

Department of Sports Science and Physical Education
The Chinese University of Hong Kong



Theory-driven interventions in physical education: Learnings and findings from on-going initiatives

以理論導向介入體育：研究成果的啟示

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Today's topic

- Background
- Showcase studies
 - Innovative tools for PE:
Fitness Dice
 - Improving intervention fidelity through effective communication
 - Home-school cooperation

Global recommendations for daily PA

Children should engage in an average of **60 minutes** of moderate-to-vigorous physical activity (MVPA; 中高強度體力活動) per day

The status quo



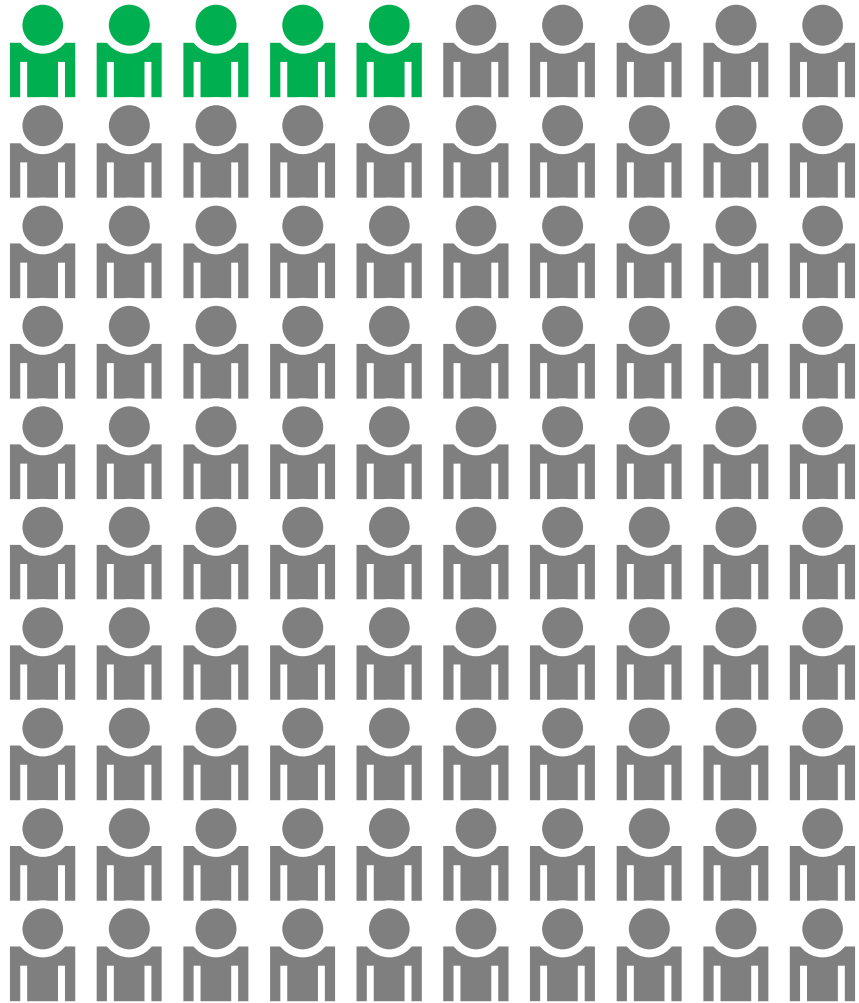
Hong Kong primary school-aged children –
Meeting WHO recommendations:

12% - 20%

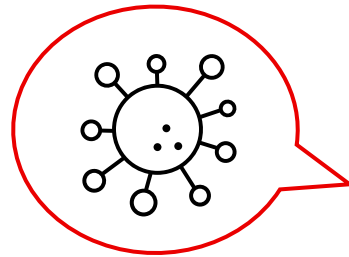
(studies conducted by CUHK in 2013 - 2020)

Research-grade accelerometers

The status quo



Hong Kong primary school-aged children –
Meeting WHO recommendations:



~ 5%

[During COVID-19]

(studies conducted by CUHK in 2021 - 2022)

The status quo

Low levels of moderate-to-vigorous physical activity (MVPA) within school PE

Target

50%

Sources:

Centre for Disease Control [CDC], US;
Associations for Physical Education [AfPE], UK

Actual

40.5% / 18.4%

(From global research)

(Hong Kong)

Sources:

Hollis et al. (2017) / Ha et al. (2020)

The status quo

Low levels of moderate-to-vigorous physical activity (MVPA) within school PE

With no intervention,
% drops over time:

