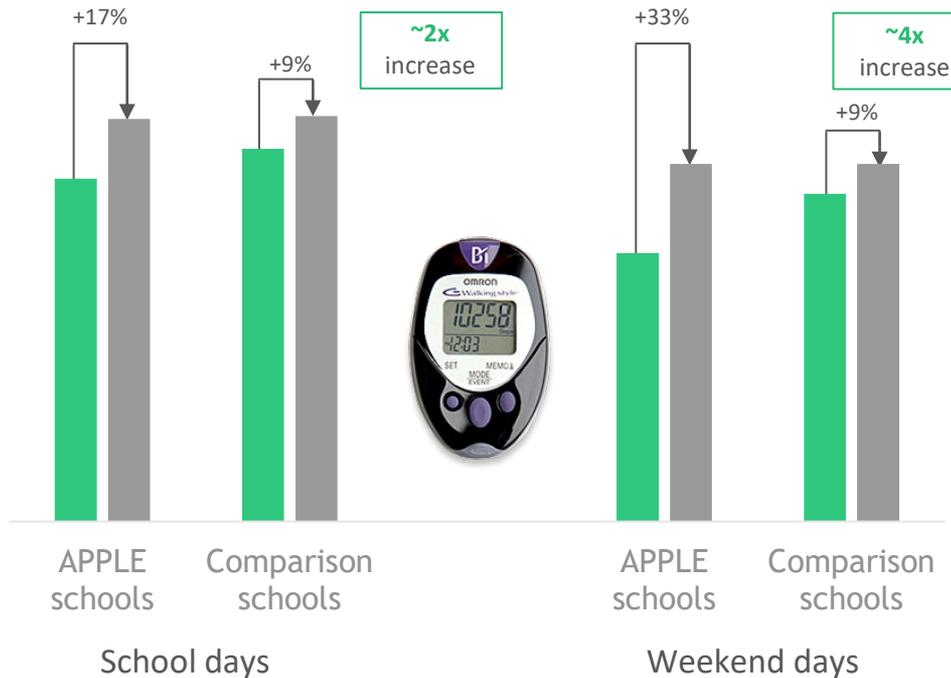
Scientific papers

- ✓ Effectiveness and cost-effectiveness of the program
- ✓ National Cancer Institute: research-tested intervention
- ✓ HundrED organisation: [world's top 100 Education Innovation](#)
- ✓ LEAP | Pecaut Centre for Social Impact #HealthyFutures Scale-a-rator



2-4x increase in physical activity among participating students after intervention compared to non-APPLE school students over same period

Average steps per day taken by participating students at APPLE schools vs students at comparison schools



students attending APPLE schools increased their physical activity almost 2x more than students attending non-APPLE schools



... & they are taking the increased physical activity home with them: among students attending APPLE schools, the increase in physical activity was almost 4x that of non-APPLE schools outside of school days

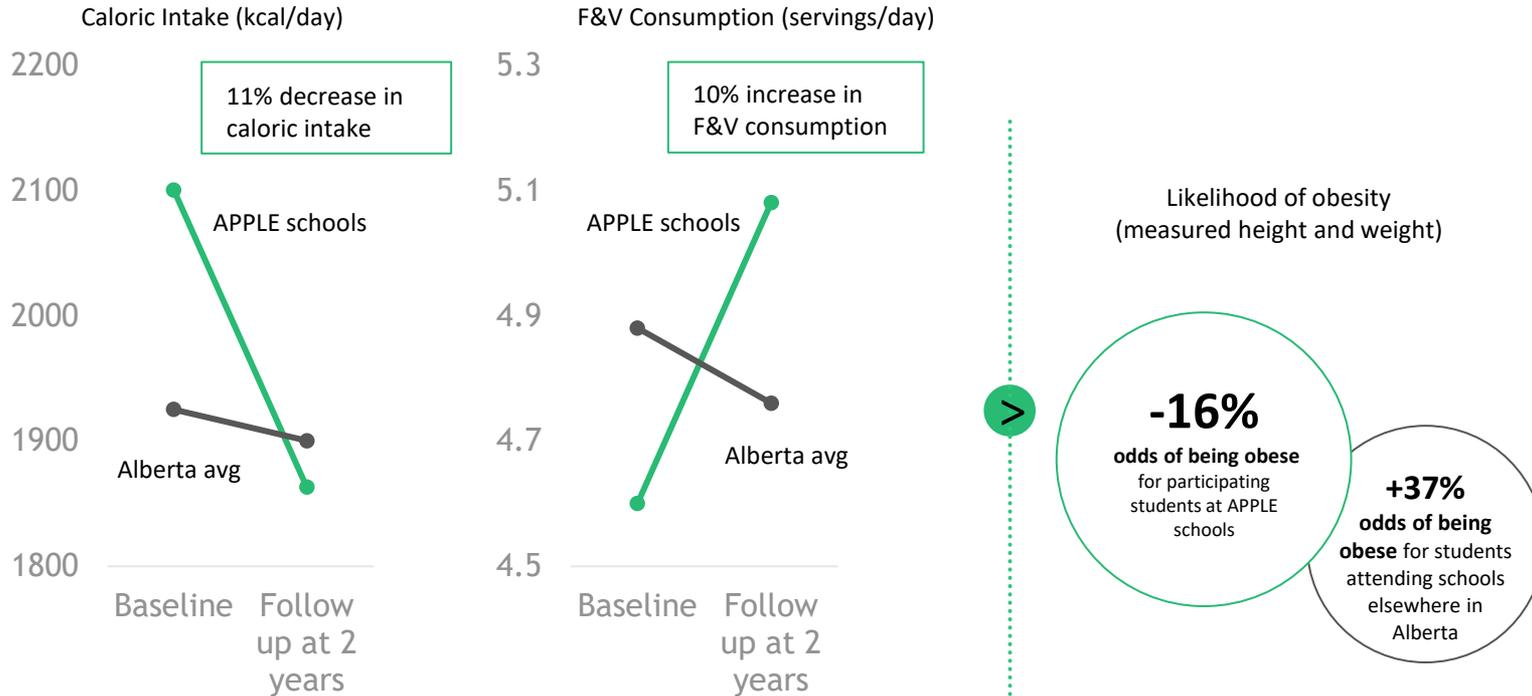
Least active and most disadvantaged students benefit the most

Inequity in physical activity levels (steps/day) by grade five students attending APPLE Schools and comparison schools over a two year interval (2009–2011) of a Comprehensive School Health intervention.

