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DEVELOPMENT AND VALIDATION OF THE DUTCH VERSION OF THE MOBILE APPLICATION RATING SCALE (MARS):

A PILOT STUDY ON PREGNANCY APPS

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BACKGROUND & OBJECTIVE

Expectant mothers are now accessing the **Internet** for health information. Also **mobile technology** is an increasing, influential source of information. A majority of pregnant women download an average of three **pregnancy apps** during gestation. However, the reliance on apps for information about pregnancy rather than on health care professionals, as well as the **quality of the information** in mobile apps are causes of concern.

A generally accepted, reliable tool for evaluating health applications is the Mobile Application Rating Scale (**MARS**). However, there is no standardized Dutch tool for assessing apps. Therefore, the objective of this study was to develop a **Dutch version of the MARS**, to investigate its usefulness for assessing the quality of pregnancy apps and to evaluate its **psychometric properties**.

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MATERIALS AND METHODS

INSTRUMENT MARS	❖ 23 items scored on a five-point Likert scale ❖ 4 objective subscales : engagement, functionality, aesthetics, information ❖ 1 subjective subscale ❖ MARS score: total, subscale, subjective score
ADAPTATION AND TRANSLATION	❖ According to the WHO-guideline 'Translation and adaptation of instruments ' ❖ Consisting of a forward translation, expert panel and backward translation
SEARCH STRATEGY PREGNANCY APPS	❖ Google Play Store ❖ Samsung Galaxy S8 plus ❖ March 2018 ❖ Search terms: 'pregnancy', 'zwangerschap', 'birth', 'geboorte', 'bevalling', 'labour' and 'foetal'
APP SELECTION	❖ Smartphone based, free and paid ❖ 19 most downloaded apps ❖ Apps targeting pregnant women, providing information about pregnancy, a specific maternal risk factor or perinatal health outcome
APP ASSESSMENT	❖ MARS online training module + guideline ❖ Pilot study on five apps ❖ Two reviewers rating independently at two time points (two weeks apart)
STATISTICAL ANALYSIS	❖ Descriptive statistics (MARS score) ❖ Absolute reliability (standard error of measurement, %SEM) ❖ Inter- and intrarater reliability (Wilcoxon signed-rank tests, Intraclass correlation coefficients) ❖ Internal consistency (Cronbach's alpha coefficients)

RESULTS

Moderate to excellent inter- and intrarater reliability were found for the total MARS scores and the subjective part. The absolute reliability showed generally low %SEMs, indicating good reliability.

The reliability for the subscale scores varied from poor to good. Intraclass correlation coefficients (ICCs) of the interrater reliability ranged from 0.176 to 0.796 and from 0.276 to 0.921 for the intrarater reliability, with poor ICCs in the functionality subscale.

Internal consistency was acceptable for all subscales and the subjective part, except for the functionality subscale (Table 1).

Table 1: Results of the inter- and intrarater reliability (ICC), the absolute reliability (%SEM) and internal consistency (Cronbach's alpha) of the MARS total scores, subscale scores and subjective part

	Interrater reliability (ICC)	Intrarater reliability (ICC)	Absolute reliability (%SEM)	Internal consistency (Cronbach's alpha)
MARS total	0.672 - 0.765	0.794 - 0.921	3.50 - 7.70	-
Engagement	0.782 - 0.796	0.808 - 0.886	6.71 - 10.25	0.861 - 0.932
Functionality	0.176 - 0.304	0.276 - 0.393	5.32 - 6.27	0.010 - 0.596
Aesthetics	0.492 - 0.729	0.671 - 0.779	9.29 - 12.02	0.786 - 0.902
Information	0.657 - 0.665	0.730 - 0.874	6.10 - 10.73	-
Subjective part	0.601 - 0.761	0.729 - 0.882	11.05 - 23.55	0.892 - 0.943

DISCUSSION

The inter- and intrarater reliability and internal consistency in our study were similar to those of the original study (Stoyanov, 2015), except for the functionality subscale. ICCs for the functionality subscale were also lower in the original study, but were moderate (ICC=0.50) rather than poor in our study. However, absolute reliability (%SEM) for this subscale was low.

CONCLUSION

The Dutch version of the MARS seems to be a reliable tool for rating the quality of pregnancy apps. However, further research is needed to optimize the instrument (e.g. functionality subscale) and to evaluate its psychometric properties (e.g. validity) on a larger number of apps. Also the usability of the MARS by health professionals and the implementation in daily practice should be further explored.

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