

A Structured Review and Evaluation of Android Mobile Applications for Yoga Support

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Abstract. Although there are hundreds of mobile yoga apps in the app market space, the quality and usefulness of these apps have not been systematically tested. We conducted a structured quality evaluation of apps from the Google Play store, applying the validated Mobile Application Rating Scale (MARS) by two independent raters. 18 out of 250 apps were identified for evaluation after applying inclusion/exclusion criteria. The mean MARS score is 4.11 (out of 5) with SD = 0.38. There was high interrater reliability (ICC = .88; 95% CI 0.85-0.91). Apps performed well on functionality and aesthetics. However, there is much room for improvement in information and engagement. Designers and researchers should focus on improving user engagement and building the evidence base for informational content provided in apps.

Keywords. mobile application quality assessment, Android, yoga app

1. Introduction

An age-old eastern healing tradition, yoga is widely accepted and practiced by approximately 36.7 million Americans [1]. Traditionally taught by in-person training, some of the issues such as time and transportation might hinder the continuity of practice. A previous intervention study using a mobile application (app) that offered yoga, meditation, sound, breathing exercise, health advice (e.g., diet, exercise) found significant improvement in mental health status [2]. Apps may offer the convenience of doing yoga when an individual chooses and eliminate the need for transportation and scheduling. To provide a better user experience, evaluation of the functionality and quality of the yoga apps is necessary. Despite the widespread availability of commercial yoga apps, there is a lack of evidence about the potential usability of these tools. In this pilot study, we aimed to rigorously evaluate mobile yoga tools from the Google Play store with a validated tool.

2. Methods

Two distinct processes were applied for this study. First, we selected apps based on our selection criteria established a priori. In the second step, we evaluated our final sample of apps with a validated tool. We used the Python library, Google-Play-Scraper, to retrieve app information from the Google Play store. We used the search keyword 'yoga' on 4/18/2019 for retrieving yoga-related apps.

We selected apps for inclusion if they fulfilled the following criteria based on the description mentioned in the Play store: a) in English; b) for general adult population; c) had a recent update in the year 2017 or later; d) had textual, visual, and audio guidance of the Asana or yoga postures; e) are free to download and offer some yoga support free of cost; and f) had current star rating above 4 with a minimum of 1,824 raters. The number of raters criterion was selected as an indication that the app was commercially available and in active use (rather than being recently published and potentially untested) and represented the mean number of raters among all 142 apps with minimum 4-star rating identified in the search. The median number of raters was 84, and the range was 2 to 86,761. We excluded apps that offered only yoga wallpapers, yoga magazine articles, finger yoga poses, or meditation music as they lacked audio-visual demonstration and guidance for body yoga poses.

We applied the Mobile Application Rating Scale (MARS) developed by Stoyanov et al. because of its widespread use as an instrument for assessing app quality along multiple dimensions (engagement, functionality, aesthetics, information, and subjective quality) and its high internal consistency (Cronbach alpha = .90) [3]. Each of these MARS components consists of a 5-point Likert scale (1-Inadequate, 2-Poor, 3-Acceptable, 4-Good, 5-Excellent) with distinct and identifiable characteristics. The investigators agreed upon the methodology and the interpretation of the MARS components. Two raters reviewed each app independently, spending 30 to 40 minutes with each. After individually rating apps, they met to discuss their ratings and consulted with a third investigator to mediate and resolve any discrepancies in the interpretation of the scale or ratings.

3. Results

The flow chart (Figure 1) describes the step-by-step process of screening and selecting 18 apps for the final analysis from the initial pool of 250 apps. Based on the ratings (shown in Table 1), the Track Yoga app received the highest score (4.82), which is 0.32 higher than its published average star rating in the Google play store. The lowest MARS score observed was the Yoga Challenge App1, although this app had a higher published star rating. Most apps performed well on functionality ($M=4.65$; $SD=0.34$) and aesthetics ($M=4.22$; $SD=0.41$) compared to the engagement ($M=3.83$; $SD=0.62$) and information ($M=3.75$; $SD=0.83$) domains. There was excellent inter-rater reliability between the two independent raters (two-way mixed ICC = 0.88; 95% CI 0.85-0.91). Similar inter-rater reliability was noted in another study using MARS to evaluate mindfulness apps [4].

