

# Multicomponent interventions to promote physical activity in childcare, kindergarten and school

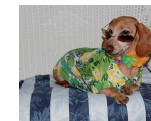
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In 2003....

Federal Office of Sport decides....

wanted to know all about PA, fitness and health in Swiss kids



## Federal Office of Sport decides....

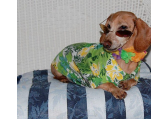
wanted to know all about PA, fitness and health in Swiss kids



but we wanted to know more about what we can change and started...

## Federal Office of Sport decides....

wanted to know all about PA, fitness and health in Swiss kids



but she wanted to know more about what we can do and started...



KISS

## Initial idealistic enthusiasm....

wanted to do better than others....

1. only the minimum of questionnaires
2. questionnaires often inappropriate in kids -> PA objectively measured
3. BMI is not enough -> skinfolds, BIA, DXA
4. as pediatrician/sport scientist hard endpoints nice: overall PA, aerobic fitness, bodyfat, cardiovascular risk factors, bone mineral content/density

Int postponed for 1 year due to local denial by the school physician on the provincial level -> we had to change provinces

## What's up?

1. overview of the interventions (Joup'la Bouge, BALLABEINA, KISS)
2. different type of environment as before
3. components of the intervention and how they were supposed to work
4. practical challenges and issues in evaluating several components of an intervention
5. challenges of analyses



?



# 1. Overview of the studies



Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: cluster-randomised controlled trial  
**BMJ 2010; 340: c785**



Effect of multidimensional lifestyle intervention on fitness and adiposity in predominantly migrant preschool children (Ballabeina): cluster randomised controlled trial  
**BMJ 2011; 343: d6195**



Effect of a governmentally-led physical activity program in young children attending child care centers (648 2-4 years olds) : a cluster randomized controlled trial: The Youp'la Bouge program  
**IJBPA 2013 (in revision)**



Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: cluster-randomised controlled trial

**BMJ 2010; 340: c785**

- School-based RCT, only PA
- 15 schools, 28 classes, n=504, Int:Con=3:2
- Int: 9 mt, 3-year follow up
- 1° outcomes:
  - aerobic fitness (shuttlerun),
  - PA (accelerometers)
  - bodyfat (sum 4 skinfolds)
  - qoL (child health questionnaire)
- 2° outcomes:
  - Cardiovascular risk score (components of metabolic syndrome)
  - BMI
- Int content: multicomponent, mixed educational-behavioural-environmental (next slide)

## Components of the Intervention

education of teachers

PA homework

daily PE

recess tools

**Muskeln kräftigen**

**Beinglocke**

Stützt auch mit den Unterarmen auf der Tischfläche ab und zieht die Beine an. Dann pendelt mit den Beinen vor und zurück, abwechselungsweise und dann auch mit beiden Beinen gleichzeitig.

**Tipp**

gleichmäßig atmen

Doppelknie machen oder Rädergummi unter dem Kinn einlegen. Wie kann die Beine strecken?

