Nutrition Management Mini-Programs in WeChat: Evaluation of Functionality and Quality

Hui Sun, yanping Wu, jia Sun, wu Zhou, qian Xu, dandan Hu

Submitted to: JMIR Human Factors
on: January 18, 2024

Table of Contents

Nutrition Management Mini-Programs in WeChat: Evaluation of Functionality and Quality

Hui Sun[1]; yanping Wu[1]; jia Sun[2]; wu Zhou[1]; qian Xu[1]; dandan Hu[1]

[1]School of Medicine, Southeast University, Nanjing, China Southeast University China Naning CN
[2]The Affiliated Lianyungang Hospital of Xuzhou Medical University Lianyungang CN

Corresponding Author:
yanping Wu
School of Medicine, Southeast University, Nanjing, China
Southeast University
China
No.87 Dingjiaqiao, Hunan Road
Naning
CN

Abstract

Background: Due to the improvement of living standards and the aging of the population, the medical and health field has attracted much attention.Among them, nutrition management has become the focus of domestic research.Nowadays,with the rapid development of the Internet, developers have developed wechat nutrition management mini programs aimed at improving and monitoring the nutritional health status of individuals. However, there has been insufficient scientific evaluation of the functionality and quality of the various nutritional applets that have emerged on the market.

Objective: The purpose of this study was to evaluate the function and quality of China's wechat nutrition management mini program by using uMARS scale, and to explore the relationship between user rating, function rating and user-version mobile application Rating Scale (uMARS).

Methods: Search for keywords such as nutrition, diet and meals on wechat platform, screen related mini programs according to inclusion and exclusion criteria, screen mini programs registered, updated and in use from January 2017 to November 2023, and collect basic information about mini programs such as experience score, registration time, update time and service type . The main functions of the mini program were integrated and summarized, and the function score of each mini program was obtained in the form of 1 point for each function. The quality of the mini program for nutrition management was evaluated by the user version Mobile Mini Program Rating Scale (uMARS) by 2 nutrient-related field evaluators and 1 user experiencer.

Results: Of 891 small programs were searched and 27 small programs related to nutrition management were finally obtained. 85.2% (23/27) of the mini programs provide diet management, record daily diet to assess nutritional status, 70.4% (19/27) of the mini programs provide nutrition knowledge and classroom teaching, 59.3% (16/27) of the mini programs provide exercise management, daily exercise clock. Only 44.4% (12/27) of the mini programs included weight management.The uMARS total quality median score (out of 5) was 3.38(IQR3.13-3.58), indicating that most small programs scored higher than 3 points ,and the overall range 2.85 to 3.88. The dimensions of engagement ranged from 2 to 4.33 (median 3, IQR 2.67-3.67), with 2 being the lowest score for uMARS. The functional dimension ranges from 3 to 4(IQR 3.33-4), but there are two scores outside the normal range, 2.67 and 4.33. The aesthetic dimension ranges from 2.33 to 4.67(median 3.67,IQR3.33-4) The informational dimension ranges from 2.33 to 4.67(median 3.33, IQR 2.67-3.67).

Conclusions: This research evaluated the application of wechat mini programs related to nutrition management. The uMARS scale shows that these mini programs are of average quality, and most concentrate on health rather than nutrition. And the quality is uneven, the function is not perfect, urgent improvement. The future development direction should focus on enhancing quality, innovative functions, and encourage the active participation of professionals to provide more scientific and practical personalized diet guidance.

(JMIR Preprints 18/01/2024:56486)
DOI: https://doi.org/10.2196/preprints.56486

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v
Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

Nutrition Management Mini-Programs in WeChat: Evaluation of Functionality and Quality

Hui Sun[i] Yan Ping Wu[1] Jia Sun[ii] Wu Zhou[1] Qian Xu[1] DanDan Hu[1]

1 School of Medicine, Southeast University, Nanjing, 210009, China;

2 The Affiliated Lianyungang Hospital of Xuzhou Medical University, Nanjing, 222002, China

Corresponding Author

Yan Ping Wu

School of Medicine, Southeast University

No.87 Dingjiaqiao, Hunan Road

Nanjing

China

Phone:17612561340

Email: chuchu_999@126.com

Abstract

Background: With the rise in people's living standards and ageing populations, a heightened emphasis has been placed in the field of medical and health care. In recent years, there has been a dramatic increase in nutrition management in domestic research circles. The mobile nutritional health management platform based on WeChat mini-programs has been widely used to promote health and self-management and further to monitor individual nutritional health status in China. Nevertheless, there has been a lack of comprehensive scientific evaluation regarding the functionality and quality of the diverse range of nutritional mini-programs that have surfaced in the market.

Objective: The purpose of this study was to evaluate the functionality and quality of China's WeChat nutrition management mini-program by using the user-version of Mobile Application Rating Scale (uMARS).

Methods: This paper is an observational study that incorporates quantitative methods.

A keyword search for “nutrition”, “diet”, “food’’ and “meal” in Chinese or English was conducted on WeChat platform, and all mini-programs pertaining to these keywords were thoroughly analyzed. Then, the basic information related to name, registration date, update date, service type, user scores and functional scores was extracted from January 2017 to November 2023. Rating scores were provided by users in according to their experience and satisfaction with the usage of WeChat mini-program, and functional scores were integrated and summarized for the primary functions of each mini-program. Moreover, the quality of nutrition management applets was evaluated using the uMARS by three researchers independently.

Results:27 out of 891 mini-programs initially identified were found to be relevant to nutrition management. Among them, 85.2% (23/27) offered features for diet management, facilitating the recording of daily dietary intake to evaluate nutritional status. 70.4% (19/27) provided resources for nutrition education and classroom instruction. 59.3% (16/27) included functionalities for exercise management, allowing users to record daily physical activity. And only 44.4% (12/27) featured components for weight management. The total quality score on the uMARS ranged from 2.85 to 3.88, with a median score of 3.38 (IQR 0.64). Engagement scores on the uMARS varied from 2.00 to 4.33, with a median score of 3.00 (IQR 0.67). Functional dimension scores ranged from 3.00 to 4.00, with a median score of 3.33 (IQR 0.67) and a lower score of 2.67 and a higher score of 4.33 outside the normal range. Aesthetic dimension scores ranged from 2.33 to 4.67, with a median score of 3.67 (IQR 0.67). And the informational dimension scores ranged from 2.33 to 4.67, with a median score of 3.33 (IQR 1.00).

