

A systematic review and meta-analysis of intervention for pediatric obesity using mobile technology

Jisan LEE, RN, M.Sc^{a,c}, Meihua PIAO, RN, M.Sc^{a,*}, Ahjung BYUN, RN^a, Jeongeun KIM, RN, PhD, INS^{a,b,c}

Consumer Health Informatics & Communication Laboratory
Seoul National University
saan2mari@gmail.com

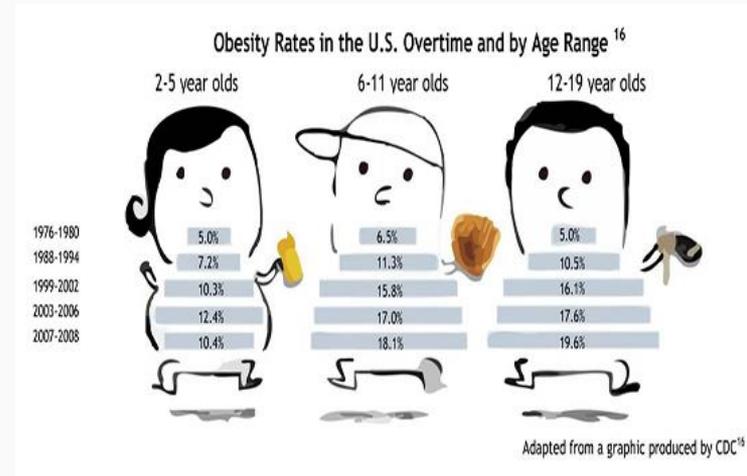


Introduction



Introduction

- Overweight or obese children are at great risk of diseases such as diabetes and metabolic syndrome, and are also affected psychosocially.
- The obesity rate of elementary school students in **Korea** (based on body mass index [BMI]) is **20.6%**, and **32%** of those aged 2–19 years in the **United States** are overweight or obese (Ng et al, 2014).





Introduction

- Additionally, **smartphone** ownership rates are increasing among children, with **72.2%** of elementary school students in **Korea** and **68%** of **children** aged 13–14 in the U. S. owning a smartphone (Lenhart, 2015).
- To effectively manage pediatric obesity, some interventions have utilized mobile technology (Niet et al., 2012) (Huang et al., 2014)(Nollen et al., 2014).





My question

“I am wondering...”





Methods



PICO for the more specific questions

P

Who is the patient, or **Population**, your question is focusing on?

- Elementary school student with Obesity

I

What kind of **intervention** you are looking at?

- Mobile technology

C

Comparison

- Experiment group VS control group

O

Outcome: What is the outcome you are looking for

- Weight or behavior change



PICOTS-SD for more detail

T

Time

- Pre- and post-test studies

S

Setting

- Any !

SD

Study Design

- Randomized Controlled Trial



Key Question !

“whether a intervention using mobile technology,[intervention]
is effective in managing obesity [outcome]
in elementary school student [population]”



