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Protocol for a systematic review comparing mobile health apps for breast cancer prevention and education

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 August 2023 and was last updated on 23 August 2023.

INTRODUCTION

Review question / Objective The objective of this systematic review is to comprehensively assess and evaluate the functionalities, features, accuracy, and quality of mobile health (mHealth) apps designed for breast cancer prevention and education among women. The review aims to provide a comprehensive understanding of the available mHealth apps on the German Google Play or Apple App store, specifically focusing on their potential to support women in adopting healthier lifestyles, increasing awareness about breast cancer prevention, and providing reliable and accurate information. By systematically examining the apps within this context, the review intends to identify the strengths, limitations, and gaps in the current landscape of breast cancer prevention apps, thereby contributing to informed decision-making for both users and healthcare professionals. Nowadays, digital tools including mHealth Apps are increasingly recognized as essential and widely

used resources for provision of information and education. mHealth Apps provide a range of functionalities and benefits, including tailored health information, interactive features, reminders and tracking tools, and real-time monitoring of health behaviors, which are not typically available through traditional websites or other information sources. In the context of breast cancer prevention, mHealth apps can support users in various ways. For example, smartphone apps can track physical activity and nutrition, which have been shown to be a feasible and acceptable intervention for weight loss, and there are apps specifically designed for breast cancer prevention in women. Lifestyle factors such as alcohol and tobacco consumption, have significant impact on breast cancer risk and recent studies have demonstrated the potential of smartphone apps to increase cessation rates of tobacco and alcohol consumption, thereby further contributing to breast cancer prevention efforts. While mHealth apps have a great potential to aid women in adopting healthier lifestyles, raise awareness about the

significance of breast cancer prevention, and offering dependable and accurate information, prior reviews show that breast cancer apps are still subjected to various limitations. Some have only focused on breast cancer patients or survivors, while others conducted app store searches from other continents than Europe, or only analyzed app content and not their quality. Consequently, we set out to provide a systematic review of mobile apps available on the German Google Play or Apple App store covering particularly apps focusing on breast cancer prevention and education.

Rationale mHealth apps have become vital tools for disseminating information and education. These apps offer tailored health insights, interactive features, reminders, and real-time health monitoring.

Within the context of breast cancer prevention, mHealth apps offer diverse support. Some apps track physical activity and nutrition, aiding weight management, while others specifically target breast cancer prevention. Lifestyle factors like alcohol and tobacco can impact breast cancer risk, and apps tailoring such topics might help to improve the users' lifestyle.

Despite their potential, previous reviews of breast cancer apps have shown limitations—focusing only on patients or analyzing app content without considering the quality. To address this, we propose a systematic review protocol focusing on mHealth apps available on the German Google Play and Apple App stores, with the focus on breast cancer prevention and education. By evaluating app functionalities, attributes, and quality, we aim to summarize current digital options for breast cancer prevention and highlight features that can be leveraged to improve app development.

Condition being studied Mobile Applications addressing breast cancer prevention and education available on the German Google Play and Apple App stores with the focus on functionalities, attributes and overall quality.

METHODS

Search strategy Systematic search in the Google Play Store and Apple App store using following search terms, either in English or in German: breast cancer, breast cancer help, breastcancer, Brustkrebs, Brustkrebshilfe, Mammakarzinom.

Participant or population Mobile Applications addressing breast cancer prevention and education.

Intervention Prevention and education about breast cancer using different interventions like tutorials for breast self-examination, education about breast cancer risk factors, education about mammography and screening programs, notification and documentation features.

Comparator Not applicable.

Study designs to be included All apps matching the search terms will be categorized. Apps categorized as "Prevention" and last updated after June 2020 will be included.

Eligibility criteria Apps will be excluded and defined as false hit based on the following criteria: 1) no relation to breast cancer, e.g. apps made for other types of cancer, 2) have a relation to breast cancer but do not fit in one of the above groups, e.g. apps without a benefit for the user itself like wallpaper apps, 3) are not available in either English or German.

Information sources The search will be performed using the search function within the Google Play and the Apple App store.

Main outcome(s) The review aims to identify and categorize these apps based on their attributes, technical aspects, and preventive features, including but not limited to breast self-examination tutorials, reminders for self-examination, documentation features, information about breast cancer risk factors, mammography and screening programs, and references to scientific literature.

Additional outcome(s) The Mobile Application Rating Scale (MARS) is utilized to quantitatively assess the quality and effectiveness of the reviewed apps.

Quality assessment / Risk of bias analysis Given our review's focus on app evaluation within App stores, traditional risk of bias assessment methods are not directly applicable; instead, a systematic analysis of app attributes, functionalities, and user feedback to thoroughly assess their features and characteristics will be conducted.

Strategy of data synthesis Two independent reviewers will rate each app using the MARS. The MARS is a simple, reliable and objective tool for analyzing, classifying and evaluating the quality of mobile applications. . The mean over all objective subscales (engagement, functionality, aesthetics and information) will be analyzed as well as the mean value of satisfaction representing the subjective quality.

Association of MARS scores with app characteristics and breast cancer prevention specific app features, respectively, will be evaluated using the Mann-Whitney-U test. The interrater reliability coefficient Cohen κ will be calculated.

Subgroup analysis The following subgroups will be evaluated: App distribution platforms, app developers (Health organization vs. other developers), Download numbers, App update frequency and preventive features.

Sensitivity analysis The interrater reliability coefficient Cohen κ will be calculated to assess reviewers' agreement.

Language restriction German, English.

Country(ies) involved Germany.

Keywords breast cancer; prevention; mHealth; mobile apps; quality; MARS; rating.

Contributions of each author

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