

Positive Technology: Using Mobile Phones for Psychosocial Interventions

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INTRODUCTION AND OVERVIEW

Intellectual History

Mobile phones are ubiquitous: 91% of Americans own one (Center, 2012), and 61% of those are smartphones (Nielsen, 2013b). Smartphones are extremely versatile, functioning like personal computers, and are an increasingly important part of people's daily lives. In one study, smartphones were within arm's reach 50% of the time, and in the same room 90% of the time (Dey et al., 2011). Researchers and clinicians in a variety of fields, including medicine and public health, have taken note of mobile phones as potentially powerful interventions.

Mobile phone interventions, including text messages and smartphone applications, are part of the broader use of electronic tools to improve physical health (also called e-health or mHealth). mHealth is defined as "*the use of mobile and wireless technologies to support the achievement of health objectives*" (Kay, Santos, & Takane, 2011). These started (and continue) via web-based platforms, and evolved with the rise of widespread mobile phone usage. The first known studies to examine the use of text messaging (or SMS – short message service) were published in 2003, making this a relatively young research discipline. Victoria Franklin of the University of Dundee, UK (Franklin, Waller, Pagliari, & Greene, 2003) and Stephanie Bauer of Heidelberg University, Germany, (Bauer, Percevic, Okon, Meermann, & Kordy, 2003), are among the earliest published authors in the field.

Since these early studies, there have been a large number of intervention studies to improve physical health outcomes, and currently there are a number of published review articles and meta-analyses (Cole-Lewis & Kershaw, 2010; Fiordelli, Diviani, & Schulz, 2013; Fjeldsoe, Marshall, & Miller, 2009; Herbert, Owen, Pascarella, & Streisand, 2013; Krishna, Boren, & Balas, 2009; Liang et al., 2011; Militello, Kelly, & Melnyk, 2012; Park, Howie-Esquivel, & Dracup, 2014; Shaw & Bosworth, 2012; Whittaker et al., 2009). Since text messages are inexpensive, comparatively simple to program, and available to any mobile phone owner, the majority of physical health mobile-based studies have used text messages to deliver interventions, rather than smartphone applications (see Table 1). One recent review concluded that "the potential of smartphones does not seem to have been fully exploited yet" (Fiordelli et al., 2013, p. 7). To date, the vast majority of these studies have taken place in Europe and North America. Studies have only rarely been conducted in developing countries, where the need for such tools is high because of relatively low access to physical health resources. Interventions have ranged from relatively short durations (2 weeks) to relatively long-term (14 months), with the frequency of the interventions ranging from 1 time per month to 6 times per day. The majority of studies (between 60% to 100%) have found positive health change on the outcome measure of interest, although this might be in part due to publication bias. The reviews demonstrate that follow up assessments are rare, making it unclear how long these effects last.

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Table 1. Summary of review articles on mobile based physical health outcomes

Citation	Number of Studies Included	Type of Intervention	Location	Intervention Period Range	Follow Up Assessments	Health Domains	Results
Cole-Lewis & Kershaw, 2010; review	12 studies (RCTs)	SMS	9 countries (majority European and North America), including 1 developing nation	3 to 12 months	None	Medication adherence, smoking, obesity/physical activity	89% found positive health change. Very high retention rates (9 with 80% plus).
Fiordelli et al, 2013; review	117 articles: only 1 from social sciences (RCTs and pilot studies)	49% SMS, 6% apps	Europe (34%), North America (33%)	Not reported	Not reported	Diabetes (21%) and obesity (14%) most commonly studied	60% found overall positive impacts across all measures; 35% found mixed results (some positive, some null).
Fjeldsoe et al, 2009; review	14 studies (RCTs or pre post designs)	SMS	Majority Europe and North America	6 weeks to 12 months	None	Diabetes, smoking, obesity/physical activity	93% found positive health change.
Herbert et al, 2013; review	7 studies (RCTs or quasi experiments)	SMS	Not reported	11 weeks to 12 months	None	Diabetes	67% found positive health change. Very high retention rates (6 with 80% plus).
Krishna et al, 2009; review	25 studies (20 RCTs and 5 controlled trials)	SMS	13 countries (majority in Europe and North America)	3 weeks to 12 months (average 6 months)	None	Diabetes, smoking, HIV/AIDS, physical activity	84% found positive health change.
Liang et al, 2011; meta-analysis	22 studies (11 RCTs, 7 pre-post, 2 quasi-experiments, 2 randomized crossover)	SMS	Not reported	3 months to 12 months	None	Diabetes (blood glucose control)	Overall, average reduction in blood glucose (declines present in 86% of studies).
Militello et al, 2012; review	7 studies of children and adolescents (RCTs)	SMS	Majority Europe and North America	2 weeks to 12 months	None	Medication adherence, smoking, physical activity, diabetes	71% positive health change.
Park, Howie-Esquivel, & Dracup, 2014; review	29 studies (RCTs and pilot studies)	SMS	Majority Europe and North America	up to 14 months	1 study with follow up assessments	Medication adherence specifically. Most common diseases were HIV/AIDS, diabetes, and asthma	62% found positive results.
Shaw & Bosworth, 2012; review	14 studies (RCTs and quasi-experiments)	SMS	7 countries (36% Europe, 36% North America)	2 weeks to 12 months	None	Weight loss, diet, or exercise	79% found positive results.
Whittaker et al, 2009; review	4 studies (RCTs and quasi-experiments)	SMS	4 countries (75% Europe)	6 weeks	6 months to 12 months	Smoking cessation	100% found short-term self-reported results. Long-term results mixed.

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