Inclusion and exclusion criteria

Inclusion criteria

Studies with **abstract and full text**

English or Korean

Pre- and post-test studies

Using smartphone or mobile technology

Elementary school students

Conducted with parents are also included

Exclusion criteria

Target only parents

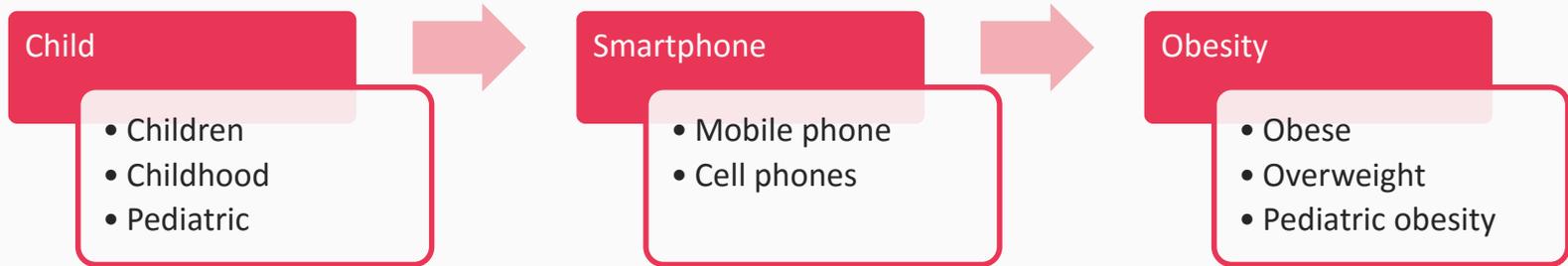
For normal students





Literature sources and search strategy

- Search terms



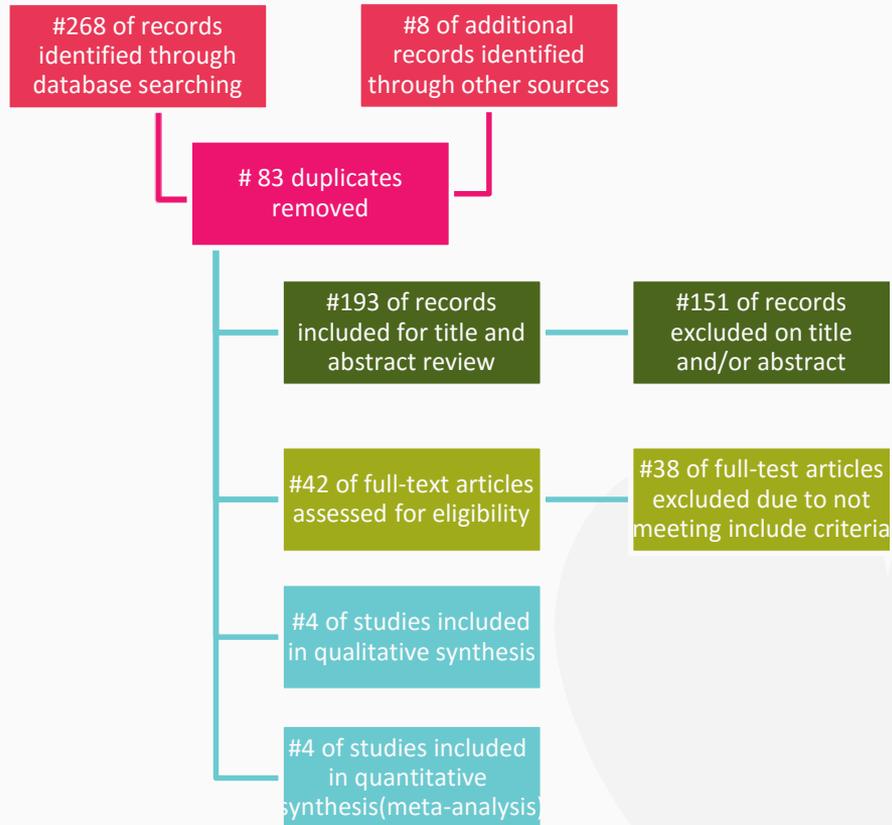
- Publication year: After January 2007

- **10 Search DB:** Cochrane CENTRAL, PubMed/Medline, CINAHL, EMBASE, KISS, KoreaMED, KMBASE, NDSL, KSITI, and RISS.

- An additional 8 studies were found manually.

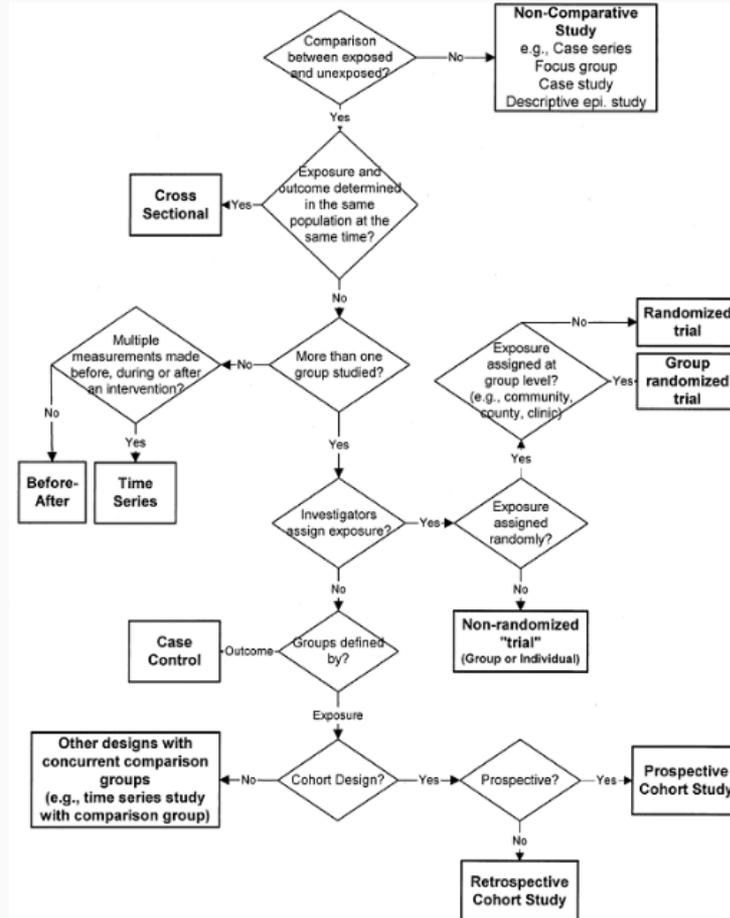


Study selection





Study classification





Data extraction and Data synthesis

- **Data extraction** was completed independently by two researchers with **Excel 2013**.
- Disagreements were resolved through discussion.
- Relevant data on study design and variables were summarized.
- Qualitative and quantitative syntheses were conducted **using Comprehensive Meta-Analysis software**.