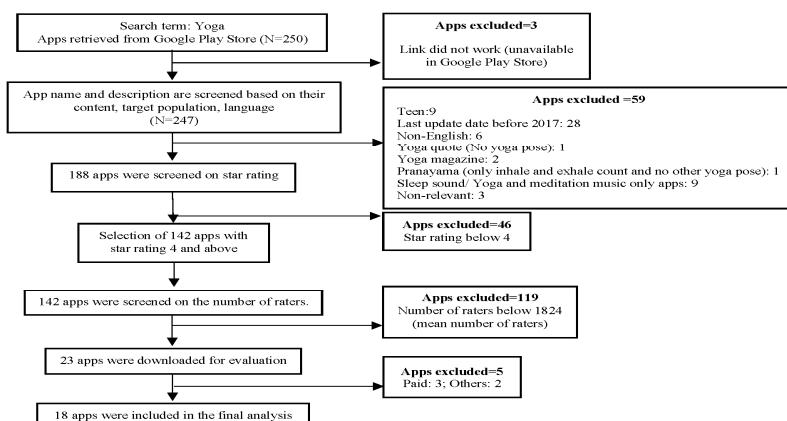


Figure 1. Flow chart describing the app selection process

Table 1. The MARS scores compared to Google Play star ratings for yoga applications

Name of App	Average sub-score of two reviewers				Average total score (a+b+c+d)/4	Google star rating*
	Engagement	Functionality	Aesthetics	Information		
Daily Yoga – Yoga Fitness Plans	4.50	3.50	4.33	3.75	4.02	4.4
Keep Yoga - Yoga & Meditation, 4.30		4.62	4.16	4.08	4.29	4.7
Yoga Daily Fitness						
5 Minute Yoga	3.30	5.00	4.49	4.08	4.21	4.5
Yoga poses & Classes	3.57	4.75	4.33	3.83	4.12	4.3
Yoga-Track Yoga	4.90	5.00	4.83	4.58	4.82	4.5
Yoga for weight loss -Loss weight in 30 days plan	4.70	4.5	4.33	4.33	4.46	4.6
Simply Yoga - Fitness Trainer for Workouts & Poses	3.70	4.62	4.00	4.33	4.16	4.1
Yoga Challenge App1	3.00	4.37	3.83	1.58	3.19	4.4
Yoga daily fitness - Yoga workout plan	4.30	4.50	4.00	3.91	4.17	4.6
Yoga Studio: Mind & Body	3.40	4.50	4.83	3.74	4.11	4.3
Yoga Workout - Yoga for Beginners - Daily Yoga	4.50	4.87	4.49	3.99	4.46	4.7
Yoga for Beginners	3.40	5.00	4.66	4.24	4.32	4.3
7pranayama: Yoga Daily Breath Fitness Habit – Calm	4.00	4.62	3.83	4.49	4.23	4.6
Yoga Flexibility for Beginners	3.60	4.62	4.49	4.08	4.19	4.1
Yoga for Kids	3.30	4.62	3.66	2.41	3.49	4.4
Yoga for Weight Loss	4.20	4.75	4.66	3.99	4.40	4.2
Complete Yoga Guide	2.60	4.87	3.66	4.08	3.80	4.2
Yoga Challenge App2	3.70	5.00	3.49	2.16	3.58	4.6

Note. Yoga Challenge App1 and Yoga Challenge App2 are two different apps with the same name.

* The scores are based on the app versions from the time of our search (2019) and may not be representative of the most up-to-date versions of the apps.

4. Discussion

Most apps (78%) scored above 4 on MARS ($M=4.11$; $SD=0.38$, range 3.19 to 4.82), indicating little variability among apps. This may be due to the selection criterion of 4-star rating or above. The majority of apps (72.2%) also had a lower MARS score than the star rating. Our findings highlight the need for attention to the information and engagement domains compared to the functionality and aesthetics. A low score in the engagement domain suggests that developers should focus on enhancing user engagement strategies (e.g., gamification). Another study [4] with mindfulness apps also noted low engagement scores and recommended design-specific attention in this domain. The lowest MARS score was observed in the information domain, which is consistent with other app review studies [5], indicating the lack of evidence-based content.

We were unable to consider the MARS item 19 (Evidence Base), which asks the rater to assess the evidence from the literature as most of the apps were not represented in the scientific literature, consistent with other studies [4]. There is a possibility that high-quality apps were not included in our review since we excluded apps with low number of raters, apps requiring payment, and those that did not provide full-body demonstration or guidance. In addition, use of single search term 'yoga' might eliminate some of the apps that contain yoga support components. For example, an app with yoga content 'Nike Training Club' was missing from our app retrieval. Multiple key search terms may reduce the possibility of such automatic elimination of the target apps.

Our study findings highlight that the MARS is a useful tool for the initial quality evaluation and provides similar scores to Google star ratings. However, the use of the instrument alone cannot be a replacement for other evidence-based research methods involving end-users. There is a possibility that the recent status of the apps after publication may differ from the app status during evaluation. Despite limitations, our findings have given a preliminary idea about the status of the selected free content of the yoga apps and will encourage further research.

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