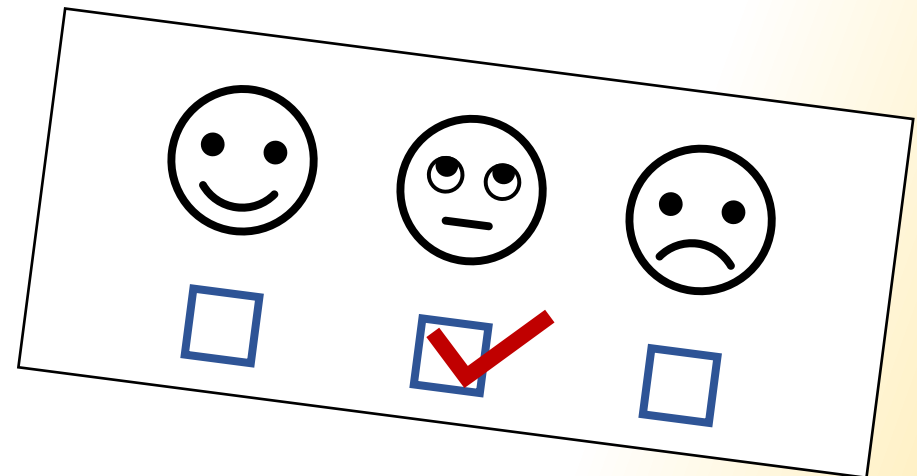
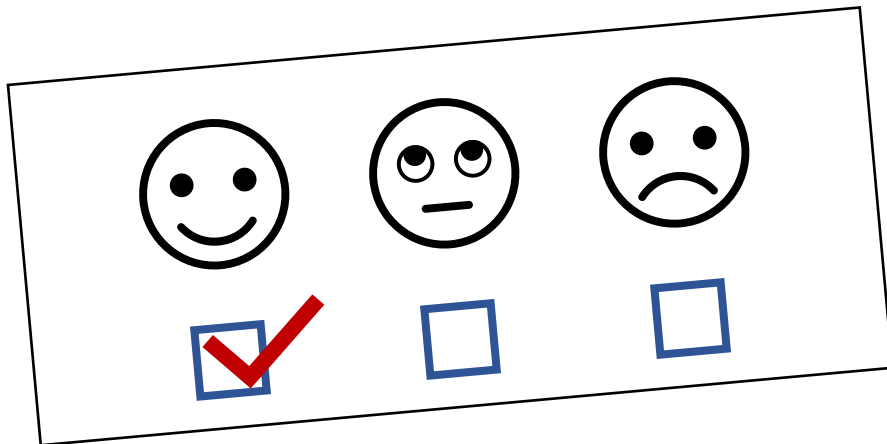
- Within academic year
- Across academic years

18.4%
(Hong Kong)

The status quo

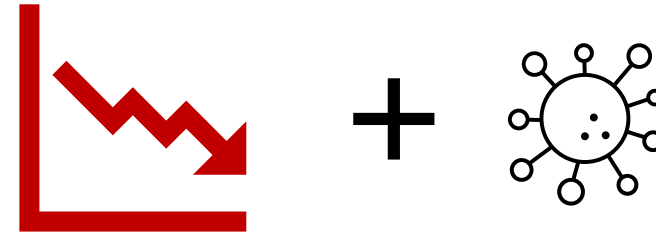
Low levels of moderate-to-vigorous physical activity (MVPA) within school PE

- Students' **motivation towards physical education** also drops over time

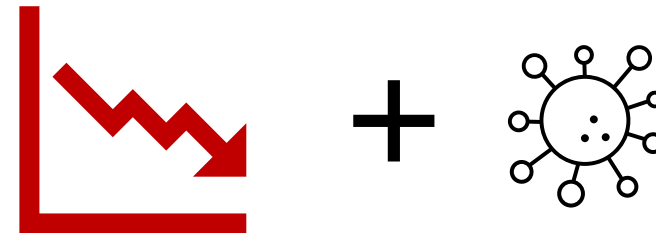


Current challenges

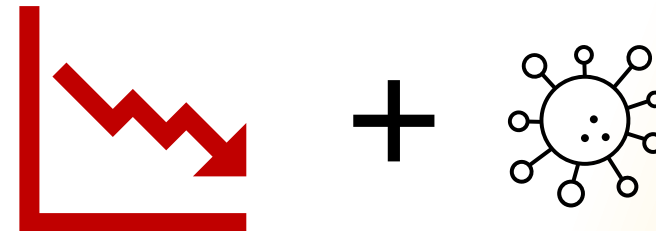
Leisure-time MVPA:



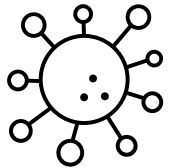
MVPA during school PE:



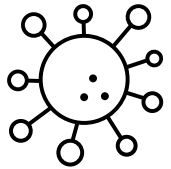
Motivation:



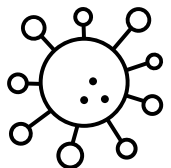
Current challenges



Extended periods of staying at home
Closures of sport venues / exercise facilities



Cancellation of PE / Switch to online modes of delivery
Social distancing measures during PE



Wearing facemasks during physical activity
Reduced interaction with others



Hong Kong children are at great risk of health / developmental / social issues associated with physical inactivity



Physical activity interventions

- A way to *lessen* (NOT overcome completely) old and new challenges pertaining to physical inactivity
- Success of interventions depends on many factors
 - Delivery setting and personnel
 - Duration
 - Based on sound theory



Application of theory – why is it important?

Providing explanations to behaviour change mechanisms

- Help design intervention content
 - what and how to intervene
- Identify key constructs to evaluate
 - what to measure / how to determine success
 - how intervention can be modified / improved
- Improve fidelity
 - theory as content to deliver