	2009			2011			Group × time effect ^b	95% CI	Change in equity ^c		
	APPLE Schools	Comparison schools	95% CI	Relative inequity ^a	APPLE Schools	Comparison schools				95% CI	Relative inequity ^a
Overall^d	10,827	12,265	-2173; -703	-13.3%	13,168	13,207	-830; 751	-0.3%	1399	485; 2312	+13.0%
Girls & boys^d											
Low-active	7366	8508	-1608; -674	-15.5%	9096	9113	-517; 483	-0.2%	1124	522; 1727	+15.3%
Active	10,489	11,897	-1675; -1139	-13.4%	12,470	12,486	-304; 273	-0.1%	1391	1005; 1778	+13.3%
High-active	14,345	16,509	-3095; -1233	-15.1%	17,399	17,868	-1466; 527	-2.7%	1695	542; 2848	+12.4%
Girls^e											
Low-active	7424	7874	-962; 62	-6.1%	9315	8895	-108; 947	+4.5%	870	139; 1600	+10.6%
Active	9911	11,100	-1503; -876	-12.0%	12,155	11,656	174; 824	+4.1%	1689	1238; 2139	+16.1%
High-active	13,108	15,319	-3170; -1252	-16.9%	15,716	16,268	-1583; 478	-3.5%	1658	329; 2987	+13.4%
Boys^e											
Low-active	7462	9666	-2895; -1513	-29.5%	8946	9657	-1481; 59	-7.9%	1493	498; 2488	+21.6%
Active	11,492	12,836	-1858; -830	-11.7%	13,351	14,125	-1346; -204	-5.8%	569	-133; 1272	+5.9%
High-active	15,655	17,659	-3297; -712	-12.8%	19,178	19,472	-1696; 1108	-1.5%	1710	-88; 3508	+11.3%
Weight status^d											
Excess weight	10,214	11,930	-2788; -643	-16.8%	12,631	12,807	-1418; 1068	-1.4%	1540	-50; 3131	+15.4%
Normal weight	11,159	12,400	-2103; -380	-11.1%	13,531	13,313	-697; 1132	-1.6%	1459	337; 2581	+12.7%
Income^f											
<\$50,000	10,606	11,952	-2984; 292	-12.7%	13,165	11,732	-597; 3463	+10.9%	2779	427; 5131	+23.6%
\$50,001–\$100,000	10,782	12,112	-2530; -131	-12.3%	12,985	13,442	-1921; 1007	-3.5%	873	-991; 2738	+8.8%
>\$100,001	10,994	12,909	-3340; -490	-17.4%	12,709	13,213	-1810; 803	-4.0%	1412	-499; 3323	+13.4%
Education^f											
≤Secondary	10,083	12,168	-3398; -772	-20.7%	13,150	12,737	-1125; 1951	+3.1%	2498	703; 4293	+23.8%
College	10,999	12,212	-2277; -149	-11.0%	12,590	13,840	-2358; -142	-9.9%	-37	-1562; 1488	+1.1%
University or graduate	10,776	12,487	-2955; -468	-15.9%	13,535	12,882	-703; 2011	+4.8%	2365	782; 3948	+20.7%

16% lower odds of being obese after participating in APPLE Schools; increases consumption of fruit and vegetables while reducing calorie intake

Participating students at APPLE schools vs Alberta average



Alberta average for caloric intake decreased by 1% and F&V consumption decreased by 2.5% over the same period (2008-2010).

1. K.A. Vander Ploeg et al. Pediatrics. 2014; 2. C. Fung et al. IJBNPA. 2012; 3. N.N. Ofosu et al. BMC Public Health. 2018

Healthy behaviours acquired while attending an APPLE school are sustained throughout junior high school and high school

Poor dietary habits, low activity levels, and obesity prevalence among APPLE schools students vs comparable schools¹

Before APPLE Schools
Elementary School



APPLE schools Comparison schools

APPLE schools students had poorer dietary habits, lower activity levels, and higher obesity prevalence

After APPLE Schools
Elementary School



APPLE schools Comparison schools

APPLE schools program students showed substantial improvements; similar to students at comparison schools

After APPLE Schools
Junior and High School



APPLE schools Comparison schools

APPLE schools students remained similar to students from comparison schools, with no significant differences found

Broader Benefits: School Performance

- Notable improvement of PAT scores in L.A. and Math (2011-2013)
- Principals reported:
 - ✓ *Increased learning outcomes*
 - ✓ *Reduced incidences of behaviour*
 - ✓ *Increased engagement*

Low diet quality:	reference
Middle group:	18% less failure
Best diet quality:	30% less failure



Lifestyle Habits and Academic Achievement

Meeting recommendations for 9 health behaviours

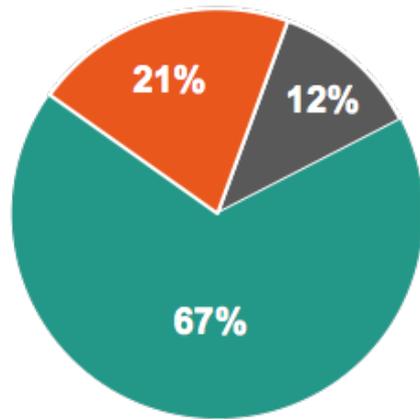


Grade 6 test scores for Math and L.A.
“Meeting Expectations”

- Meeting *more recommendations* was associated with *higher* test scores for Math and L.A.
- Children who met **7-9** lifestyle recommendations were **1.5** and **3** times more likely to meet expectations for Math and L.A. compared to those who met 0-3 recommendations.
- Body weight status was not associated with academic achievement.