Conclusion: Our findings from the uMARS highlight a predominant emphasis on health aspects over nutrition specifics in the application (APP) of WeChat mini-programs related to nutrition management and these mini-programs show a moderate quality, but their functionalities still have an enhanced space in the future.

Keywords: nutrition management; WeChat mini-program; user-version mobile applet rating scale; uMARS ;function and quality evaluation

Introduction

With the intensification of the population aging tendency, people pay more and more attention to the health of the elderly. Specifically, the nutritional management is of paramount importance for the older adults in that the nutritional needs not only impact their quality of life, but also significantly influence overall health status [1]. As we know, aging, a normal process, is accompanied by physiological change such as a loss of muscle mass, reduction in bone density, and decline in metabolic rate, therefore it is of vital importance to adjust the nutritional intake for the older individuals, especially those with weak digestive systems [2].

Malnutrition among the elderly is a significant universal concern. Senile malnutrition, characterized by inadequate and imbalanced nutrition, arises from various factors, such as inappropriate dietary choices, insufficient intake, absorption disorders, and so on [3].The aging demographic shift contributes to a rise in the elderly population, and the health status of the elderly directly impacts societal sustainability [4]. Consequently, there is an urgent need for effective nutrition policies and intervening measures for the elderly. Among them, nutrition education, promotion of a balanced diet, and optimization of medical healthcare systems are essential strategies to prevent and improve senile malnutrition [5].

Up to now, the government has issued a series of policies, including the “Healthy China 2030 Plan Outline”, which emphasizes the promotion of self-disciplined in health behaviors and the encouragement of balanced diets. Concurrently, the National Nutrition Plan (2017-2030) advocates for the integration of “Internet + nutrition and health” [6], endorsing the utilization of technology to manage public health and nutrition. Nowadays, this shift towards digital health management and intelligent nutrition support system for the elderly reassure the growing emphasis on leveraging science and technology in healthcare. Through the internet platforms and mobile applications, the dietary habits of the elderly can be more effectively monitored, and personalized dietary recommendations can be provided to identify and address

possible malnutrition issues promptly [7]. WeChat is an instant messaging software for smart terminals launched by Tencent on January 21, 2011, and it emerged in 2017 with its distinct advantages, including user-friendly mini-programs that do not require downloading and occupy minimal mobile phone memory, payment capabilities, circles of friends, public platforms, WeChat mini-programs, and other functions. All these features have contributed greatly to its widespread adoption among users [8].

Despite the growing number of mobile Apps for nutrition guidance, there is remarkable variability among them due to a lack of specificity. Domestic scholars have predominantly focused on exploring the intervention effects and the significance of nutrition research, yet there remains a notable absence of scientific evaluation regarding the functionality and quality of nutrition mini-programs available in the market [9, 10]. Accordingly, this research aimed to undertake a comprehensive search and assessment of relevant mini-programs using the User Version of the Mobile Application Rating Scale (uMARS) and develop WeChat applet of nutrition and management.

Methods

Search Strategy

A keyword search for “nutrition”, “diet”, “food”, and “meal” in Chinese or English was independently conducted on WeChat platform by two researchers, and all mini-programs pertaining to these keywords were thoroughly analyzed. They personally experienced the operation of relevant mini-programs registered on the WeChat platform between January 2017 and November 2023.Screening for mini-programs adheres strictly to predefined inclusion and exclusion criteria.

The inclusion criteria were as follows: (1) The mini-program's functional content pertained to diet and nutrition; (2) It was available for free use; (3) It was written in Chinese or English; (4) It was compatible with mobile phones or tablets. The exclusion criteria were as follows: (1) It was never updated or maintained; (2) It was designed for commercial ordering and canteen services; (3) It was specifically for

purchasing food; (4) It solely records data. During the screening process, the two researchers resorted to another researcher, if necessary, to resolve any discrepancies.

Sample size

In this study, an observational research design was adopted to systematically search and quantitatively evaluate the function and quality of nutrition management mini-programs on the WeChat platform. Using keywords such as "nutrition," "diet," "food," and "meal," a total of 891 mini-programs were initially identified. These mini-programs were then screened based on predefined inclusion and exclusion criteria. After the screening process, 27 eligible mini-programs were selected for detailed analysis.

Quality assessment of WeChat mini-programs related to nutrition management

As described in a previous study [11],the uMARS was originally developed as an end-user evaluation tool base on the Mobile Application Rating Scale (MARS) and it has been widely utilized for evaluating diverse categories of mobile health Apps, which include those focusing on weight loss and nutrition, as well as the management of conditions such as rheumatism, and ankylosing spondylitis [12].

As a comprehensive tool for evaluating the user experience of mobile Apps, uMARS was commonly utilized to gauge usability, user satisfaction, functionality, and other pertinent factors [13].The five dimensions based on uMARS are engagement, functionality, aesthetics, information and subjective quality, in which each dimension encompasses 3-5 questions and each question scores on a scale of 0-5 points, totaling 20 items [14, 15]. In the engagement dimension, the evaluator can evaluate the mini-program's entertainment value, level of interest, customization, interactivity and target audience appeal. The functional dimension provides evaluation of performance, ease of use, navigation and gesture design. The aesthetics section focuses on layout, graphics quality and visual appeal, and the information section assesses information quality, quantity visual information and the credibility of the information source [16-18]. Notably, to ensure the evaluation consistency, the subjective scale is not included in

the assessment process due to the highly subjective nature of evaluators' personal opinions and preferences.

Participants

Evaluation of uMARS was conducted independently by two nutrition experts and one experiencer. Before the evaluation, it is wise for each evaluator to read and get more familiar with dimensions and items of the scale. All evaluators must comply with the consensus of the scoring criteria reached by the group discussion, and evaluate each applet independently.

User scores

User scores, a built-in feature of WeChat applets, are intended to assess users' overall satisfaction and experience, and 5-point satisfaction scale is commonly used to measure people's satisfaction levels with the applets for research and surveys. Developers utilize these ratings to gauge satisfaction levels of existing users and identify any areas for enhancement. If the feature of WeChat mini-program is not properly activated or if no users have participated in rating, the default rating is set to 0.

Functional scores

From the 27 mini-programs selected, a total of 16 functions were identified following registration and usage. Each mini-program's functionality was evaluated by assigning one point for each aspect assessed, contributing to the cumulative total score. Feature scores range from 0 to 16, illustrating the comprehensiveness of the mini-program features.

Data collection

The basic information of the 27 selected mini-programs was collected, encompassing metrics such as name, registration date, update date, service type, user scores and functional scores. Subsequently, the functionality and quality of these mini-programs were quantitatively assessed using the User Version of the Mobile Application Rating Scale (uMARS).

