

A CONTENT ANALYSIS AND ETHICAL REVIEW OF MOBILE APPLICATIONS FOR DEPRESSION: EXPLORING THE APP MARKETPLACE

Dionne Bowie-DaBreo, PhD student^{1,2}; Sandra-Ilona Sunram-Lea, PhD¹; Corina Sas, PhD³; Heather Iles-Smith, PhD²

¹ Department of Psychology, Lancaster University; ² Research and Innovation Centre, Leeds Teaching Hospitals NHS Trust; ³ Department of Computing, Lancaster University

BACKGROUND

- Research investigating publicly available mobile apps for depression have shown a range of concerns from limited research evidence¹, poor treatment fidelity^{2,3}, and issues with privacy and data security^{4,5}
- This study advances this work through a content analysis and ethical review of app store listings of apps for depression
- Whilst past content analyses and app reviews have highlighted some ethical and safety concerns, there has been no focussed ethical review to consider how these issues may present to potential users who seek to find help through the app stores
- This research is part of a larger work in progress aimed at developing an ethical framework for mobile mental health

METHODS

- We searched the two main app stores (Google Play Store and Apple iOS App Store) using the terms 'Depression' and 'Mental health' during October – November 2018
- Inclusion criteria included: Apps targeting depression
- Exclusion criteria included: Apps not marketed for depression, apps not considered to be mHealth (e.g. training apps), quotes/wallpaper apps, and exact duplicates
- Content analysis and ethical review of app store listings was iterative, with new variables extracted as treatment and ethical issues presented. Key categories of data extracted included: App information, developer information, treatment information, app store age ratings, privacy policies, permissions, usage data, and financial information

RESULTS

We identified a total of 353 eligible apps for depression

Treatment approach varied across apps

- 24 different treatment approaches were listed
- Most apps (203/353) used a single treatment approach

The network below shows the 10 most used treatment approaches for all apps (n=353), proportionate in size to frequency of use. It also highlights connections between the use of different treatment approaches for apps using multiple approaches (150/353)