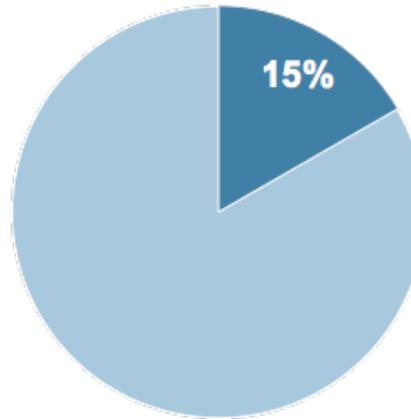
Lifestyle Habits and Mental Health

% meeting lifestyle recommendations



■ 1 to 3 ■ 4 to 6 ■ 7 to 9

% with a mental health diagnosis



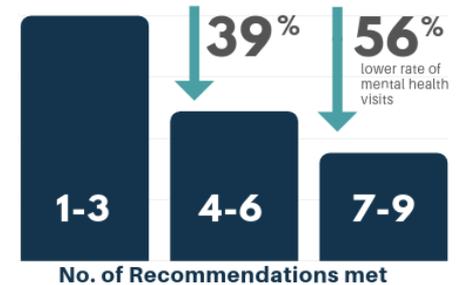
■ with a mental health diagnosis
■ no diagnosis



On average
Children met **5.3/9**
recommendations

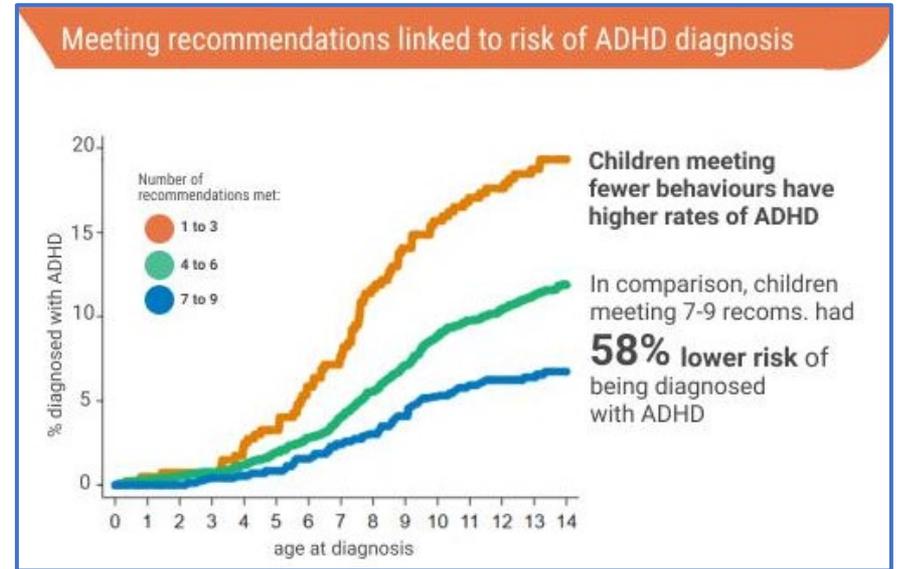
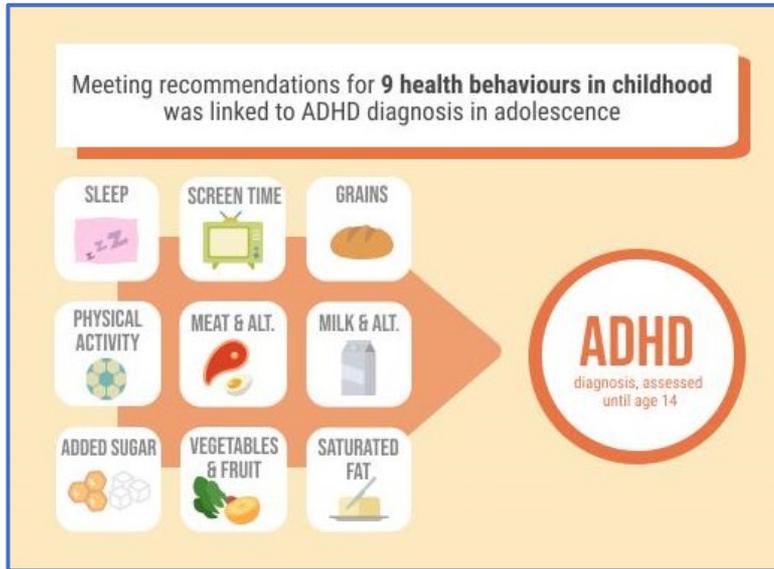
15% of the sample had
a mental illness

Meeting *more recommendations*
was associated with *lower rates* of
mental health visits.



15% reduction in rate of physician visits
for mental health with *every*
additional recommendation met

Lifestyle Habits and ADHD



Cost Effectiveness & Return on Investment

OF SCHOOL-BASED HEALTH PROMOTION PROGRAMS

Schools are the opportune environment for health promotion and chronic disease prevention programs as they are where children spend most of their time

But are school-based health promotion programs:
Feasible? Acceptable? Sustainable? Effective? Cost-effective?
We sought to answer this in 3 steps:

1

Workshop

Met with 45 key education and health stakeholders to identify what programs are feasible, acceptable, and sustainable. *8 intervention types were identified.*

- Comprehensive School Health (CSH)
- Modification of school nutrition policy
- Universal school food program
- Increased health food availability
- Modification of existing PE classes
- Promotion of activity outside PE class
- Changing food/drinks sold or served
- Multicomponent interventions

2

Systematic Review

Literature review conducted to assess which types of programs are most effective. *3 types were identified as the most effective.*

- Comprehensive School Health: holistic approach to promoting healthy eating and active living through changes to the school culture and environment
- Physical education: modification of existing physical education classes delivered by specialists
- Multicomponent: combination of programs identified by stakeholders

3

New Estimation Methods

An approach that considered program effects on vegetable and fruit intake, physical activity and body weight. *CSH was identified as most-effective*

An example of a CSH program is the APPLE Schools program



How does the Return on Investment stack up for APPLE Schools?