Statistical Analyses

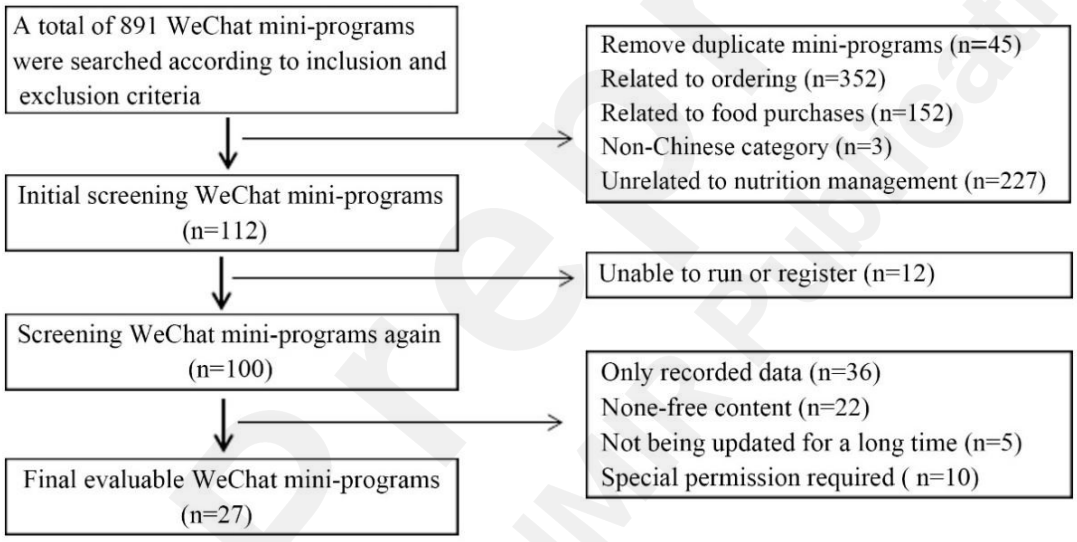
The functional score of each small program was collected and expressed in quantity and percentage. uMARS scores were described as means and standard deviations (SD) or and interquartile range (IQR). All data was analyzed using SPSS 26.0.

Results

Nutrition management mini-programs screening

We identified a total of 891 mini-programs based on search terms (Figure 1). After removing the duplicate and unrelated mini-programs, 112 mini-programs were filtered. Ultimately, 27 mini-programs met the inclusion and exclusion criteria were selected for further study.

Figure 1 Flow chart of nutrition management mini-programs screening



Characteristics of nutrition management mini-programs

We conducted a thorough search for mini-programs related to nutrition management through WeChat platform and utilized them after registration. Interestingly, these mini-programs shared several common characteristics, including name, registration date, update date, service type, user scores and functional scores (Table 1).

Table 1 Characteristics of the nutrition- related WeChat mini-programs

Name	Registration date	Update date	Service type	User scores	Functional scores
Peppermint nutritionist	Nov 15, 2018	Feb 10, 2023	Health management, medical information, Food and beverage, Health products	-	10
YOU nutrition	Apr 17, 2020	Nov 3, 2023	Health management, Health care products, Food and beverage, Drug information display, medical equipment sales platform	5	9
The more accurate and nutritious the diet	Oct 12, 2021	Nov 2, 2023	Food and beverage, Health products	4.6	6
Long light nutrition diet therapy	Jul 19, 2021	Nov 2, 2023	Online education, educational information services, medical information	-	7
Nutrition pagoda	Sep 14, 2022	Mar 10, 2023	Health management	3.6	7
Little Ann dietitian	Jan 15, 2021	Nov 4, 2023	Health management, Equipment management	4.6	6
Abbott Medical Nutrition Care	Sep 18, 2019	Oct 28, 2023	Health management	4.5	5
Peppermint nutrition Pro	Dec 10, 2018	Jan 10, 2023	Health management	3.7	4
Nutritionist world	Aug 12, 2022	Nov 2, 2023	Health care products, Food and beverage,	3.5	4
Nutritional meal companion	Jul 9, 2022	Oct 28, 2023	Catering information service	-	6
Better One Nutritional fat reduction	Jan 19, 2022	Oct 28, 2023	Beauty service	-	6
Nutrition weight loss service platform	Aug 28, 2023	Nov 4, 2023	Health management, Online fitness	-	8
Carkaka |Meal control card assistant	Feb 17, 2023	Oct 26, 2023	Recipe drinks, Community/Forum, Health management	4.1	6
High uric acid diet	Oct 27, 2017	Nov 6, 2023	Information inquiry, Health management, Community/Forum	4.3	6

Food diary	Mar 8, 2020	Nov 1, 2023	Catering information service, medical information	4.7	3
56t78	Dec 5, 2022	Nov 6, 2023	Information query, Video customer service, Health management	-	6
Little Doctor's diet diary	Nov 10, 2022	Jul 10, 2023	Health data statistics	-	5
High potassium diet	Dec 22, 2017	Nov 5, 2023	Information inquiry, Health management, Community/Forum	4.6	6
Chestnut food diary	Nov 27, 2018	Oct 28, 2023	Health management, medical information,	4.3	8
Dietary calories	Oct 4, 2021	Sep 12, 2023	Information inquiry, Food and beverage Information service, Health management	4.2	5
Low carb diet assistant	Jun 21, 2019	Nov 12, 2022	Health management	4.4	4
Diet evaluation	Feb 28, 2023	Jun 12, 2023	Information, Health management, Drug information display	-	2
Food notes	Feb 1, 2023	Sep 12, 2023	Health management	4.1	4
Sannuo Health	Sep 20, 2019	Nov 6, 2023	Medical information, Community/Forum, Drug information display, medical device manufacturer	-	9
Pick fruit health	May 27, 2020	Oct 13, 2023	Food and beverage, Equipment management, medical equipment, Health products, Health management	4.0	6
Mint Health	Apr 26, 2017	Oct 13, 2023	Catering information service, Information inquiry	4.6	7
Peak Health Butler	Oct 11, 2022	Jul 13, 2023	Health management, Information inquiry	4.2	5

(1) Health management: Manage health through lifestyle changes; (2) Medical information: Information about diseases and health; (3) Food and beverage: Information about food nutrients; (4) Health products: Goods for maintaining or improving well-being; (5) Drug information display: Platform for medication details and usage guidance; (6) Medical equipment sales platform: Marketplace for healthcare equipment transactions; (7) Educational information services: Provide information resources for health purposes; (8) Medical information: Information related to healthcare and treatments; (9) Equipment management: Access basic medical equipment data online; (10) Catering information service:

Information hub for dining options and nutrition; (11)Beauty Service: Offerings for cosmetic and aesthetic treatments; (12) Online fitness: Exercise and wellness programs accessible via the internet.(13)Recipe drinks: Formulations for beverages with health benefits; (14) Community/ Forum: Platform for discussions and interactions among users; (15) Video customer service: Support assistance provided through video communication; (16) Health data statistics: Analysis and presentation of health-related data; (17) Medical device manufacturer: Producer of healthcare equipment.