Licensed to
111VMR

www.Meta-Analysis.com
Copyright 1998-2014 Biostat, Inc.
All rights reserved



Results



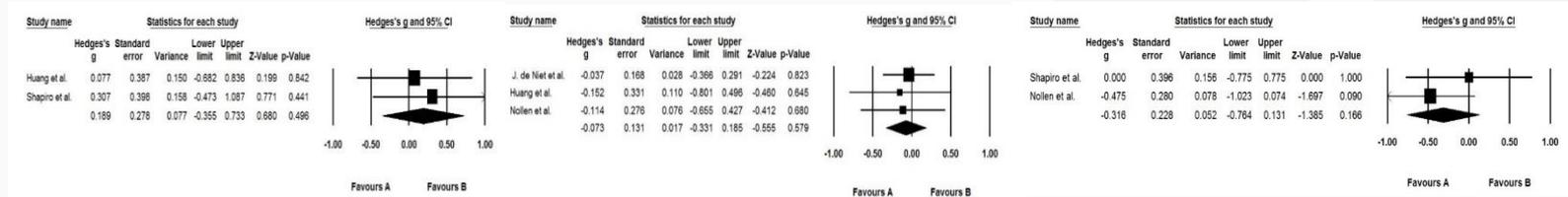
Qualitative Synthesis – study characteristics

Reference	Sample	Research Design /Duration +Used device	Intervention	Control	Obesity-related Outcomes	Dropout
J. R. Shapiro et al. (2008)	n = 58 (SMS = 18; PD = 18; C = 22) 5–13y, 62% female Mean BMI = 27	Three-group RCT, pre- and post-test /2 months +phone +pedometer	Educational group sessions weekly for 3 weeks with parents Sending 2 SMS per day (one for parent and one for child) receiving an automated SMS feedback message	PD group: self-monitoring forms to record the 3 behaviors daily for both parent and child, turned in their forms at each session, and received weekly verbal feedback. Control group: Participated in the 3 intervention sessions	Physical activity SSB screen time treatment acceptability Attrition self-monitoring preliminary efficacy	27(46.6%) (SMS = 5; PD = 11; C = 11)
J. de Niet et al. (2012)	n = 141 (SMSMT = 73; C = 68) 8–12y, 65% female, Mean BMI-SDS 2.59 (75% Obesity)	Two-group RCT, pre- and post-test /9 months +phone	Follow group sessions every 3 months with parents sent weekly self-monitoring data on exercise and eating behavior and their mood by SMS, and received tailored feedback messages	Standard care	BMI eating behaviors psychological well-being	33(23.4%) (SMSMT = 12; C = 21)
J. S. Huang et al. (2014)	n = 38 (Fit4Life = 19; C = 19) under 14y = 22 60.5% female, over BMI 85% percentile: all	Two-group RCT, pre- and post-test /4 months + phone +accelerometer	Received weekly materials via an Internet program outlining weight management, tailored SMS messages and queries were delivered twice per day, and weekly counseling calls	Once a month, parents and youth received printed weight management materials	Weight health behaviors cardio metabolic psychological outcomes	3(7.9%) (Fit4Life = 1; C = 2)
N. L. Nollen et al. (2014)	n = 51 (MT = 26; C = 25) 9–14 y, 100% female, Mean BMI = 23.7 (60% over overweight)	Two-group RCT, pre- and post-test /3 months +Mypal A626 instead of phone	Goal-setting and planning of setting two daily goals self-monitor progress toward their goals at five preselected times throughout the day	Received manuals at Weeks 1–4 (FV); 5–8 (SSB); and 9–12 (screen time).	BMI SSBs screen time	7(13.8%) (MT = 3; C = 4)



Qualitative Synthesis

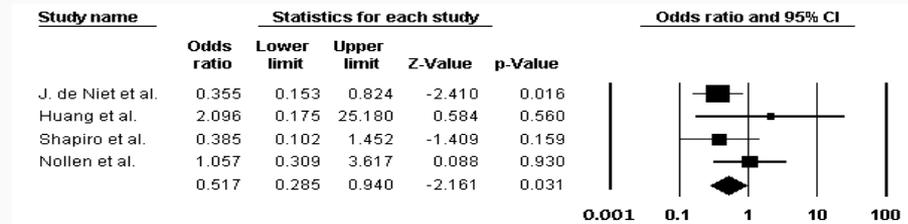
- Three studies were included for computing BMI effect size. Mobile intervention had **no significant effect** on BMI (Hedges' g : -0.073, 95% CI: -0.031 to 0.185). Additionally, two studies were examined for the effect size of daily exercise and sugar-sweetened beverage intake; neither showed any significant effect (Hedges' g : 0.189, 95% CI: -0.355 to 0.733; Hedges' g : -0.316, 95% CI: -0.764 to 0.131).





Qualitative Synthesis

- Dropout rates were considered as potential mediators of intervention outcome. Mobile intervention was **effective for controlling dropout rates** (Odds ratio: 0.363, 95% CI: 0.178 to 0.74).





Discussion



Qualitative Synthesis – Common characteristics

Four RCT Studies

- Intervention group attrition rates were lower

Three RCT Studies

- Parents' participation, text messaging was used

Two RCT Studies

- Add a pedometer or accelerometer to mobile technology.



Limitation

- **The sample size is not enough to find out the relative effectiveness.**
- We recommend additional systematic review and meta-analysis **after further studies** performed to **verify the indicators which can maximize the outcome.**





Thank You!



Any Question?

saan2mari@gmail.com

NI 2016