Frameworks employed in showcased studies

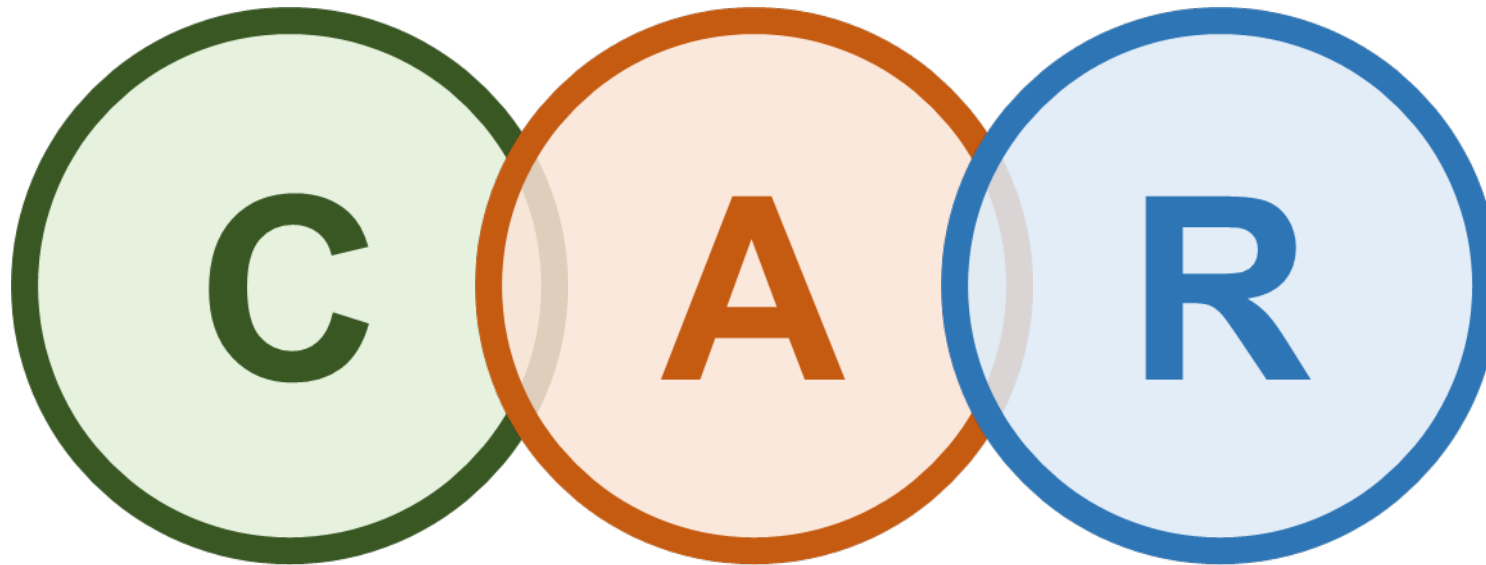
- **Self-determination theory**
 - A psychology theory
 - Explains the link between basic psychological need satisfaction, motivation, and related behaviors
- **Socio-ecological model**
 - Describes how various “levels” of factors interact with behaviors of individuals

Overview of self-determination theory (SDT)

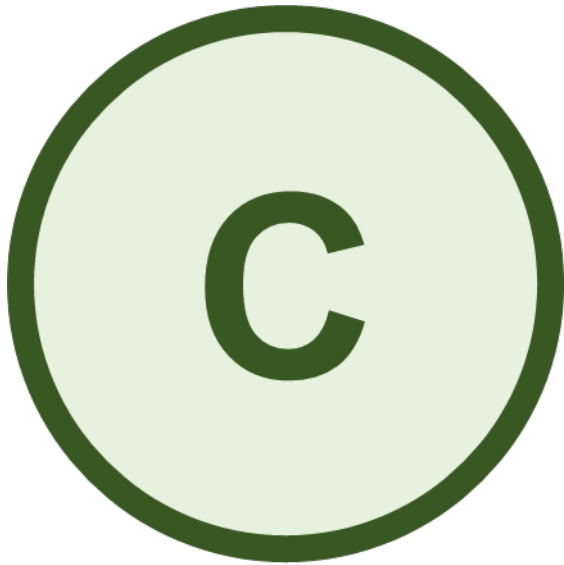
Deci and Ryan, 1985; Ryan and Deci, 2002

Tenets of self-determination theory

- Three basic psychological needs
 - Competence, Autonomy, Relatedness



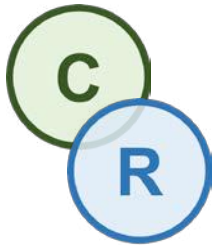
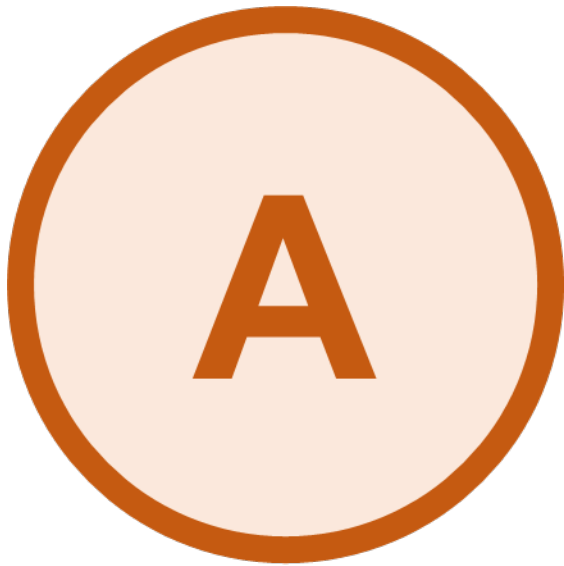
Need for Competence 勝任感



- Feeling effective and **confident** in producing desired outcomes
- Having the ability and opportunity to exercise one's capacities



Need for Autonomy 自主性

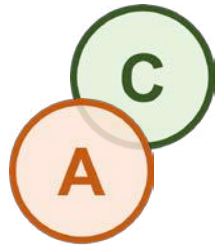


- Perception of being origin of one's own behaviors (i.e., not being forced)
- Sense of volition (意志)
- Having meaningful choices