WeChat mini-program for nutritional management

Following registration and utilization, the functional evaluation mainly focused on the nutrition management module of the mini-program. This module encompassed four primary functions (diet management, weight management, exercise management and nutrition education through class, video, popular science content) and 12 auxiliary functions (Table 2). These auxiliary functions encompassed specific features such as comparisons, analysis, and recommendations, along with capabilities for managing blood sugar, blood pressure and sleep. Furthermore, it included features for nutrition assessment, questionnaire survey, dietitian consultation, access to a nutrition marketplace, generation of nutrition report, monitoring of biochemical indicators, participation in nutrition-related social circles, and health assessment [19-21].

As depicted in Table 2, the average functional score across all mini-programs was 6 points, ranging from 2 points in diet assessment to 10

points in peppermint nutrition food. Among the analyzed mini-programs, 85.2% (23/27) offered diet management features, facilitating the recording of daily dietary intake to assess nutritional status. 70.4% (19/27) provided nutrition knowledge and classroom teaching functionalities. 59.3% (16/27) offered exercise management capabilities, enabling users to record their daily physical activities. And only 44.4% (12/27) incorporated weight management functionalities.

In the functional evaluation, we conducted a comprehensive evaluation of the four main functions of each mini-program. Simultaneously, we scrutinized and evaluated the auxiliary features to ensure that users could access comprehensive nutrition management services. Through this comprehensive assessment, we aimed to furnish users with detailed feedback, assisting them in selecting a high-quality nutrition management mini-program, which was tailored to their requirements. Furthermore, this endeavor aimed to enhance users' health management practices and

improve their overall and quality of life [22].

Table 2 WeChat mini-program for nutritional management

WeChat mini-program function	Number (n)	Percentage (%)
Main function		
Food record/management/analysis/clock in	23	85.2
Exercise recording/management/analysis/clocking	16	59.3
Weight recording/management/analysis/clocking	12	44.4
Nutrition class/video/popular science	19	70.4
Auxiliary function		
Food list	4	14.8
Food comparison	3	11.1
Food inquiry/analysis	8	29.7
Food/recipe recommendations	13	48.1
Blood pressure/blood sugar/sleep management	7	25.9
Nutrition assessment/questionnaire	8	29.7
Nutrition expert consultation	13	48.1
Nutrition mall	10	37.0
Nutrition report	7	25.9
Biochemical index	5	18.5
Nutrition sharing/friend circle/community	10	37.0
Health assessment	8	29.6

uMARS quality rating

An overview of the engagement, functionality, aesthetics, and information scores for the top five and bottom five mini-programs was presented in Table 3. Among them, the highest ranking was WeChat applet-mint health, with a uMARS score of 3.88 (SD, 0.73), then AI dietary dietitian, chestnut food diary, peppermint nutritionist, sannuo

health in turn. Notably, the user score reached 4.6 and the functional scores were 7.0. In contrast, the lowest ranking was WeChat applet-nutritionist world, with a uMARS score of 2.85 (SD,1.09), then followed by diet evaluation, peppermint nutrition pro, nutritional meal companion, and long light nutrition diet therapy in turn. In addition, the participation, function, aesthetics, and information scores of mini-programs were summarized in the Table 3.

The uMARS total quality median score, calculated on a scale of 5, was 3.38 (IQR 0.64), with an overall range from 2.85 to 3.88, indicating that the most mini-programs achieved scores above 3 points. The uMARS score of engagement ranged from 2.00 to 4.33, with a median score of 3.00 (IQR 0.67). The functional dimension varied from 3.00 to 4.00 and the median score was 3.33 (IQR 0.67), with a lower score of 2.67 and a higher score of 4.33 outside the normal range. The aesthetic dimension spanned from 2.33 to 4.67, with a median score of 3.67 (IQR 0.67). And

the informational dimension ranged from 2.33 to 4.67, with a median score of 3.33 (IQR 1.00). Detailed uMARS scores for all 27 mini-programs can be found in Multimedia Appendix 1.

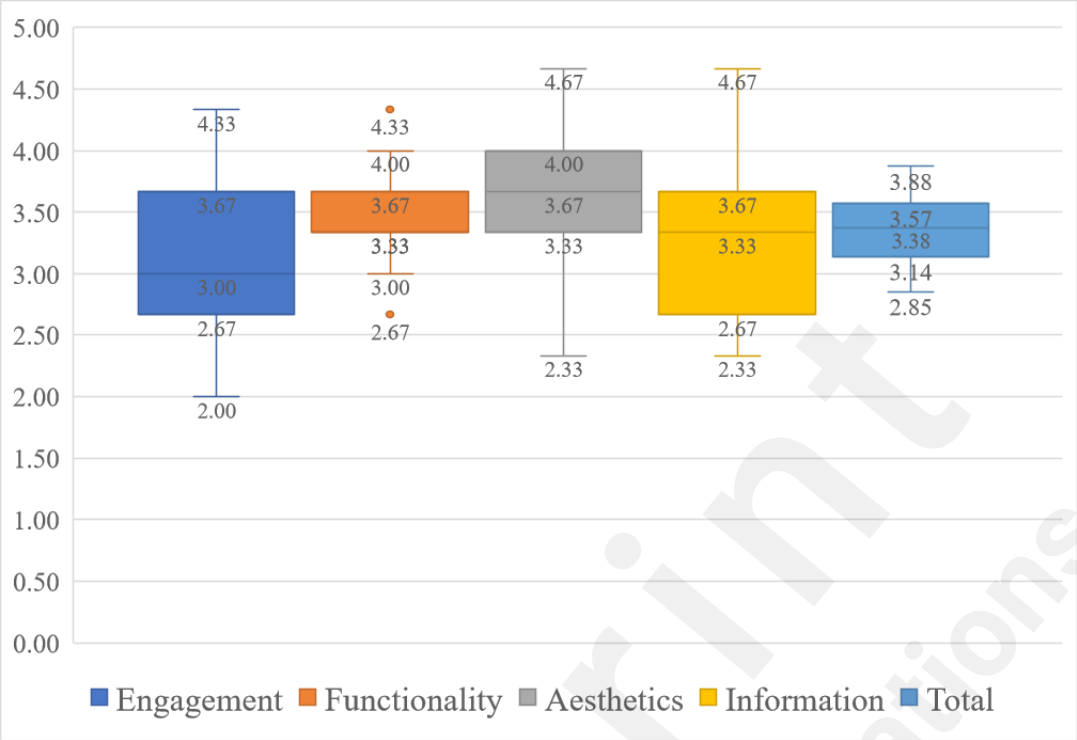
Table 3 The five highest- and lowest-scoring mini-programs (N=27) based on the user version of the Mobile Application Rating Scale (uMARS). All the values were mean (SD).