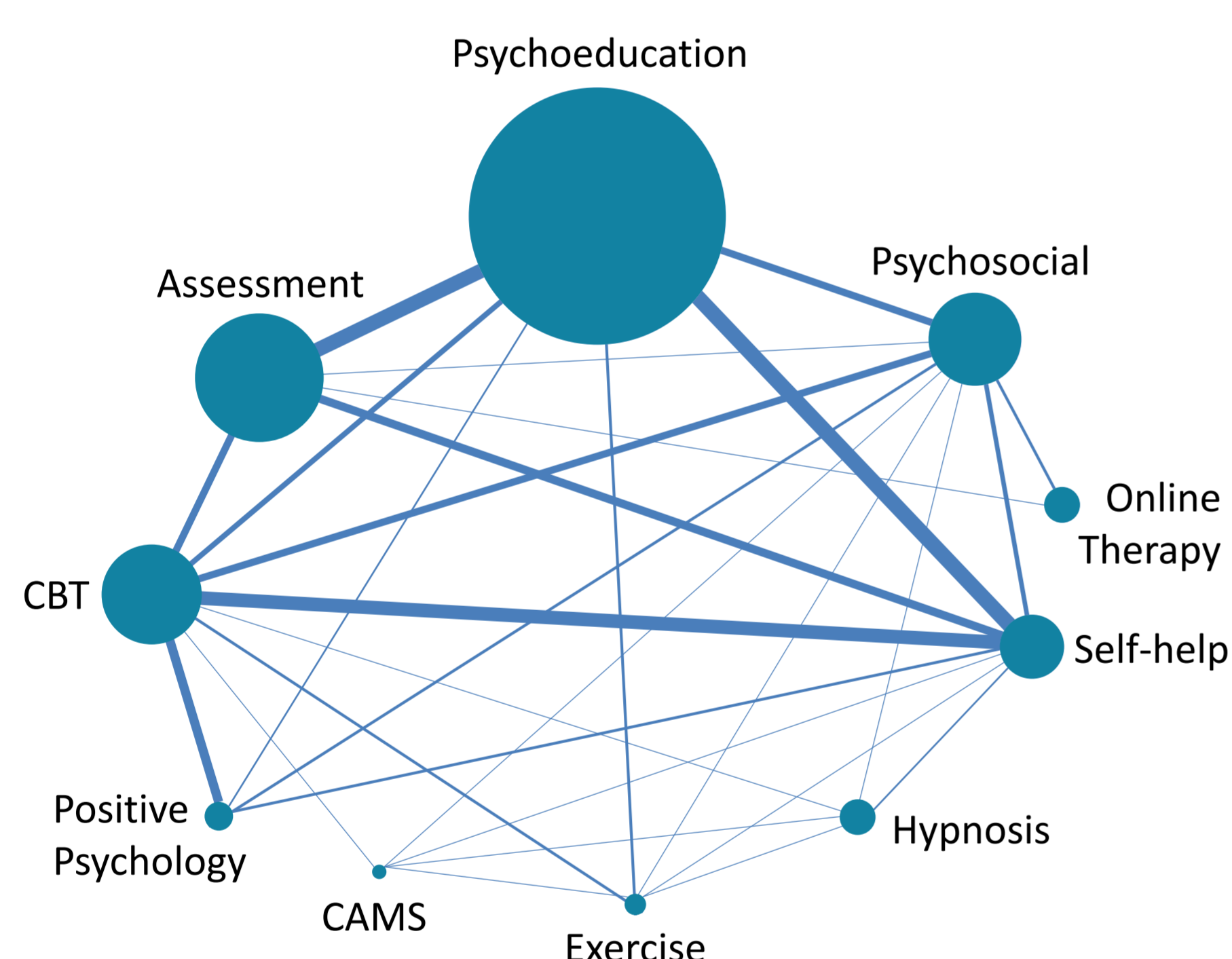


Fig 1. Network of most used treatment approaches

Treatment strategies also varied across apps

- 34 different strategies were listed with the 5 most used being:
 1. Monitoring and tracking (108/353)
 2. Mindfulness/Meditation (54/353)
 3. Emotional awareness (41/353)
 3. Relaxation (41/353)
 5. Peer support (34/353)