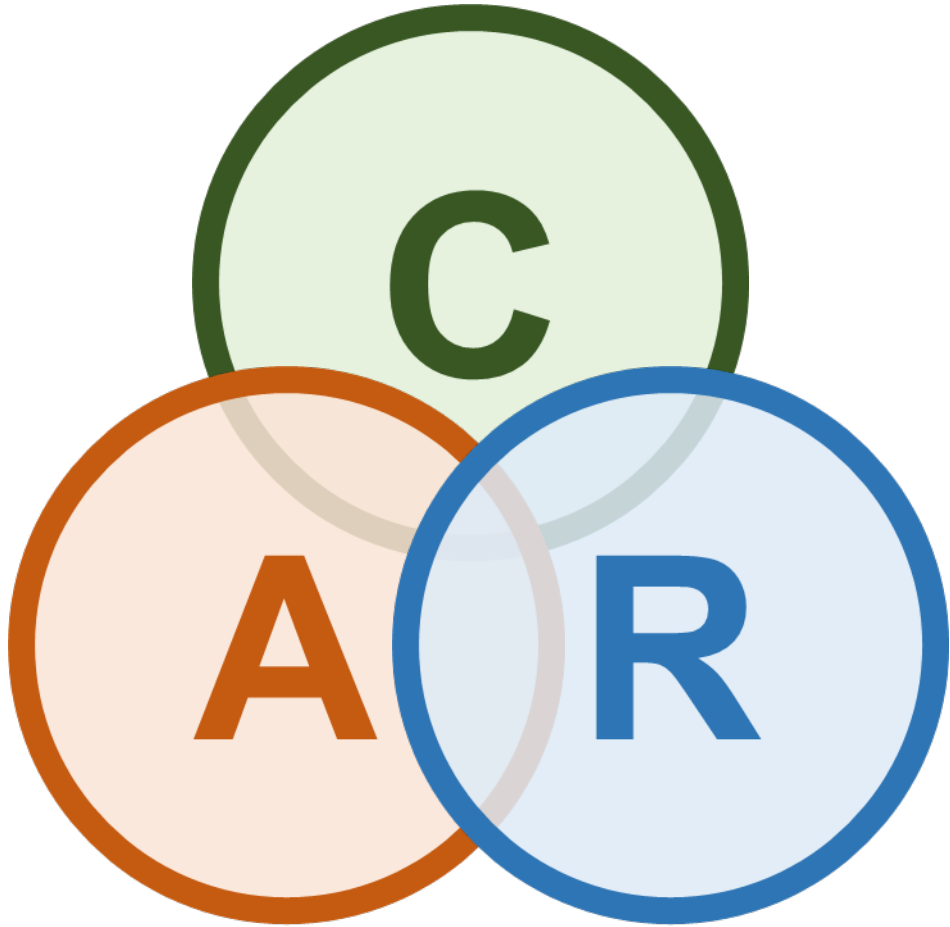
Need for Relatedness 關聯感



- Sense of belongingness to a group
- Being respected and understood
- Having someone to care for



Tenets of self-determination theory



- When needs are satisfied:
 - Have higher levels of “good” motivation (e.g., participation out of fun and enjoyment)
 - Higher engagement in behaviour
 - Better psychological well-being

Implications

- Intervention components should aim to maximize need satisfaction
- Modification of behaviour while frustrating needs will **NOT** lead to sustained behavioural change
 - e.g., motivating through rewards will reduce sense of autonomy; when rewards are removed, behaviours may cease



Overview of socio-ecological model

McLeroy et al., 1988; Mehtälä et al., 2014

Socio-ecological model

- Promotion of healthy behaviour should focus on multiple “levels” of factors





Implications



- Since behaviours are a consequence of factors at many levels, interventions should target multiple levels

Showcase studies

1. Innovative tools for PE:
Fitness Dice
2. Improving intervention fidelity
through effective communication
3. Home-school cooperation

Application of the *Fitness Dice*

Showcased Study 1

Rationale

- Health-related fitness is important to our health
- But the term “體能” is associated with many negative thoughts with children

Boring
吓? 好悶呀

Difficult
好辛苦呀

Punishment
「同我去做XX下
掌上壓！」

Rationale

- Fitness in school physical education is also monotonous

What is “fitness”?
「體能」係啲咩?

跑圈、push up、sit up

Push up、sit up、跑圈

Sit up、跑圈、push up



Our goals

- To make fitness in PE fun
 - Incorporating “game-like” experiences
 - How?* Using the ***Fitness Dice*** in school PE
 - Making fitness activities more diverse
 - How?* Introducing a variety of exercises through the dice
- Training teachers to be more supportive of students’ basic needs
 - *How?* Training in-service PE teachers

Fitness Dice

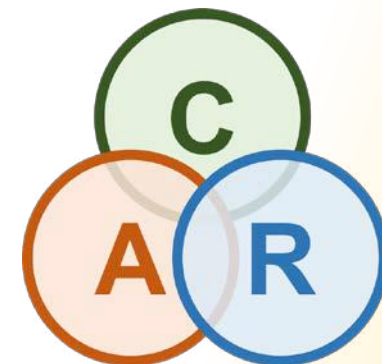
- Set of four dice with transparent “pockets” on each side
 - Each die correspond to one set of exercises:
 1. Cardiovascular endurance
 2. Lower body muscular strength and endurance
 3. Upper body muscular strength and endurance
 4. Flexibility
 - Modifiable sides (exercises) by replacing activity cards inserted in pockets

In-service teacher training

- SAAFE Principles (Lubans et al., 2017):
Supportive, Active, Autonomous, Fair, Enjoyable

Theoretical underpinning

- Based on self-determination theory, the “best” form of motivation is **intrinsic motivation**, i.e., to engage in an activity for its fun and enjoyment
- By teaching teachers SAAFE principles and concepts of SDT, teachers will be more supportive towards students' competence, autonomy, and relatedness



Research design and findings

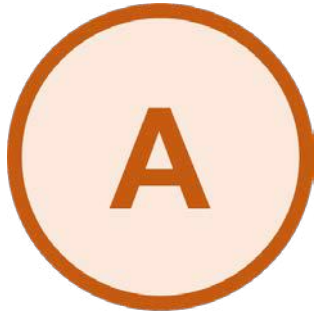
- Randomized controlled trial consisting 26 schools, involving 826 Secondary 2 students
- Measured students' MVPA over 8 weeks
 - First 4 weeks: No intervention
 - Last 4 weeks: Experimental group received intervention
- Results:
 - Girls' MVPA increased when fitness dice were used;**
 - No change was found in boys

Psychological need satisfaction?