WeChat applet	Engagement	Functionality	Aesthetics	Information	uMARS
Five highest scoring mini-program [a]					
	3.73(0.96)	3.83(0.72)	4.11(0.33)	3.92(0.67)	3.88(0.73)
	3.73(0.88)	3.67(0.49)	4.33(0.50)	3.83(0.58)	3.85(0.68)
	3.53(0.92)	3.67(0.49)	4.11(0.60)	4.08(0.79)	3.81(0.76)
	3.47(1.13)	3.67(0.49)	4.00(0.50)	4.00(0.60)	3.75(0.79)
	3.60(1.12)	3.67(0.65)	3.67(0.50)	4.00(0.74)	3.73(0.82)
Five lowest scoring mini-program [b]					
	2.80(0.86)	3.17(0.58)	3.44(1.01)	2.91(0.79)	3.04(0.82)
	2.73(1.03)	3.08(0.79)	3.33(0.50)	3.17(0.94)	3.04(0.87)
	2.93(1.22)	3.33(0.49)	3.11(0.93)	2.58(1.24)	2.98(1.04)
	2.93(1.16)	3.33(0.49)	3.11(1.05)	2.50(1.17)	2.96(1.03)
	2.53(1.89)	3.08(0.90)	3.22(1.09)	2.75(1.14)	2.85(1.09)

a Five highest scoring mini-program: (1) Mint health; (2) AI dietary dietitian; (3) Chestnut food diary; (4) Peppermint nutritionist; (5) Sannuo health.

b Five lowest scoring mini-program :(1) Long light nutrition diet therapy; (2) Nutritional meal companion; (3) Peppermint nutrition pro; (4) Diet evaluation; (5) Nutritionist world.

Figure 2 The user version of the Mobile App Rating Scale overall and section-specific scores of the Nutrition Management Mini Programs (n=27).



Discussion

As we know, a single user rating may not accurately gauge the quality of the mini-programs, and some existing evaluation systems for nutrition management mini-programs lack a scientifically grounded approach to promoting human nutrition. At present, the field of nutrition management mini-programs in China is still in its nascent stage and requires a continual refinement of technique [18]. Analysis of functional scores

revealed that only 18.5% of the mini-programs achieved scores above 8 points, indicating a need of improvement in their nutrition-related functionalities and health care. Among the identified issues, concerns were raised regarding the accuracy and comprehensiveness of food database, potentially resulting in accessing inaccurate nutrition. Furthermore, most mini-programs lack personalized services, consequently failing to offer tailored nutrition advice based on users' specific requirements and health conditions [23] .

The current study diverges from prior research in several key aspects. Firstly, many nutrition mini-programs now target specific disease types, tailoring diet management to the unique needs of patients. Secondly, some programs incorporate social circles to enhance user engagement, consequently fostering greater utilization among patients [24]. Thirdly, a subset of programs collaborates with the medical industry, engaging professional medical teams during development and establishing expert

consultation platforms accessible via the WeChat mini-program, tablet computer app and computer software. Fourthly, certain programs leverage data analysis and artificial intelligence to deliver personalized nutrition advice and services, catering to individuals' specific needs [25]. Fifthly, the seamless integration of these programs within the WeChat platform enables direct access without the need for installation or downloads, ensuring faster and more convenient processes. Finally, developers continuously refine and expand nutrition management programs in response to evolving technological advancements and user preferences, thus integrating new functionalities and enhancing user experience to elevate program quality and competitiveness [26].Notably, the evaluation further revealed that the quality of nutrition management mini-programs varies significantly, with many exhibiting incomplete content, imperfect functionality, and limited individualization and intelligence [27].

Limitations

Although some interesting and significant findings have been found in this study, there are several limitations in using WeChat mini-program. Firstly, nutrition mini-programs on WeChat platform are still undeveloped and immature compared to nutrition apps with high usage rate. Secondly, due to the inability to download WeChat mini-programs, relevant data such as download counts and software size cannot be fully obtained, limiting our analysis of the data displayed on the platform [28]. Additionally, our research focus solely on analyzing the functionality and quality of mini-programs within the WeChat platform, resulting in a relatively narrow scope. Accordingly, future studies could expand their scope by conducting questionnaire surveys among users of the existing mini-programs or by integrating user feedback more effectively [29]. Simultaneously, encouraging active involvement from health professionals in the development of mobile health Apps is crucial for

ensuring their effectiveness and relevance in promoting better health outcomes [30].Moving forward, the trajectory of development should prioritize enhancing quality, introducing innovative features, and fostering active participation of professionals, consequently providing more scientifically grounded and practical personalized dietary guidance and enriching research on domestic nutrition management mini-programs [31-33].

Conclusions

Our findings from the uMARS scale highlight a predominant emphasis on health aspects over nutrition specifics in the application (APP) of WeChat mini-programs related to nutrition management and these mini-programs show a moderate quality, but their functionalities still have an enhanced space in the future.

Acknowledgments

This paper is supported by the project of Jiangsu Social Science Fund in

2022: Research on the path and countermeasures of digital Technology to Promote the construction of Jiangsu Health Community (22GLB010).

Authors' Contributions

This article is a collaboration of all the authors. HS and YPW developed and designed the study. HS, JS, WZ, QX and DDH conducted the search of small programs, data analysis and scale evaluation. HS and YPW drafted the manuscript, and all authors participated in the review and editing of the manuscript.

Conflicts of Interest

None declared.

Abbreviations

uMARS user version of the Mobile App Rating Scale

APP application

Multimedia Appendix 1

uMARS scale score.

