

Open research and systematic review on using virtual representations in mHealth application



interventions for health-related behaviour change

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Introduction

Background

Virtual representations can be incorporated on mobile health devices and applications (mHealth apps) to deliver health information which is aimed at improving knowledge and behaviour change (1, 2).

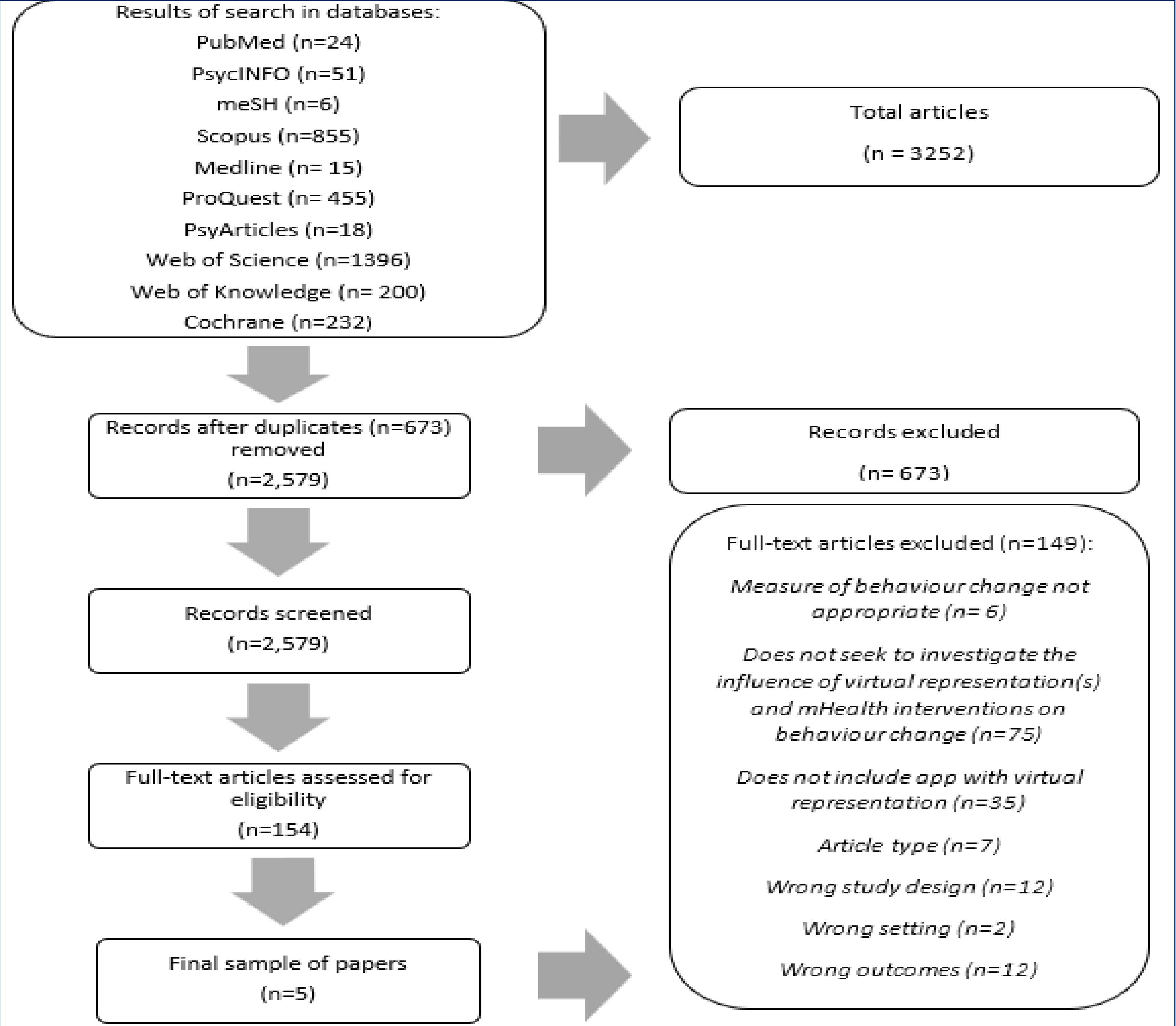
A **virtual representation** is a highly realistic representation of a person and can be presented in the following formats (3):