*Overall, I felt my fitness level improved.
I have a deeper understanding of physical fitness.*



Rolling the dice is better than the teacher's instruction, which only ask you to do this and that. Rolling the dice feels autonomous, as we decide ourselves what to do.



There's a feeling of togetherness. We chatted while exercising, so time seems to pass quickly. When you are doing it alone, every second and minute feels like a century



Teacher feedback

[使用SAAFE原則] 係會令到自己更加睇見學生嘅需要。

以前好多時候都係老師講學生就做，上完個workshop，我就多啲留意佢地個別嘅差異，無咁從我好authoritative嘅角度去睇。雖然最終都係要跟住我嘅指示，但係就會睇返佢地擺落去嘅effort。

[工作坊] 提醒左我作為一個體育老師應該點樣去鼓勵同學做運動...
我會對啲同學多左體諒，同埋鼓勵。

Scaling up...

- A scale-up study was planned to disseminate the concept to more schools
 - Target: 100 local primary and secondary schools
- Due to COVID-19, the proposed in-person teacher training + dissemination plans were affected, and ...

∴

Scaling up... to online teaching

... so we switched to online mode

- Teachers from 132 schools agreed to take part
 - Training workshops were conducted over Zoom
 - Adaptations for online teaching were discussed

Research design and findings

- Teachers taught two online PE classes
 - 1 using the Fitness Dice (experimental); 1 without (control)
- Questionnaires were administered to students (online) immediately after each class
- Results:
Students in experimental group reported higher levels of need support from teachers;
Teachers felt students were happier when Dice were used

Extensions

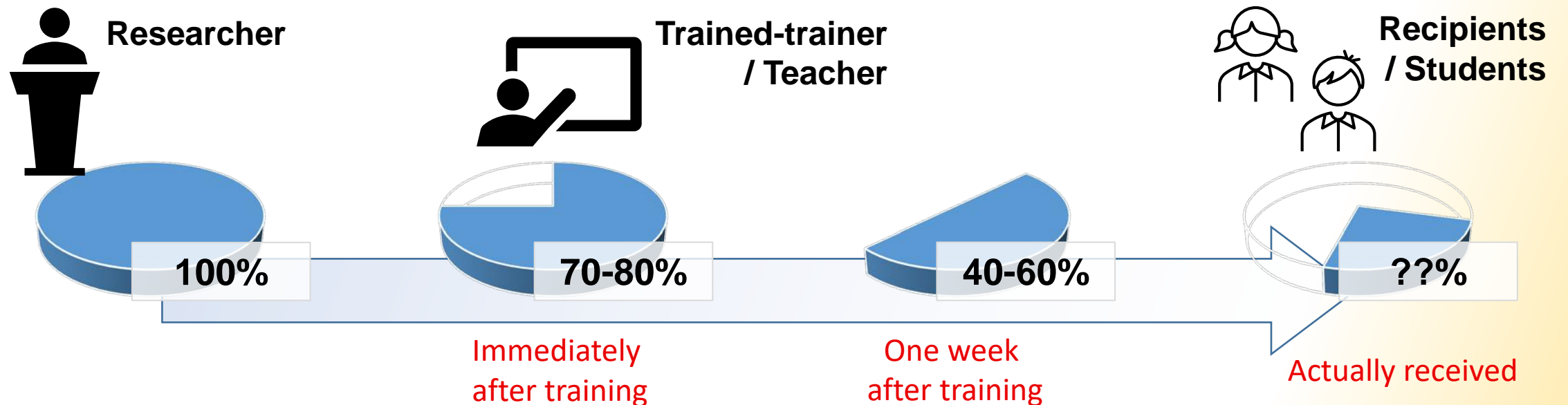
- Fitness is not part of curriculum for lower primary
- Activity cards for fundamental movement skills were developed
 - **A**gility
 - **B**alance
 - **C**oordination

Improving intervention fidelity through effective communication

Showcased Study 2

Background

- One important factor that determines success of intervention is whether contents were delivered and received as intended (i.e., fidelity)