References

1. Hua N, Zhang Y, Tan X, Liu L, Mo Y, Yao X, et al. Nutritional Status and Sarcopenia in Nursing Home Residents: A Cross-Sectional Study. Int J Environ Res Public Health. 2022 Dec 18;19(24). PMID: 36554892. doi: 10.3390/ijerph192417013.

2. Rus GE, Porter J, Brunton A, Crocker M, Kotsimbos Z, Percic J, et al. Nutrition interventions implemented in hospital to lower risk of sarcopenia in older adults: A systematic review of randomised controlled trials. Nutr Diet. 2020 Feb;77(1):90-102. PMID: 32022999. doi: 10.1111/1747-0080.12608.

3. Seemer J, Kiesswetter E, Fleckenstein-Sussmann D, Gloning M, Bader-Mittermaier S, Sieber CC, et al. Effects of an individualised nutritional intervention to tackle malnutrition in nursing homes: a pre-post study. Eur Geriatr Med. 2022 Jun;13(3):741-52. PMID: 34854062. doi: 10.1007/s41999-021-00597-y.

4. Lindner-Rabl S, Wagner V, Matijevic A, Herzog C, Lampl C, Traub J, et al. Clinical Interventions to Improve Nutritional Care in Older Adults and Patients in Primary Healthcare - A Scoping Review of Current Practices of Health Care Practitioners. Clin Interv Aging. 2022;17:1-13. PMID: 35023909. doi: 10.2147/CIA.S343307.

5. Mikkelsen S, Geisler L, Holst M. Healthcare professionals' experiences with practice for managing disease-related malnutrition in general practice and proposals for improvement: A qualitative study. Scand J Caring Sci. 2022 Sep;36(3):717-29. PMID: 34541700. doi: 10.1111/scs.13033.

6. Ding Y, Lu X, Xie Z, Jiang T, Song C, Wang Z. Evaluation of a Novel WeChat Applet for Image-Based Dietary Assessment among Pregnant Women in China. Nutrients. 2021 Sep 10;13(9). PMID: 34579035. doi: 10.3390/nu13093158.

7. Wu Y, Wang X, Gao F, Liao J, Zeng J, Fan L. Mobile nutrition and health management platform for perioperative recovery: an interdisciplinary research achievement using WeChat Applet. Front Med (Lausanne). 2023;10:1201866. PMID: 37293309. doi: 10.3389/fmed.2023.1201866.

8. Huo J, Wu X, Gu C, Yu Z, Zhang J, Chen X, et al. Using a WeChat mini-program-based lactation consultant intervention to increase the consumption of mother's own milk by preterm infants in the neonatal intensive care unit: a study protocol for a cluster randomized controlled trial. Trials. 2021 Nov 24;22(1):834. PMID: 34819117. doi: 10.1186/s13063-021-05731-6.

9. LeBeau K, Huey LG, Hart M. Assessing the Quality of Mobile Apps Used by Occupational Therapists: Evaluation Using the User Version of the Mobile Application Rating Scale. JMIR Mhealth Uhealth. 2019 May 1;7(5):e13019. PMID: 31066712. doi: 10.2196/13019.

10. Li Y, Ding J, Wang Y, Tang C, Zhang P. Nutrition-Related Mobile Apps in the China App Store: Assessment of Functionality and Quality. JMIR Mhealth Uhealth. 2019 Jul 30;7(7):e13261. PMID: 31364606. doi: 10.2196/13261.

11. Adam A, Hellig JC, Perera M, Bolton D, Lawrentschuk N. 'Prostate Cancer Risk Calculator' mobile applications (Apps): a systematic review and scoring using the validated user version of the Mobile Application Rating Scale (uMARS). World J Urol. 2018 Apr;36(4):565-73. PMID: 29222595. doi: 10.1007/s00345-017-2150-1.
12. Fijacko N, Gosak L, Cilar L, Novsak A, Creber RM, Skok P, et al. The Effects of Gamification and Oral Self-Care on Oral Hygiene in Children: Systematic Search in App Stores and Evaluation of Apps. JMIR Mhealth Uhealth. 2020 Jul 8;8(7):e16365. PMID: 32673235. doi: 10.2196/16365.
13. Shinohara Y, Yamamoto K, Ito M, Sakata M, Koizumi S, Hashisako M, et al. Development and validation of the Japanese version of the uMARS (user version of the mobile app rating system). Int J Med Inform. 2022 Sep;165:104809. PMID: 35728358. doi: 10.1016/j.ijmedinf.2022.104809.
14. Martin-Payo R, Carrasco-Santos S, Cuesta M, Stoyan S, Gonzalez-Mendez X, Fernandez-Alvarez MDM. Spanish adaptation and validation of the User Version of the Mobile Application Rating Scale (uMARS). J Am Med Inform Assoc. 2021 Nov 25;28(12):2681-6. PMID: 34613400. doi: 10.1093/jamia/ocab216.
15. Stoyanov SR, Hides L, Kavanagh DJ, Wilson H. Development and Validation of the User Version of the Mobile Application Rating Scale (uMARS). JMIR Mhealth Uhealth. 2016 Jun 10;4(2):e72. PMID: 27287964. doi: 10.2196/mhealth.5849.
16. Ko S, Lee J, An D, Woo H. Menstrual Tracking Mobile App Review by Consumers and Health Care Providers: Quality Evaluations Study. JMIR Mhealth Uhealth. 2023 Mar 1;11:e40921. PMID: 36857125. doi: 10.2196/40921.
17. Shetty VB, Soon WHK, Roberts AG, Fried L, Roby HC, Smith GJ, et al. A Novel Mobile Health App to Educate and Empower Young People With Type 1 Diabetes to Exercise Safely: Prospective Single-Arm Mixed Methods Pilot Study. JMIR Diabetes. 2021 Oct 14;6(4):e29739. PMID: 34647896. doi: 10.2196/29739.
18. Yu H, Tan L, Zhu T, Deng X. A WeChat applet-based national remote emergency system for malignant hyperthermia in China: a usability study. BMC Med Inform Decis Mak. 2023 Sep 5;23(1):175. PMID: 37670310. doi: 10.1186/s12911-023-02275-4.
19. Chen D, Shao J, Zhang H, Wu J, Xue E, Guo P, et al. Development of an individualized WeChat mini program-based intervention to increase adherence to dietary recommendations applying the behaviour change wheel among individuals with metabolic syndrome. Ann Med. 2023;55(2):2267587. PMID: 37898907. doi: 10.1080/07853890.2023.2267587.
20. Feng Y, Zhao Y, Mao L, Gu M, Yuan H, Lu J, et al. The Effectiveness of an eHealth Family-Based Intervention Program in Patients With Uncontrolled Type 2 Diabetes Mellitus (T2DM) in the Community Via WeChat: Randomized Controlled Trial. JMIR Mhealth Uhealth. 2023 Mar 20;11:e40420. PMID: 36939825. doi: 10.2196/40420.
21. Liu H, Feng J, Shi Z, Su J, Sun J, Wu F, et al. Effects of a Novel Applet-Based Personalized Dietary Intervention on Dietary Intakes: A Randomized Controlled Trial in a Real-World Scenario. Nutrients. 2024 Feb 19;16(4). PMID: 38398889. doi: 10.3390/nu16040565.