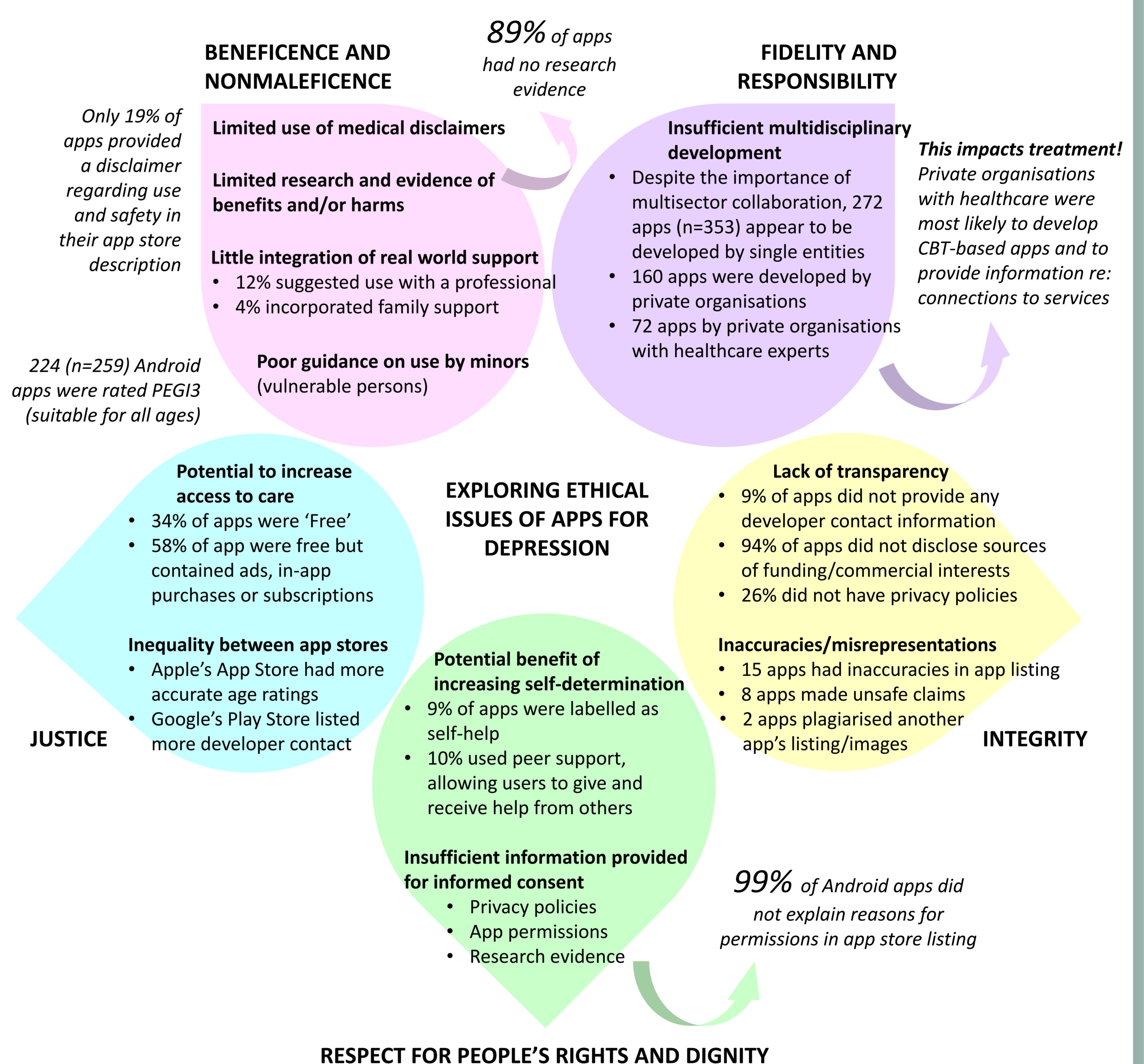


Fig 2. Ethical review of apps for depression framed by the American Psychological Association's (2017)⁶ ethical principles

DISCUSSION

- Despite advances in mobile mental health, commercial mental health apps continue to trail in evidence and practice
- Psychoeducation continues to dominate the approaches, while non-evidence-based approaches and strategies for depression are widely used by developers. There is need for greater research into the efficacy and outcomes of these strategies and combinations of treatment
- There is also great need for increased transparency of information to help users to make informed and safe choices, including information on treatment approaches, research evidence or lack thereof, use with/by minors and vulnerable persons, developer information etc. Many of these issues can be addressed by presenting users with clear and accurate information
- We have organised these issues using the APA's ethical principles with the aim of evolving the application of these principles to develop an ethical framework for mMental Health

¹ Shen, N., Levitan, M., Johnson, A., Lorene Bender, J., Hamilton-Page, M., Jadad, A.R., & Wiljer, D. (2015). Finding a depression app: A review and content analysis of the depression app marketplace. *JMIR mHealth and uHealth*, 3(1), e16.

² Huguet, A., Rao, S., McGrath, P.J., Wozney, L., Wheaton, M., Conrod, J., & Rozario, S. (2016). A systematic review of cognitive behavioural therapy and behavioural activation apps for depression. *PLoS ONE*, 11(5), e0154248

³ Stawarz, K., Preist, C., Tallon, D., Wiles, N., & Coyle, D. (2018). User experience of cognitive behavioral therapy apps for depression: An analysis of app functionality and user reviews. *Journal of Medical Internet Research*, 20(6), e10120

⁴ O'Loughlin, K., Neary, M., Adkins, E.C., & Schueller, S.M. (2019). Reviewing the data security and privacy policies of mobile apps for depression. *Internet Interventions*, 15, 110-115.

⁵ Sanches, P., Janson, A., Karpashevich, P., Nadal, C., Qu, C., Dauden Roquet, C., ..., Sas, C. (2019). HCI and affective health: Taking stock of a decade of studies and charting future research directions. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'19)*

⁶ American Psychological Association (APA) (2017). *Ethical principles of psychologists and code of conduct*. Retrieved from <http://www.apa.org/ethics/code/ethics-code-2017.pdf>

This research is part of a PhD project under the AffecTech ITN. AffecTech is a multidisciplinary research and development project funded by the Horizon 2020 Innovative Training Network of the European Union under the Marie Skłodowska-Curie grant agreement no. 722022. For more information on AffecTech, please visit www.affectech.org