Engagement with digital behavior change intervention apps for socioeconomically disadvantaged populations: Systematic review protocol

Review objective
To identify the components of engagement with mobile app digital behavior change interventions (DBCI) for socioeconomically disadvantaged populations and current evaluation methods and practices.

Searches
A comprehensive search strategy developed in consultation with an academic librarian will be used to identify potentially relevant articles. Published studies will be identified from the following databases: PubMed, Web of Science, Scopus, Embase, PsycINFO, Communication Source, Association for Computing Machinery (ACM) Digital Library, and IEEE Xplore Digital Library.

Search queries will be conducted using Boolean operators and controlled vocabulary (e.g., Medical Subject Headings or MeSH) terms (if applicable). Search terms will be informed by prior systematic reviews and other reviews on DBCI and engagement. Search terms include five main concepts: "mobile apps" *and* "health" *and* "intervention" *and* "engagement" *and* "socioeconomic status."

Searches will also be conducted in the reference lists of included studies for other potentially relevant studies.

Types of study to be included
All experimental, quasi experimental, and observational studies that describe a mobile app DBCI with a specified health outcome and include at least one behavior change technique (BCT) for socioeconomically disadvantaged populations and assess user engagement with the app will be included.

Condition or domain being studied
Engagement with DBCI apps for socioeconomically disadvantaged populations.

Participants/population
Studies will be included if they include users of DBCI who are socioeconomically disadvantaged populations, where the target population or population recruited includes a significant (>50%) proportion of individuals who are at least one of the following: low income, have low-educational attainment or are considered low SES, racial and ethnic minority, or individuals with disabilities (may be described as marginalized, disadvantaged, hard-to-reach, minority, or vulnerable in the literature).

Intervention(s)/comparator(s)
Studies will be included that (1) describe mobile app (i.e., disseminated via smartphone or tablet) DBCI, (2) with a specified health outcome, (3) include at least one BCT (4) for socioeconomically disadvantaged populations, (5) assess user engagement or interactivity with the app, (6) published in English, and (7) peer-reviewed. Studies will be excluded if they (1) do

not include an intervention, (2) do not use digital channels, (3) do not specify a health outcome (4) do not include at least one BCT, (5) not a smartphone or tablet mobile app (i.e., websites, wearables such as Fitbits and Apple watch for Fitness tracking or other web-based platforms), (6) is a social media-based intervention, (7) not explicitly for socioeconomically disadvantaged populations or does not include a significant (>50%) proportion of individuals who are considered socioeconomically disadvantaged, (8) do not assess engagement or interactivity with an app, (9) are an intervention to improve participant recruitment, participation, and retention or is a data collection tool, (10) are a non-empirical study (i.e., does not generate original data), (11) are a technical report, dissertation, thesis, book, or book chapter, (12) published in a language other than English, or (13) are not peer-reviewed.

Context
Published articles with no restriction on language, country of origin, or publication date will be included.

Main outcome(s)
To describe how engagement with DBCI for socioeconomically disadvantaged populations is operationalized, measured, and what associated analytics represent across disciplines

Data extraction (selection and coding)
In accordance with Cochrane Collaboration guidelines for conducting systematic reviews, three researchers will conduct an independent title and abstract screening in Rayyan using a decision tree for inclusion and exclusion criteria. Three researchers will then conduct a blind title and abstract screening in Rayyan and meet to resolve any discrepancies. Full-text will be located and independently reviewed for eligibility. The researchers will compare their full-text review and discrepancies will be resolved using a consensus-based approach.

Three researchers will divide and independently extract data using a data extraction form in Research Electronic Data Capture (REDCap). The data extraction form will include: intervention overview (e.g., intervention name, country of study, funders, health issue or health behavior, intervention duration, intervention component, use of behavior change techniques, and use of theory), details about the study (e.g., aims and objectives, study design, population characteristics, and total sample size), measures (e.g., engagement, outcome, and other measures), data collection methods and scales used, as well as the definition of engagement used in the article.

Risk of bias (quality) assessment
For RCTs, risk of bias will be assessed using the Cochrane Collaboration tool for assessing risk of bias and will be categorized as low, unclear, or high risk of bias. For non-RCTs, risk of bias will be assessed using the Risk Of Bias In Non-randomized Studies—of Interventions (ROBINS-I) and will be classified as low, moderate, serious, or critical risk, or no information based. Depending on the number of articles included in the review, the three researchers will independently code risk of bias for all articles and disagreements between the three researchers will be resolved by consensus.

Strategy for data synthesis

A narrative synthesis on study design, intervention characteristics, measures and data collection methods, and engagement definition will be provided for all included studies and summarized statistically where possible. PRISMA reporting guidelines will be used to report results.

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Type and method of review
Systematic review

Anticipated or actual start date
June 2020

Anticipated completion date
September 2020

Conflicts of interest
Hannah Getachew-Smith: none known. Alexandra Brockner: none known. Nihmotallahi Adebayo: none known.

Language
English

Country
United States of America

Subject index terms
Digital health; intervention; behavior change; mobile apps; engagement; socioeconomically disadvantaged

Stage of review

Review ongoing

Stage of review at time of this submission	Started	Completed
Preliminary searches	Yes	Yes
Piloting of study selection process	Yes	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No