22. Haas R, Asan H, Dogan O, Michalek CR, Karaca Akkan O, Bulut ZA. Designing and Implementing the MySusCof App-A Mobile App to Support Food Waste Reduction. Foods. 2022 Jul 26;11(15). PMID: 35892807. doi: 10.3390/foods11152222.
23. Tu W, Yan S, Yin T, Zhang S, Xu W, Zhang P, et al. Mobile-based program improves healthy eating of ulcerative colitis patients: A pilot study. Digit Health. 2023 Jan-Dec;9:20552076231205741. PMID: 37829613. doi: 10.1177/20552076231205741.
24. Lambrecht A, Vuillerme N, Raab C, Simon D, Messner EM, Hagen M, et al. Quality of a Supporting Mobile App for Rheumatic Patients: Patient-Based Assessment Using the User Version of the Mobile Application Scale (uMARS). Front Med (Lausanne). 2021;8:715345. PMID: 34368202. doi: 10.3389/fmed.2021.715345.
25. Larson D, Henning J, Burgermaster M. Smartphone Applications (Apps) for Nutrition Education: A Qualitative Analysis of Outpatient Dietitian Perspectives. J Nutr Educ Behav. 2023 Aug;55(8):596-603. PMID: 37354197. doi: 10.1016/j.jneb.2023.05.247.
26. Daniels K, Rathore FA, Bonnechere B. Mobile health: Is your next rehabilitation's specialist in your pocket? J Pak Med Assoc. 2024 Mar;74(3):599-601. PMID: 38591311. doi: 10.47391/JPMA.24-21.
27. Wang X, Zeng H, Li L, Fang Z, Xu L, Shi W, et al. Personalized nutrition intervention improves nutritional status and quality of life of colorectal cancer survivors in the community: A randomized controlled trial. Nutrition. 2022 Nov-Dec;103-104:111835. PMID: 36183482. doi: 10.1016/j.nut.2022.111835.
28. Ding B, Gou B, Guan H, Wang J, Bi Y, Hong Z. WeChat-assisted dietary and exercise intervention for prevention of gestational diabetes mellitus in overweight/obese pregnant women: a two-arm randomized clinical trial. Arch Gynecol Obstet. 2021 Sep;304(3):609-18. PMID: 33570656. doi: 10.1007/s00404-021-05984-1.
29. Lull C, von Ahnen JA, Gross G, Olsavszky V, Knitza J, Leipe J, et al. German Mobile Apps for Patients With Psoriasis: Systematic Search and Evaluation. JMIR Mhealth Uhealth. 2022 May 26;10(5):e34017. PMID: 35617014. doi: 10.2196/34017.
30. Bardus M, Ali A, Demachkieh F, Hamadeh G. Assessing the Quality of Mobile Phone Apps for Weight Management: User-Centered Study With Employees From a Lebanese University. JMIR Mhealth Uhealth. 2019 Jan 23;7(1):e9836. PMID: 30672742. doi: 10.2196/mhealth.9836.
31. Salas-Groves E, Galyean S, Alcorn M, Childress A. Behavior Change Effectiveness Using Nutrition Apps in People With Chronic Diseases: Scoping Review. JMIR Mhealth Uhealth. 2023 Jan 13;11:e41235. PMID: 36637888. doi: 10.2196/41235.
32. Schaafsma HN, Jantzi HA, Seabrook JA, McEachern LW, Burke SM, Irwin JD, et al. The impact of smartphone app-based interventions on adolescents' dietary intake: a systematic review and evaluation of equity factor reporting in intervention studies. Nutr Rev. 2024 Mar 11;82(4):467-86. PMID: 37330675. doi: 10.1093/nutrit/nuad058.

33. Vietzke J, Schenk L, Baer N-R. Middle-aged and older adults' acceptance of mobile nutrition and fitness tools: A qualitative typology. DIGITAL HEALTH. 2023;9:1-15. doi: 10.1177/20552076231163788.