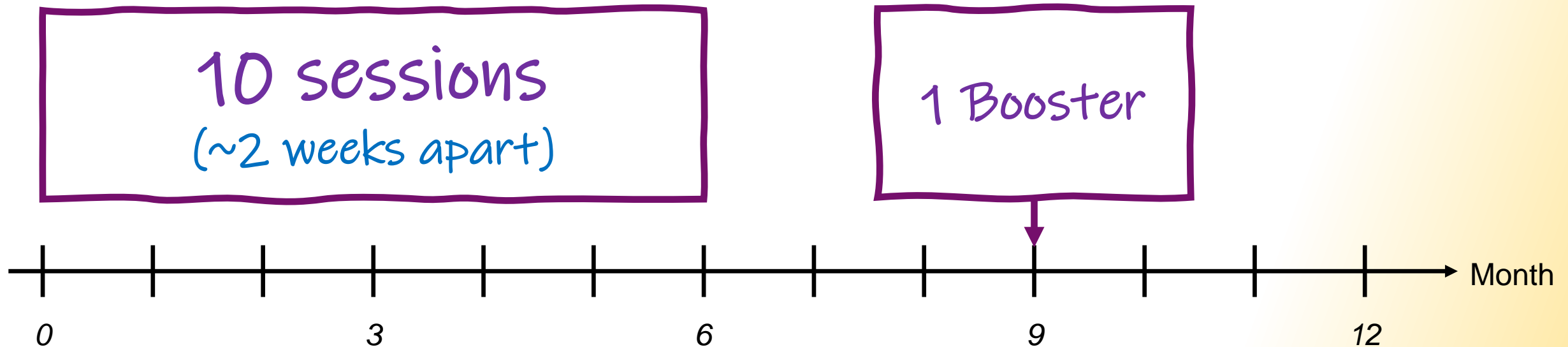


Strategies to enhance fidelity

- To maximize intervention fidelity, we adopted two key strategies in a physical activity intervention study
 - Adoption of theory principles at multiple levels of intervention
 - Maintaining effective monitoring / communication with providers of intervention contents

Our intervention

- Family-based physical activity intervention
- Targets: Children from primary school **and their parents**
- 10 Intervention sessions (spread over 6 months)



10 sessions
(~2 weeks apart)

Led by coaches trained specifically for study
Coaches received 12 hours of training

30-minute
“sit-down” session:

General knowledge of PA
Key concepts of FMS
Need supportive parenting
Goal-setting

60-minute
activity session:

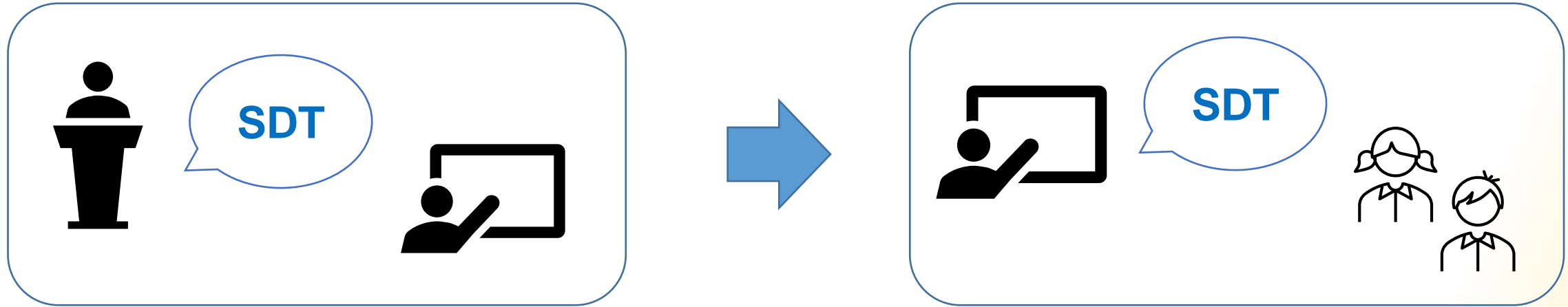
FMS instruction
Games to strengthen skills taught
Rough-and-rumble play
Group activities

10 sessions
(~2 weeks apart)

Led by coaches trained specifically for study
Coaches received 12 hours of training

- Coaches that led the sessions received 12 hours of training
 - SAAFE Principles and key tenets of SDT
 - Parent-child dynamics within physical activity classes
 - Discussions on how to engage participants in the intervention settings
 - Activity demonstrations and feedback