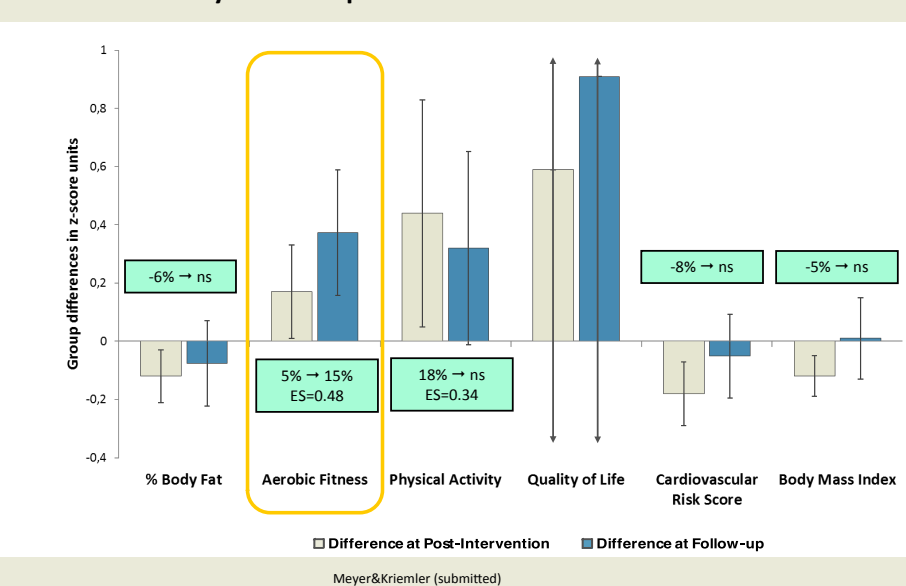
**M4**

short PA breaks

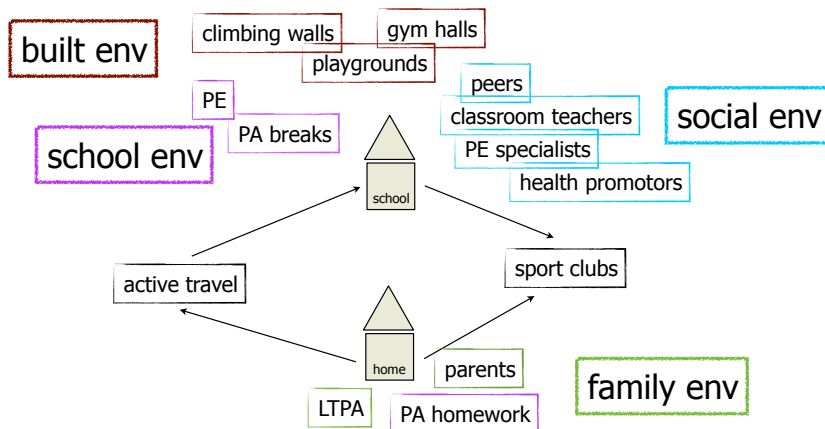
Controls:  
3 PE lessons/wk

Cleven - Becker Foundation

## Results of the 3-yr Follow-up



## 2. different type of environment ?



environment= childcare, kindergarten, school ± family

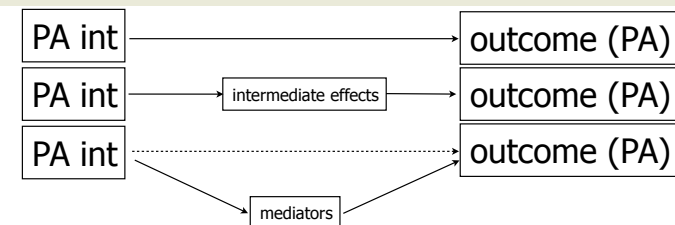
## 3. Components of the interventions and how they are supposed to work

	KISS	BALLABEINA	Joup'la Bouge
environment	1° school	kindergarten	childcare
Interventional components	PA	lifestyle	PA and motor skills
<b>Intervention strategy</b>			
Information and Education	1 flyer to increase PA	1 lifestyle lesson/wk about nutrition/PA/media use/sleep	
cognitive (general, goal setting, problem-solving)			
behavioural (practice, skill building, rehearsal, monitoring, feedback, incentives)	PE lessons, PA breaks, PA homework (practice and rehearsal)	PA lessons, lifestyle lessons, PA homework	daily PA time
environmental (home, school)	(tools on playgrounds)	provision of equipment	provision of equipment, PA room
parental/social support	PA homework, training of classroom teachers	Workshops parents/teachers, PA homework	workshops educators, workshop parents, flyers

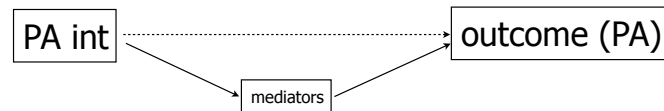
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## how do interventions work?



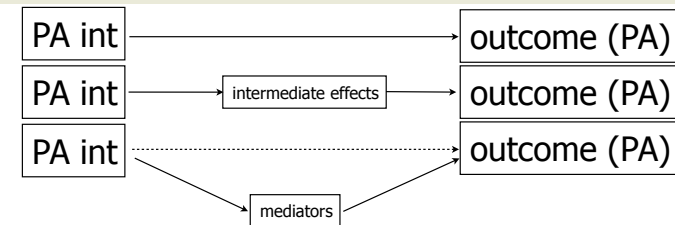
## how do interventions work?



- cognitive/psychological:  
self-efficacy towards PA, self-esteem, knowledge, intention to be active, enjoyment of PA, outcome expectations, preference for PA
- social environmental:  
social support, perceived physical environment

Brown BMC Public Health 2013, Salmon IJO 2009

## how do interventions work?



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- Potential mediators without formal mediation testing (like in most other studies)
- Studies with pos effect on mediators are more likely to show positive effects on outcome
- Only one-third of studies reported small to modest changes in the targeted potential mediators, with approximately 75% of these studies reporting positive effects on physical activity outcomes

Brown BMC Public Health 2013, Salmon IJO 2009

## "naive idea about mechanism and interference"

- kids can socialize, have fun, get positive feedback/reinforcement, don't have academically to learn (true for PE, PA breaks and homework...)
- all social partners are involved and "have a task"
  - Parents: PA homework, support
  - classroom teachers: less work for them, 2 hours off, learning without investing more time, they contribute for the whole thing (this was not enough valued by us....)
  - PE teachers: they are/were educated at increasing quality and quantity in PE, most were enthusiastic about the project and their expectations
- the system approach hinders to let those escape who need it most...