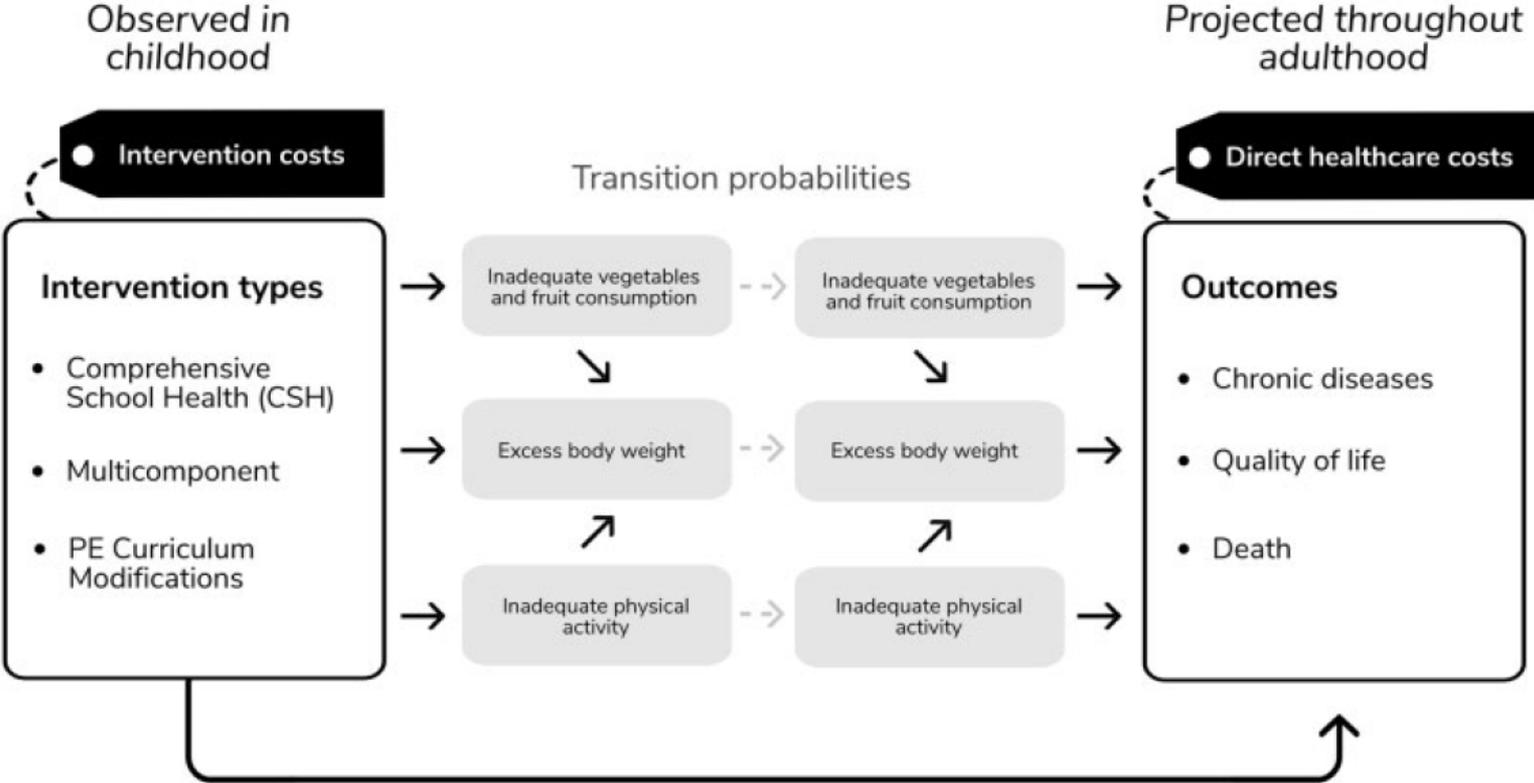


For every \$1 spent on the program, \$3.20 in future health care costs will be avoided...

...when also considering costs associated with productivity loss and premature death, every \$1 spent will save \$8.60 in future costs!



Cost-effectiveness and Return on Investment



Cost-effectiveness and Return on Investment

Total intervention cost per student (in 2016 value)	Intervention type	Cost savings	95% CI ^a	ROI ^b
CA\$20	Comprehensive School Health approach	824	662 to 881	4120%
	Multicomponent interventions	465	370 to 590	2326%
	Modifications of the existing PE ^c curriculum	484	373 to 589	2419%
CA\$30	Comprehensive School Health approach	824	662 to 881	2747%
	Multicomponent interventions	465	370 to 590	1551%
	Modifications of the existing PE curriculum	484	373 to 589	1612%
CA\$50	Comprehensive School Health approach	824	662 to 881	1648%
	Multicomponent interventions	465	370 to 590	931%
	Modifications of the existing PE curriculum	484	373 to 589	967%
CA\$100	Comprehensive School Health approach	824	662 to 881	824%
	Multicomponent interventions	465	370 to 590	465%
	Modifications of the existing PE curriculum	484	373 to 589	484%
CA\$200	Comprehensive School Health approach	824	662 to 881	412%
	Multicomponent interventions	465	370 to 590	233%
	Modifications of the existing PE curriculum	484	373 to 589	242%
CA\$300	Comprehensive School Health approach	824	662 to 881	275%
	Multicomponent interventions	465	370 to 590	155%
	Modifications of the existing PE curriculum	484	373 to 589	161%
CA\$400	Comprehensive School Health approach	824	662 to 881	206%
	Multicomponent interventions	465	370 to 590	116%
	Modifications of the existing PE curriculum	484	373 to 589	121%
CA\$500	Comprehensive School Health approach	824	662 to 881	165%
	Multicomponent interventions	465	370 to 590	93%
	Modifications of the existing PE curriculum	484	373 to 589	97%

The estimates are based on a 1.5% discounting rate.

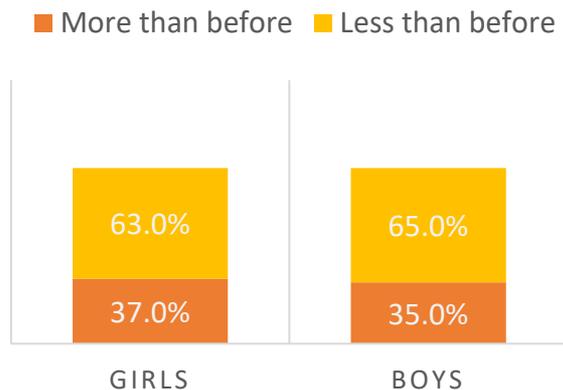
What did children say in semi-structured interviews?

I felt like I was going to lose my mind [...] it felt like the same thing every day. For a long time.

Sometimes I feel like so anxious about wanting to see my friends, I literally want to jump through the window and run to school...