Adoption of theory principles at multiple levels of intervention

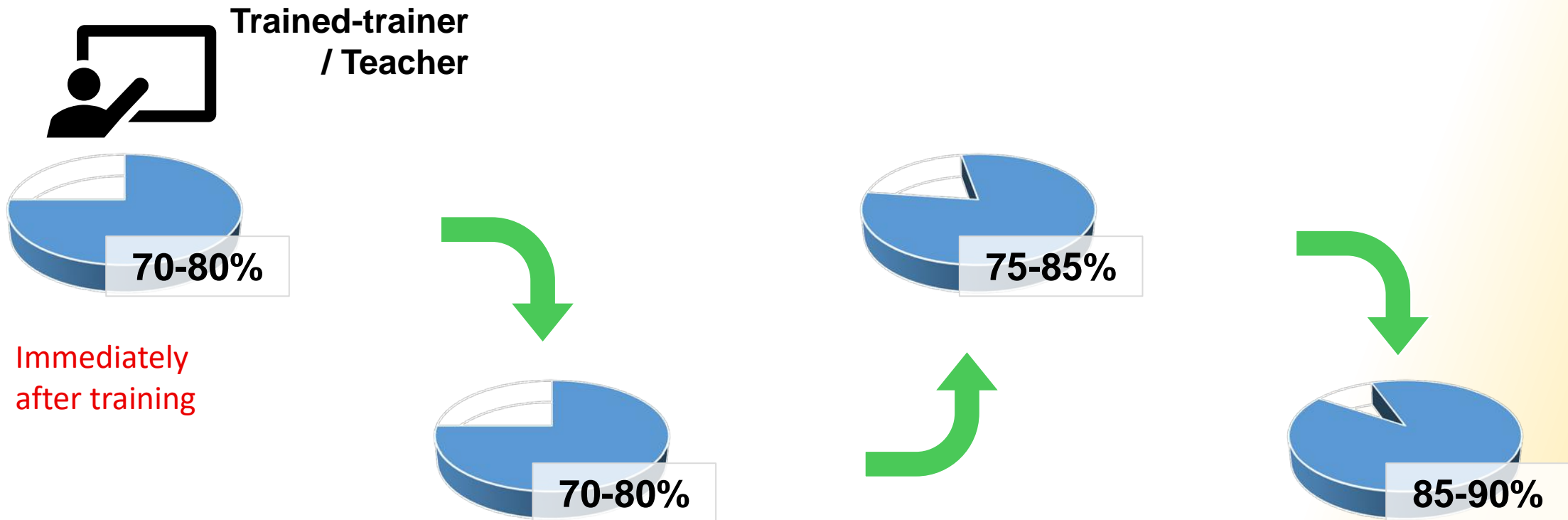


The best way to learn is to teach

- Apart from exercising SDT principles in the sessions they led, coaches also had to teach similar principles via workshops

Maintaining effective monitoring / communication with providers of intervention contents

- Maintained close communication between coaches and coaches via WhatsApp



Maintaining effective monitoring / communication with providers of intervention contents

- Lead researcher conducted on-site observation for all coaches
 - Discussed strengths and areas to improve after observations
 - Coaches shared written reports of discussion via WhatsApp
- Coaches shared other teaching videos (examples and of themselves) and written reports of other sessions

Importance

- Continuous communication ensured researchers could monitor how intervention contents were delivered
 - Clarifications to coaches could be made prior
- Challenges experienced during delivery were reported and addressed swiftly

→ Fidelity of intervention

Pros and Cons

- Enhances “accuracy” of intervention delivery
 - Better understanding of strengths and weaknesses of the designed components
-
- Difficult to maintain in-depth communication when many coaches are involved (e.g., > 20)
 - Success relies on commitment of coaches

Feedback from coaches

When preparing for classes, I was very conscious of ensuring the sessions were supportive of participants' basic needs.

I learnt a lot from other coaches via their sharing in the WhatsApp group

In one school, the teacher was always present and very supportive, she sometimes even joined in to play with the group. In another school, I never saw the teacher and had difficulty reaching him. It would be much better if teachers provided more support.

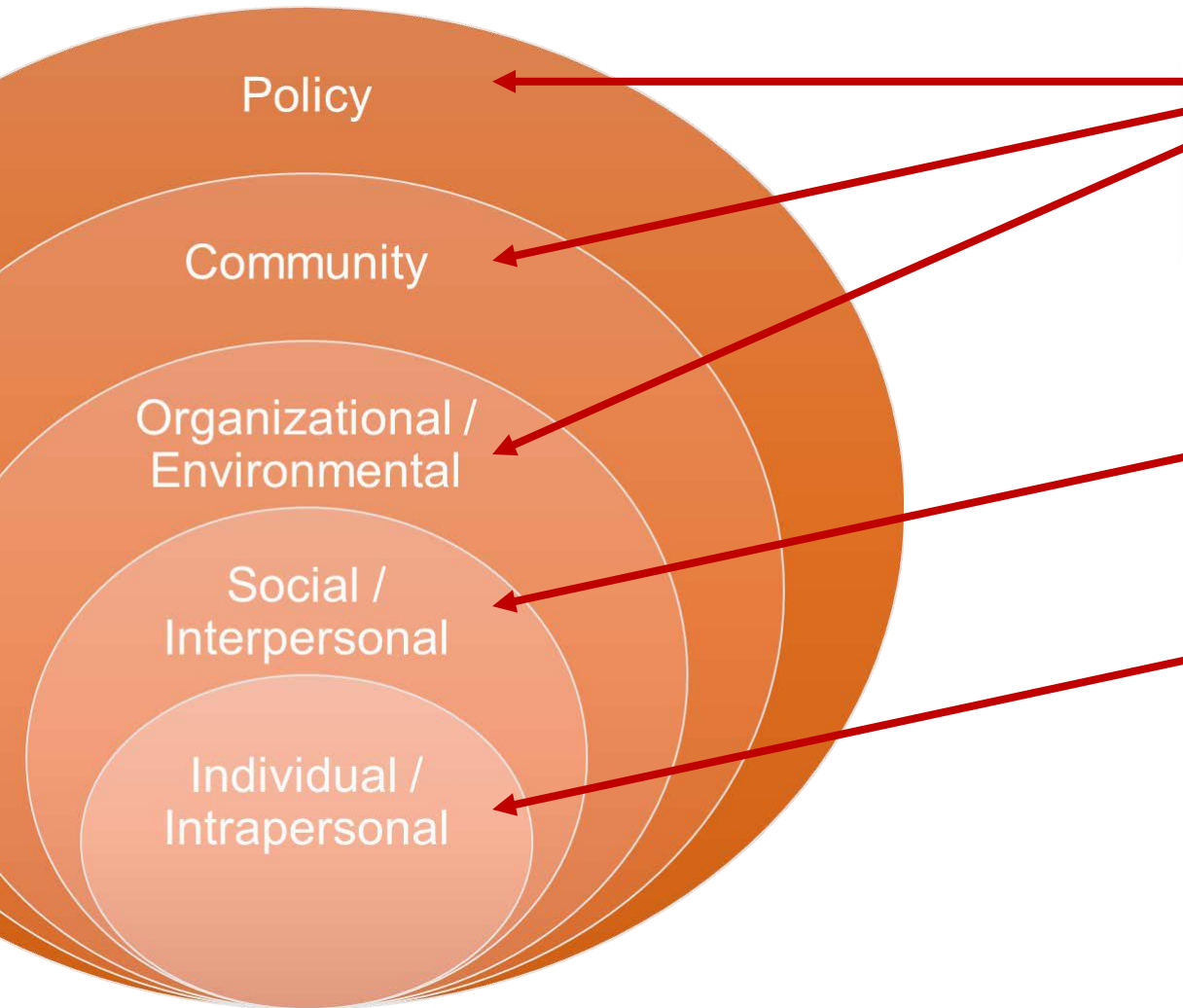
Implications (for PE teachers)