An avatar is a subject representation that has been created to look like a person

An agent or doppelganger is a representation that does not represent any person

Research Aims

- Determine which digital features of the virtual representations used in mHealth application interventions have been found to be effective in influencing health-related behaviours and outcomes.
- Understand whether there were any specific mechanisms and behaviour change techniques, if any, that were found to be effective in these interventions.



Systematic Review Article Summaries			
(Reference) Authors and virtual representation	Participant Characteristics	Summary of Key Findings	Quality Rating
Ossolinski et al., (2017) (6) Avatar	N = 145 Aged >18 years; BMI > 25 kg/m ² ; wanting to lose weight	Delaying access to personalised avatar future images promoted greater weight loss. Men were found to lose more weight than women	Low
Fuchs et al., (2019) (7) Avatar	N= 28 (17 males, 11 females) Mean age=1985.6, (SD=9.59)	The avatar improved risk awareness, low-salt outcome expectations and intentions toward a balanced, low-salt diet	Low
Dworkin et al., (2019) (8) Agent	N= 43 (HIV positive males) Aged 18–34 years (median = 29, no reported variance)	Pill count adherence, knowledge of viral load, and CD4 count significantly improved	Moderate
Wonggom et al., (2020) (9) Agent	N= 36 (males = 20; females = 7) Mean age =65.5; (SD= 11.3)	At 90 days, the intervention group participants had a higher increase in knowledge score compared with the control group	Moderate
Mohan et al., (2020) (10) Avatar	N= 21 diabetics (mean age 51 ± 8 years) No gender reported	Participants increased their weekly exercise volume in response to the coach's goal recommendations	Low

Method

Search Terms

Search criteria was developed using the PICOT template and meSH terms in ten databases. Examples of the terms included were:

“mHealth” OR virtual AND representation OR “virtual representation” OR “avatar” OR “agent” OR “doppelganger”

Study Selection Criteria

- Published in English
- Report results of non-clinical participants
- An mHealth app intervention that includes a virtual representation
- Report outcomes that include health behaviours or health risk behaviours.

Studies were also screened using the TiDIER checklist, and quality checked using the Mixed Methods Appraisal Tool (4) and the Risk of Bias Assessment tool (5).

Results & Conclusions

Out of 3252 articles screened, five met the inclusion criteria. Inclusion of a virtual representation on an mHealth app is beneficial in changing health behaviours such as weight loss, treatment adherence, diet outcome expectancies and intention, as well as in educating participants about heart failure.

Mechanisms such as motivation, feedback, self-image, goal setting, and self-monitoring were effective in encouraging behaviour change and app adherence.

More theoretical work is required to link virtual representations within the wider taxonomy of health-related behaviour change, and replication attempts are required to explicate the interaction between virtual representations on mHealth apps and real-world health-related behaviour.

References

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Contributions to Open Research

Wins

- Able to disseminate findings through eventual publication in a newly established open research, and peer-reviewed journal
- Attended open research course and collaborating with a wider research team
- Included an open-research protocol on Prospero: CRD42021231215
- Included publicly available data: <https://github.com/laurentaylorHP/Using-virtual-representations-in-mHealth-application-interventions-a-systematic-review.git>

Challenges

- Lack of guidance around preferred formats to present research content and data fairly.
- Limited opportunities to promote the benefits of sharing data in repositories for easy access, storage, and preservation

Learnings

- Importance of increasing accessibility and impact of my research
- New Open Software tools
- Importance of establishing a pre-print protocol and article