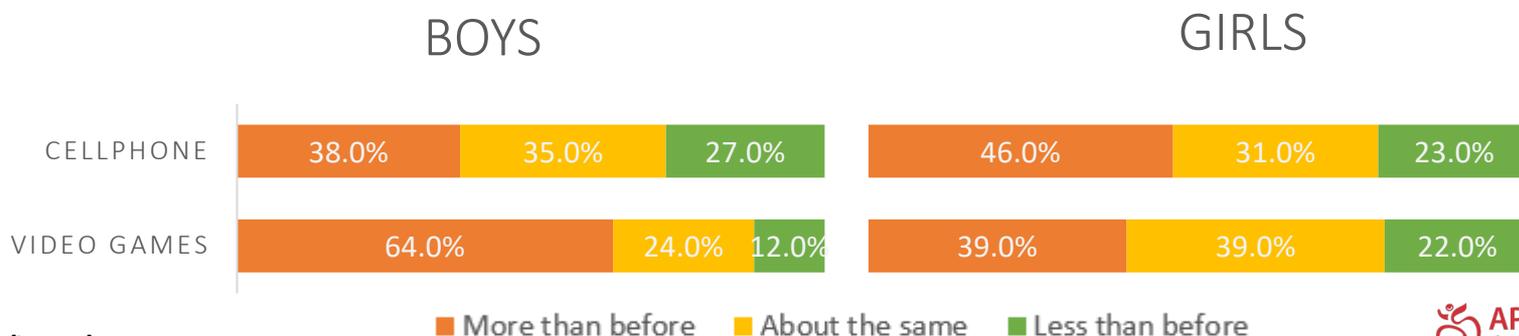
PA and SB in 2020, including the lockdown period

Physical activities



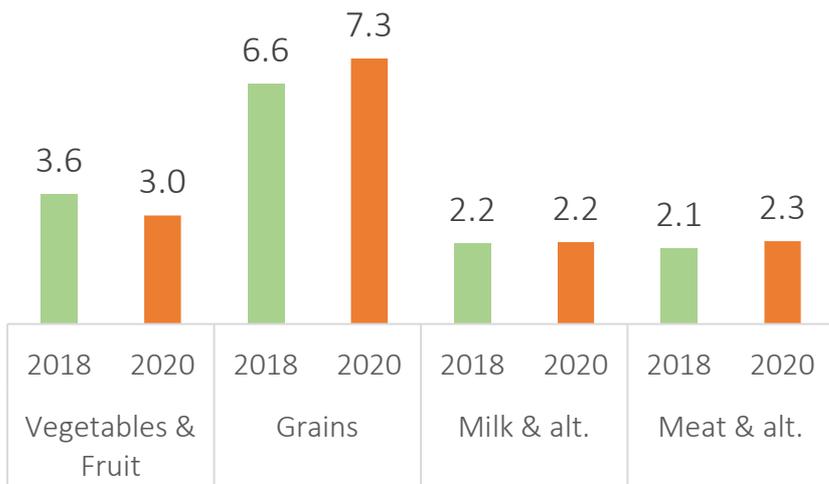
- **Less PA** in 2020 vs 2018: PAQ-C 2.21 (2018) vs 2.11 (2020)
- Most of the girls and boys reported **decreased physical activity** during the lockdown
- Boys played **video games** more often (64%)
- Girls reported spending more time on **cellphones** (46%)

Sedentary behaviours



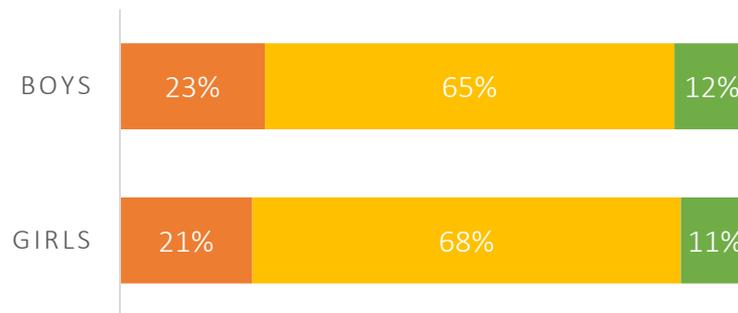
Diet and eating habits

NUMBER OF SERVINGS/DAY

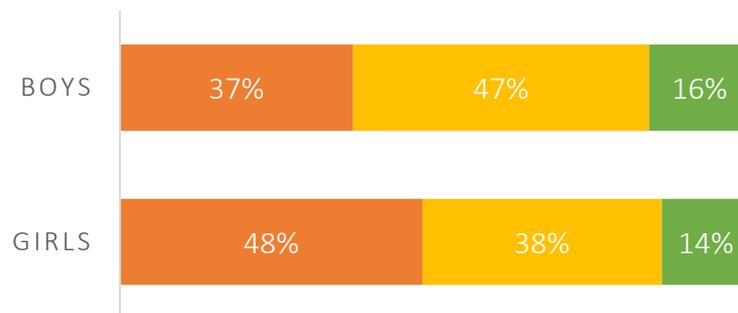


- **Fewer** vegetables & fruit and **more** grains in 2020
- ↑ snacking during the lockdown