- When delivery of ECAs (e.g., interest classes, school teams) are outsourced, it is important for teachers to maintain good communication with coaches
- Adequate support (e.g., by being present at times) will be appreciated by coaches and participants

Home-school cooperation in physical activity participation

Showcased Study 3

Previous examples



Support from parents and coaches

Motivation through fun activities

Activity Classes and events



- In-person activity classes / events were cancelled during COVID-related school closures
 - Classes / events were provided over internet
 - Participants joined from home

Activity classes

- Classes hosted over Zoom
 - Student + family classes
 - School-based + joint-school classes

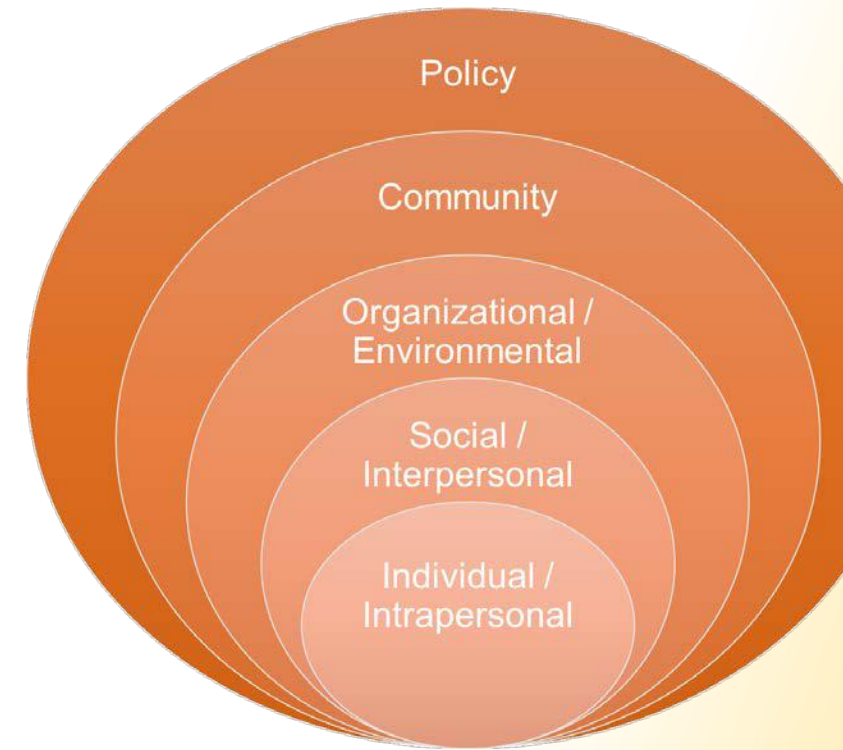
Key learnings

Buy-in from principals is important

- Ability to intervene at policy levels
 - e.g., “PE uniform day”

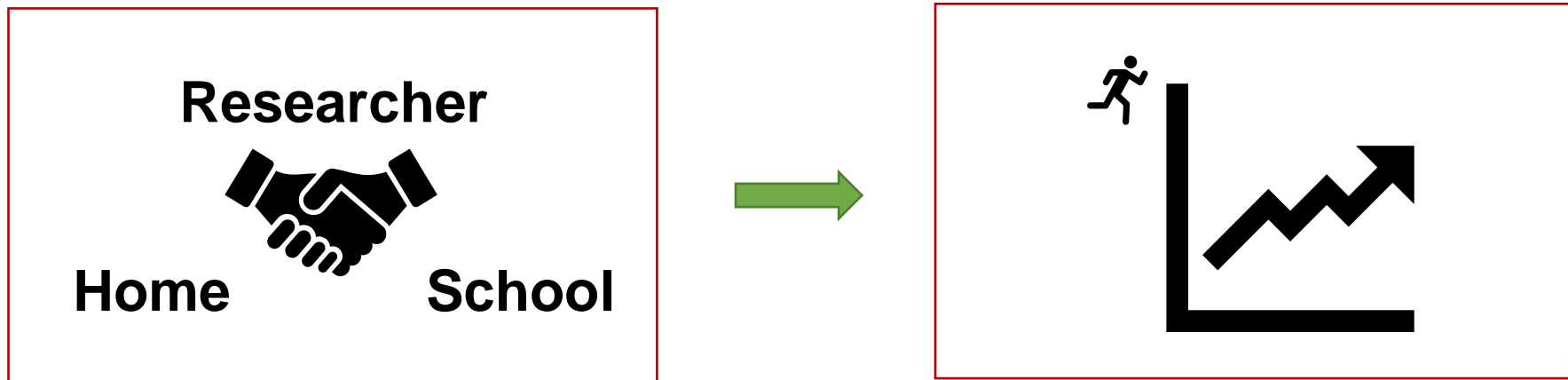
Home-school cooperation

- Parents have strong influence on children’s behaviours
- Aligning goals and expectations (related to physical activity participation) at home / school is important



Conclusions

- Combined efforts are needed to fight negative trends of physical activity



- To ensure efforts are effective, they should be built on sound frameworks and a clear vision