## "naive idea about mechanism and interference"

- motivation due to need satisfaction (need for relatedness, need for competence)
- **from controlled motivation to autonomous volitional motivation**



- indirect evidence:
- 95% of Int kids and 72% of classroom teachers in KISS wanted the program to continue (fun and play were THE key issues for kids)
- fitness and sport club participation ↑ (but not overall PA) at the 3-year follow up in KISS

adapted from Vansteenkiste



#### 4. Practical challenges in evaluation several components of the interventions of the intervention

**Despite most successful RCTs, there are several relevant issues that have the potential to "ruin" a school-based RCT**

##### Outcomes/measurement issues:

1. Precision of the outcome assessment: unsolved problems with accelerometers (different hours of measurement, different number of days, compliance issue, cutoffs for MVPA....)

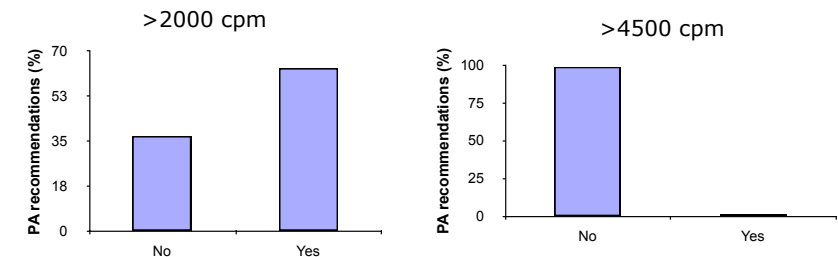
Tucker Public Health 2007

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Tucker Public Health 2007

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##### Outcomes/measurement issues:

1. Precision of the outcome assessment: unsolved problems with accelerometers (different hours of measurement, different number of days, compliance issue, cutoffs for MVPA....)
2. aligning the outcome measure with the focus of the intervention
  - measure PA if you intervene on the level of PA
  - measure PA during breaks when you want to increase PA during breaks
  - but: also measure overall PA to show that there was no compensation
  - this is a challenge ! Context and behavioural outcomes (subjective) vs overall measure (objective)
    - questionnaires unreliable and with low validity in younger children, correlation accelerometers-questionnaires 0.1-0.4 (different measurement properties), often proxy assessment by teachers and parents, but yet needed for context-specific issues (PA homework)

Tucker Public Health 2007

#### 4. Practical challenges in measuring and evaluating several components of the interventions of the intervention

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##### Outcomes/measurement issues:

3. different conditions for the measurement periods among groups

- possible scenarios:
- birthday party with dancing
- sports camps postponed due to bad weather
- community football tournament
- creative painting week (teacher forgot to tell)



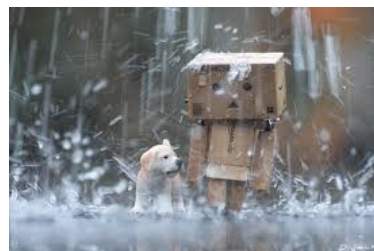
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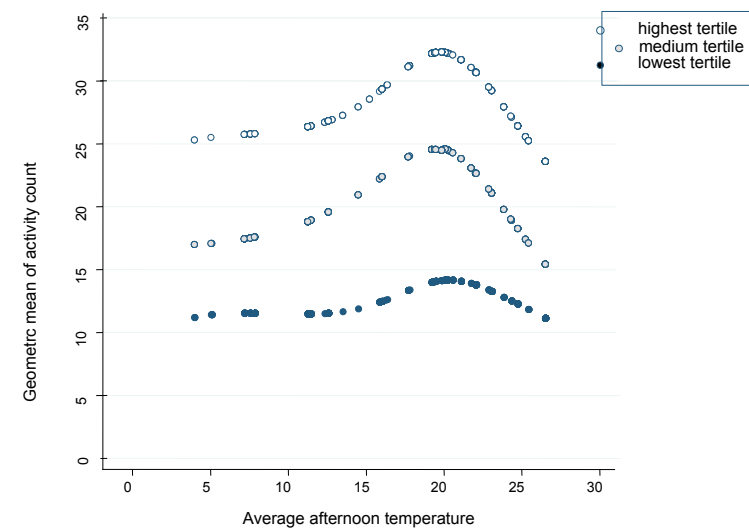
Outcomes/measurement issues:

##### 4. weather



Tucker Public Health 2007

MVPA: control group + children in intervention group in 1st season  
(adjusted to season 1 and no rain)



#### 4. Practical challenges in evaluation several components of the interventions of the intervention

Despite most successful RCTs,

there are several relevant issues that have the potential to “ruin” a school-based RCT

Outcomes/measurement issues:

##### 5. reactivity (Hawthorne effect), day of the week

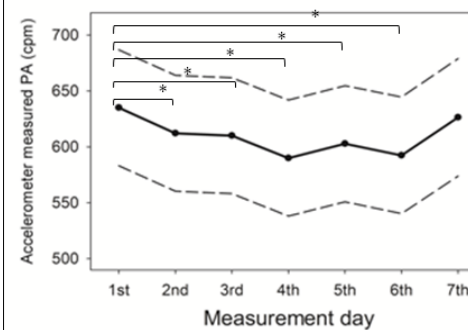


Funfoosh.com

Wickström Scand J Work Envir Health 2000; Tudor-Locke Research Q Exerc Sport 2009; Intille MSSE 2012; McClain J Sci Med Sports 09;

“reactivity of accelerometer measurements”

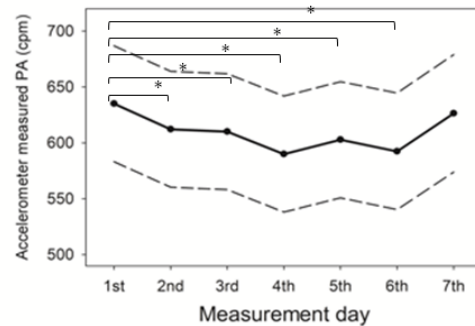
“day of the week matters”



- 5-10% difference between 1st-last day and others
- what if children do not have a 7th day? what happens with 4 days ?

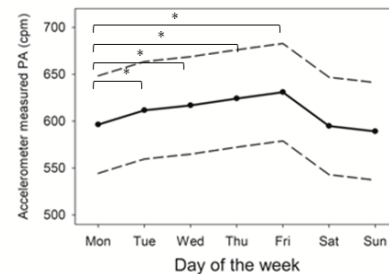
Dösegger&Kriemler unpublished

#### "reactivity of accelerometer measurements"



- 5-10% difference between 1st-last day and others
- what if children do not have a 7th day? what happens with 4 days?

#### "day of the week matters"



- 5-10% difference between weekdays and weekend days

Dösegger&Kriemler unpublished

#### 4. Practical challenges in measuring and evaluating several components of the interventions of the intervention

##### Intervention

- compliance of teachers re intervention (reliance on reports) **thus**: add the maximum of support, empathy, control possible (think of their personal need)
  - again problem of fidelity, assessment of fidelity, social desirability
- negotiating with the "delivery organisation" how they will be implemented in particular that they will be randomized (tricky!!):
  - options: cross-over design
  - waiting list
  - offer "something" like individual health reports to children and parents, later intervention tools
- ev include comparable control group that has nothing to do with the RCT (preferably in another field)

#### 4. Practical challenges in evaluation several components of the interventions of the intervention

##### Analyses

- **adequate power !!!!**
  - to include long-term follow ups
  - 60% participation 4-years after baseline, but only 40% in adolescents.....
  - to look at mediators
  - to do subgroup analyses (gender, age, SES, cultural, those with high baseline risk for low PA, high SB, obesity, high media use
  - to have a good reference group (ideal baseline and follow up of a control group)
- **measurement/outcome issues such as references, scaling, z-scores**
  1. who is the reference population: published, all at baseline, only controls
  2. statistical models: adjustment for ??? cluster class, cluster school, cluster community, cluster province.....
- **several 1° outcomes vs 1 ?**
  - you intervene to reach several outcomes at the same time
  - argument of "multiple outcomes" and Bonferroni

#### 6. future

- urgent need for economic evaluations
- more long-term follow ups (studies should even be mandated to do a follow up)
- try to understand for whom the interventions work and how they work
- implementation plan and studies
- communication plan: kids, parents, teachers, school principles, community, province, federation
- translational studies (international collaborations)
- more high quality studies
  - open for discussion: quality criteria for school-based interventions, selection process of studies included into reviews
-



## 6. future

- we should more think of analysing and evaluating behavioural change of our politicians



change the environment...



"It's very effective weight loss software.  
You only eat what can fit through the hole in the CD."