NUMBER OF MEALS



NUMBER OF SNACKS

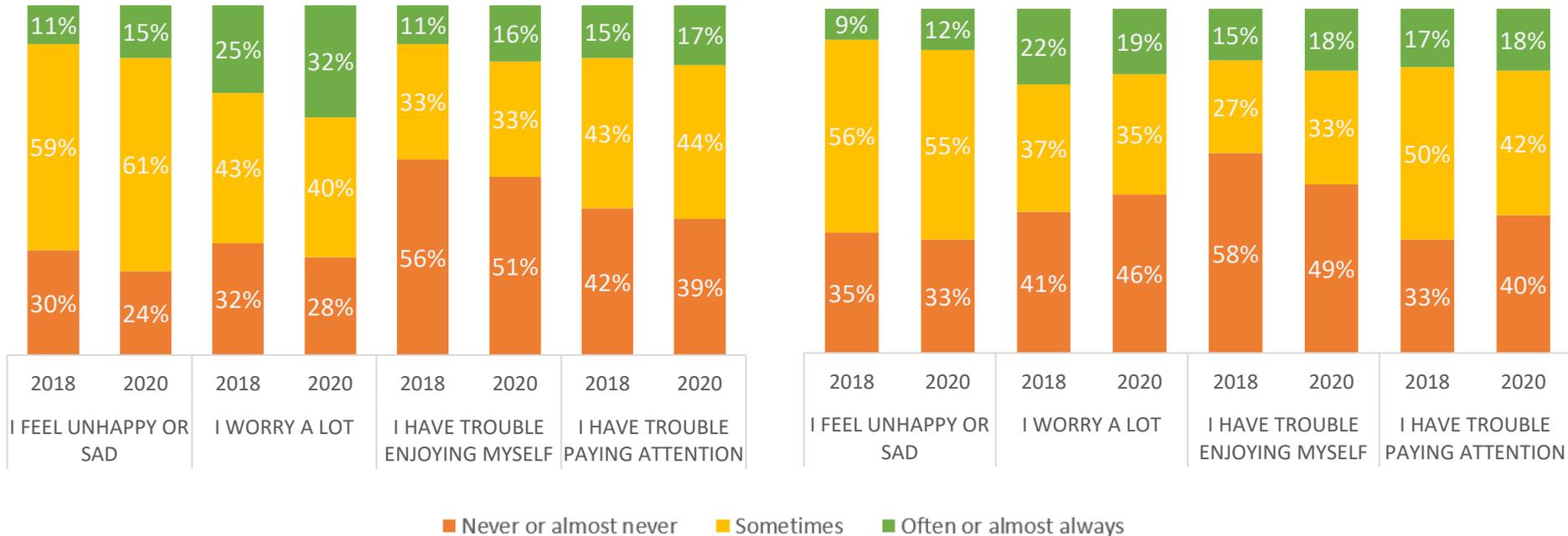


More than before About the same Less than before

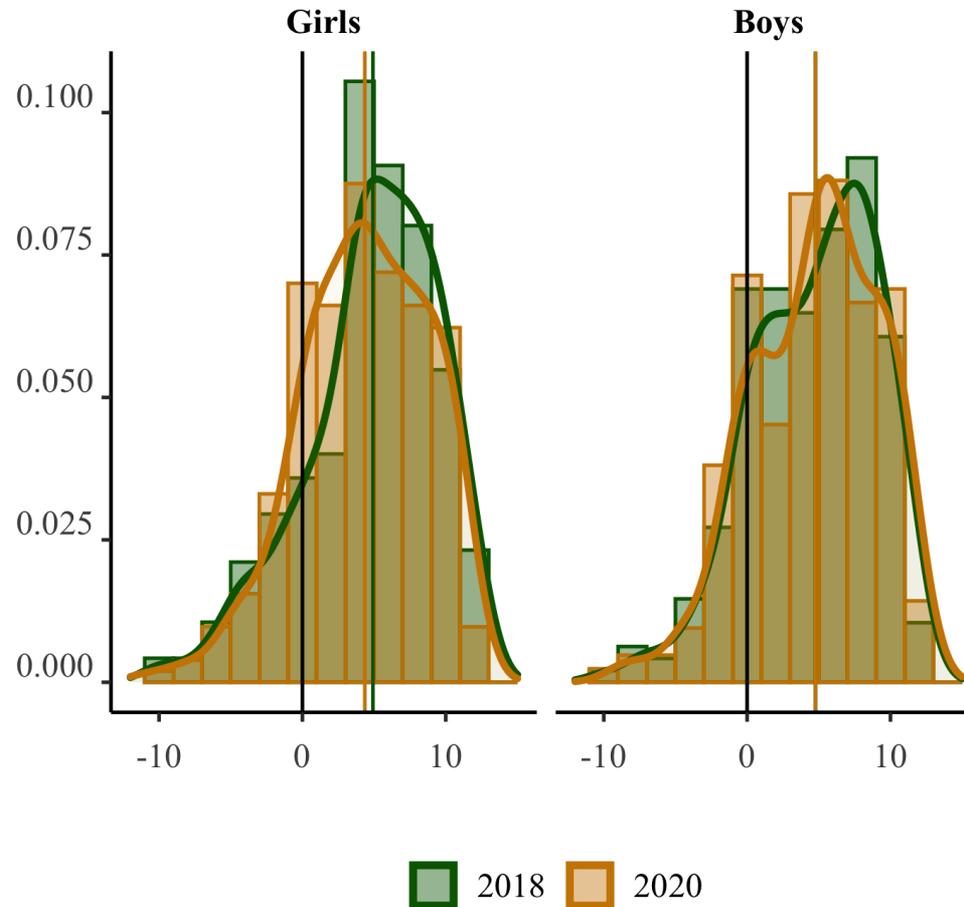
Mental health: before vs during the pandemic

GIRLS

BOYS

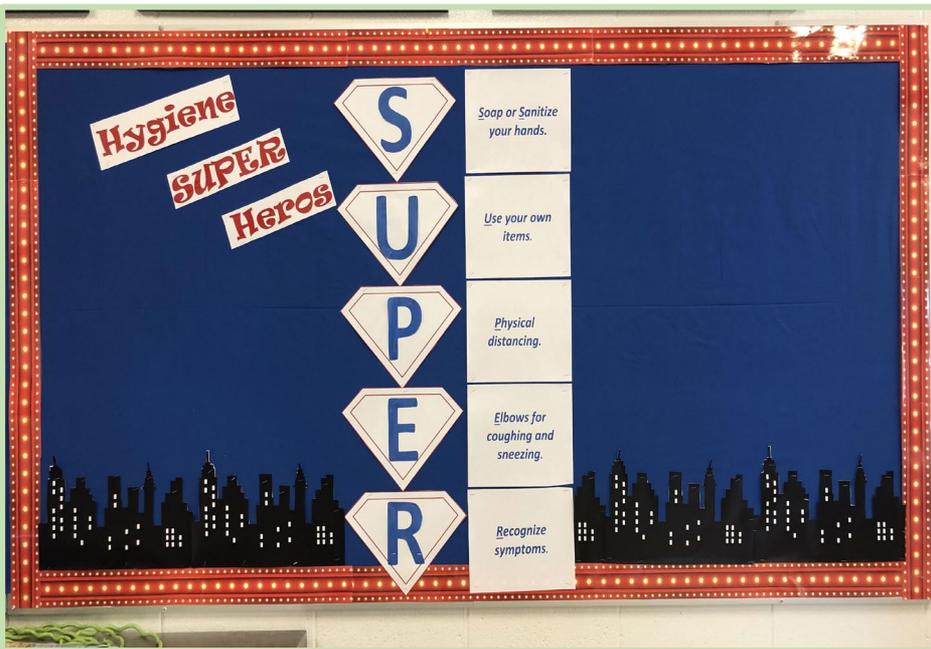


Mental health: before vs during the pandemic



2018 2020

Wellness Strategies In A Pandemic: *Positive Physical And Social Environment*



Wellness Strategies In A Pandemic: *Staying connected with each other*



Wellness Strategies In A Pandemic: *Pivoting Professional Development*



The image is a screenshot of a virtual meeting interface. On the left, a presentation slide is displayed with the following text:

APPLE Schools
Virtual Knowledge Exchange Event
February 2021

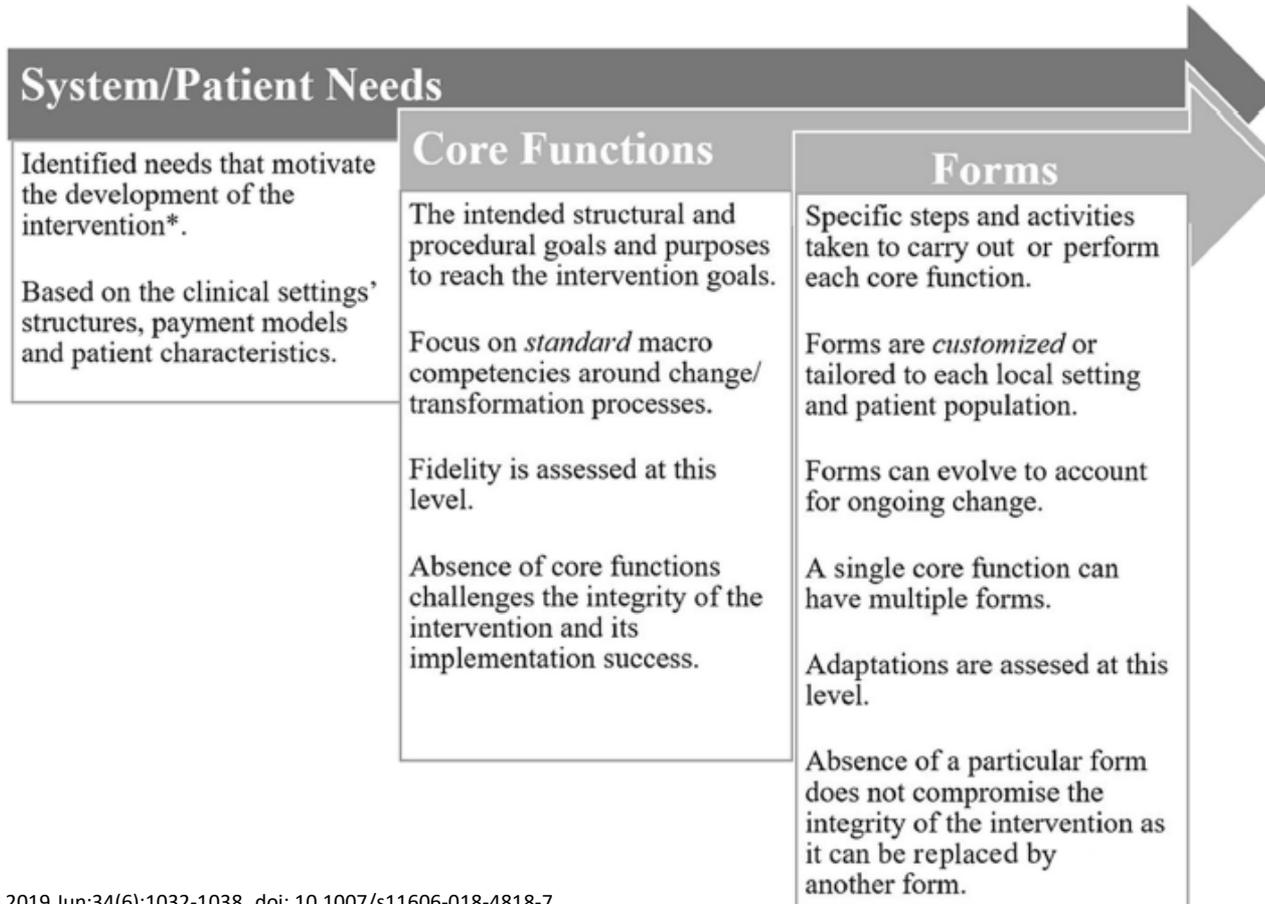
The slide features the APPLE Schools logo (a red apple icon) and a background image of children with their hands raised in the air. On the right side of the interface, there is a vertical gallery view of five video feeds of participants:

- Jenna Power
- ena skakun
- Matt Showchuk
- Joe Panzina
- Mauraen Jatkine

The interface includes a navigation arrow at the top and a return arrow at the bottom.

Next steps: Scaling up to racialized communities in large urban centres

Objective: To understand the fundamental purposes and how schools achieve these purposes



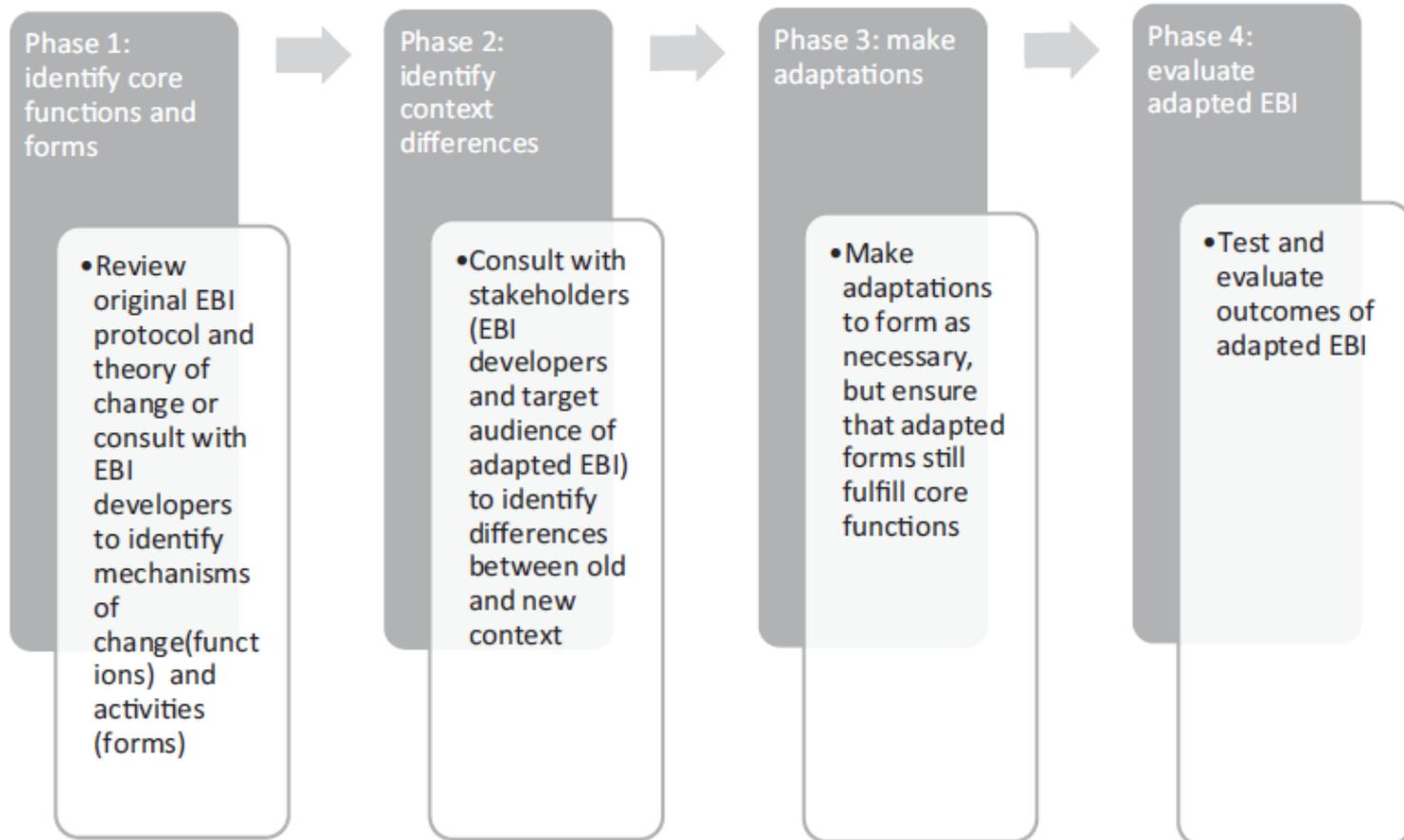
Next steps: Scaling up to racialized communities in large urban centres

Objective: To assess intervention sustainability at the school level

	School Readiness	Year 1	Year 2	Year 3	Year 4+ (Maintenance)
School Selection	School is selected by school authority				
School Health Facilitator (SHF)	SHF is hired	SHF in place with a minimum of 0.5 FTE	SHF in place with a minimum of 0.5 FTE	SHF in place with a minimum of 0.2 FTE	Transition to an identified in-school health champion (0 FTE)
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Next steps: Scaling up to racialized communities in large urban centres

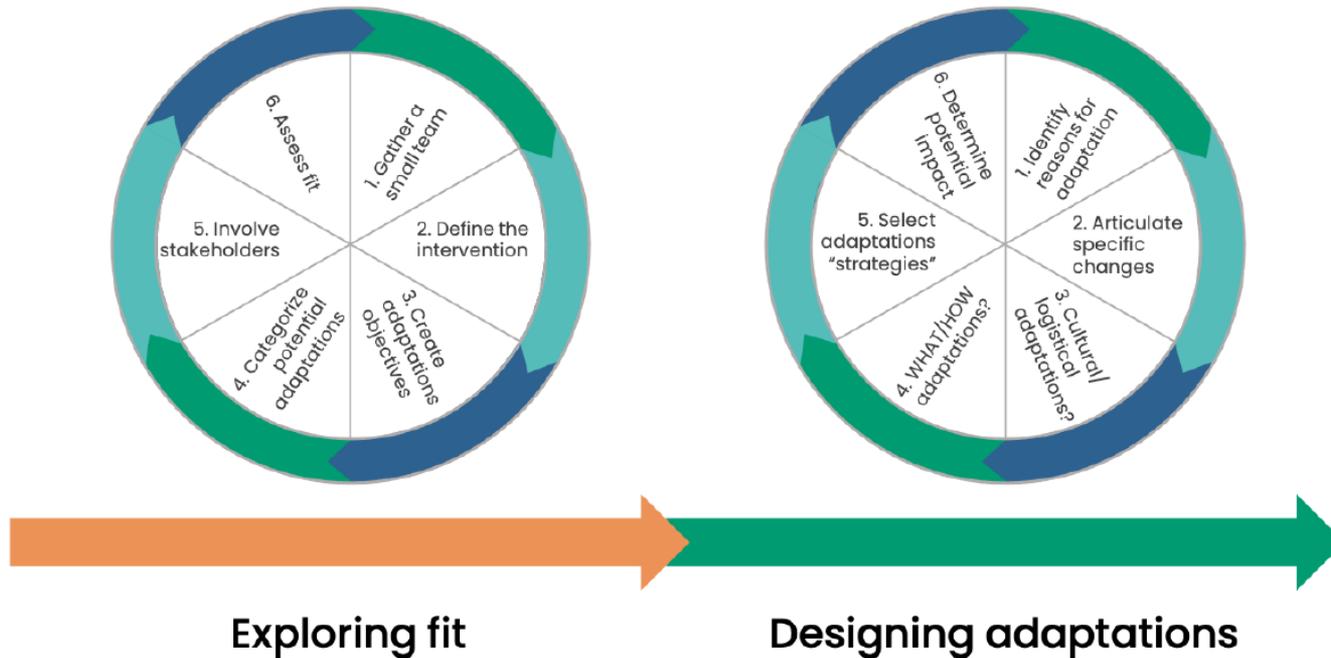
Objective: To study cultural adaptations in different school communities



Next steps: Scaling up to racialized communities in large urban centres

Objective: To co-design and evaluate new cultural adaptations

Map2Adapt



Exploring fit

Designing adaptations

Thank you!

Students, parents, and school principals for their participation in the research.

Teachers, school health champions, project assistants, and APPLE School staff for facilitating the research.

Program Team: Jenn Flynn, Landra Walker, Tina Skakun, Katherine Dekker

Research Team: Paul Veugelers, Arto Ohinmaa, Noreen Willows, David Mowat
Research Trainees: Julia Dabravolskaj, Mohammad Khan, Laena Maunula

Funding: PHAC, Alberta Government, CRC program, AIHS, CIHR, HSFC, CPHI, philanthropists

The land on which we work is traditional territories of the indigenous peoples of Treaty 6, Treaty 7, and Treaty 13, whose histories, languages, and cultures continue to influence our vibrant communities.