i
1
ii
1
1
1

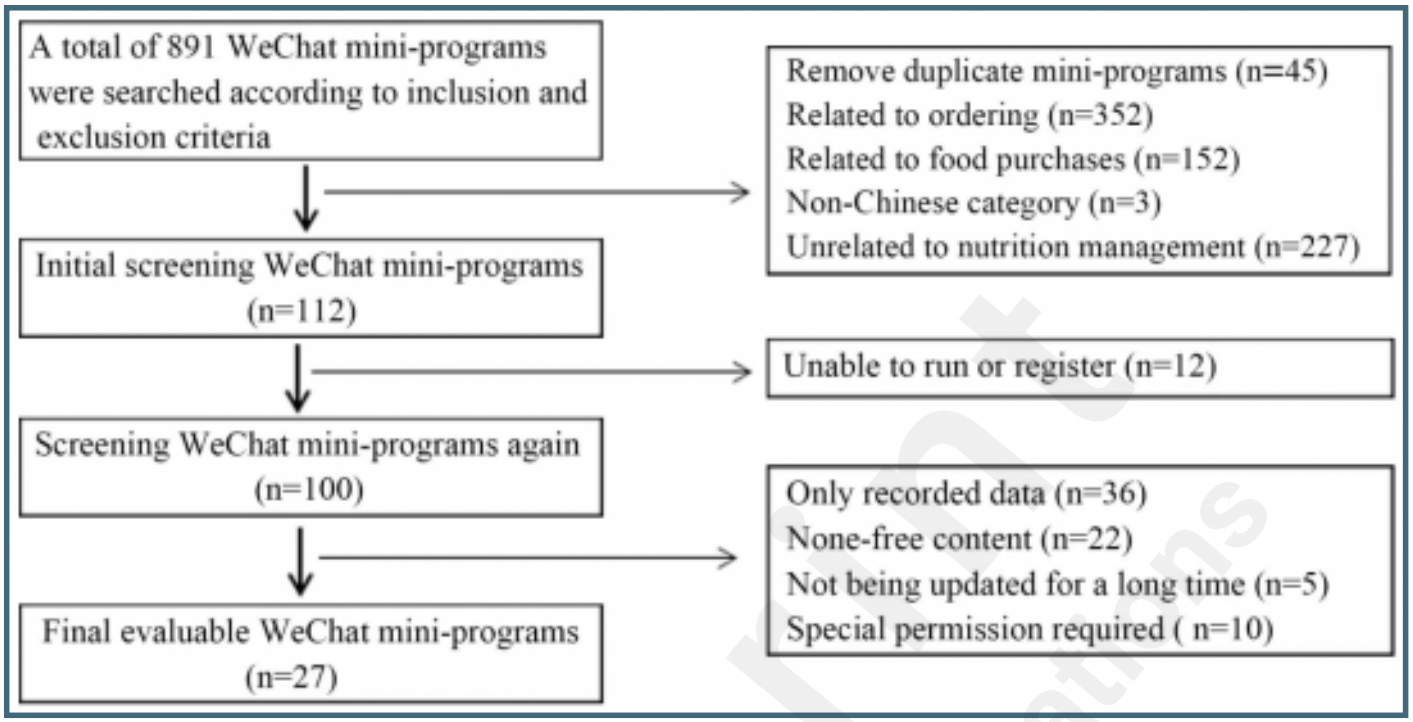
Supplementary Files

Untitled.
URL: http://asset.jmir.pub/assets/2832211602dd89b4ac35393c9489baba.docx

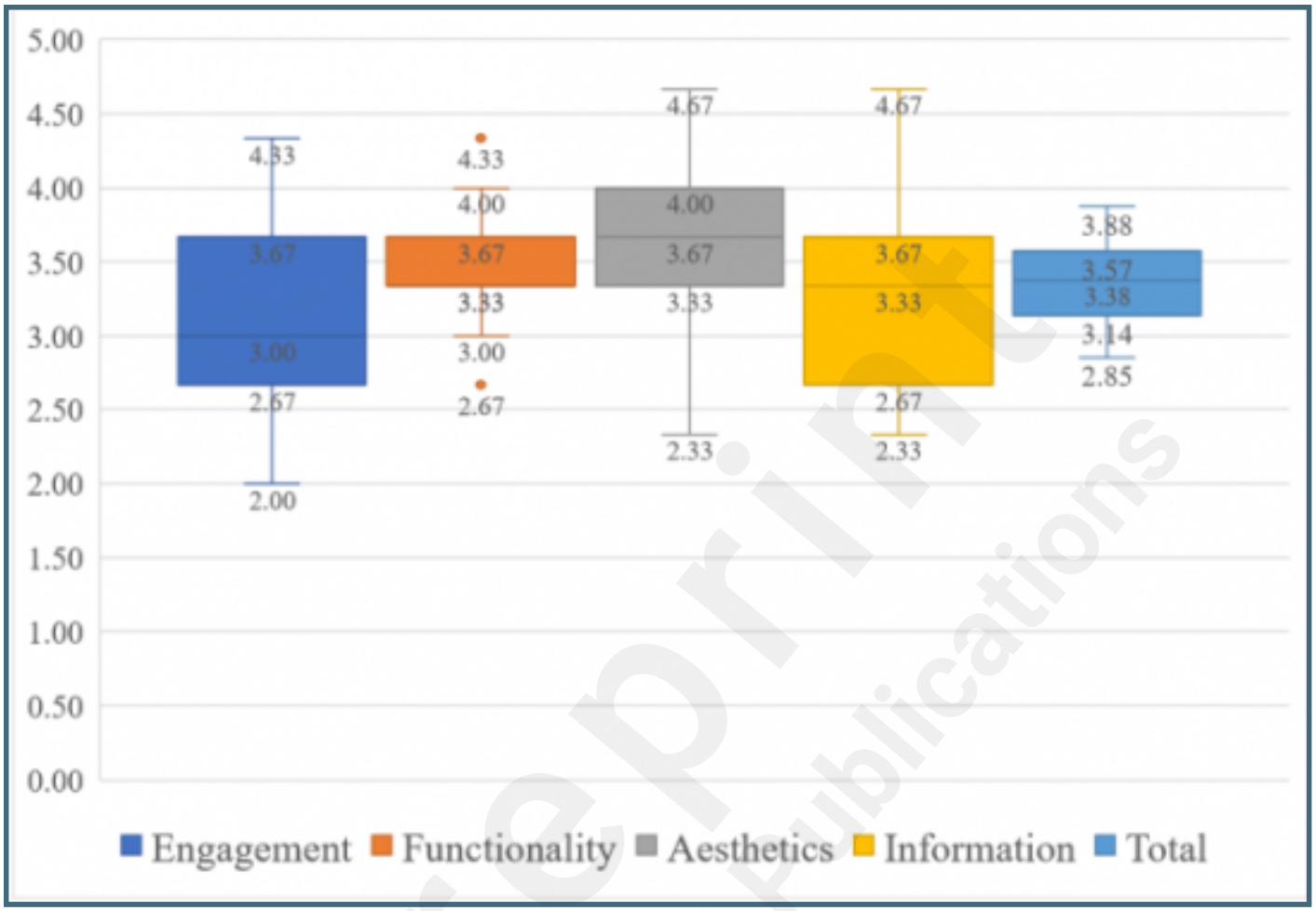
Untitled.
URL: http://asset.jmir.pub/assets/3e0ac3d22eeade5da05c00080f279166.docx

Figures

Flow chart of nutrition management applet screening.



The user version of the Mobile App Rating Scale overall and section-specific scores of the Nutrition Management Mini Programs (n=27).



Characteristics of the nutrition- related WeChat mini-programs.

Table 1 Characteristics of the nutrition- related WeChat mini-programs

Name	Registration date	Update date	Service type	User rating	Function score
Peppermint nutritionist	Nov 15, 2018	Feb 10, 2023	Health management, Medical information, Food and beverage, Health products	-	10
YOU nutrition	Apr 17, 2020	Nov 3, 2023	Health management, Health care products, Food and beverage, Drug information display, Medical equipment sales platform	5	9
The more accurate and nutritious the diet	Oct 12, 2021	Nov 2, 2023	Food and beverage, Health products	4.6	6
Long light nutrition diet therapy	Jul 19, 2021	Nov 2, 2023	Online education, Educational information services, Medical information	-	7
Nutrition pagoda	Sep 14, 2022	Mar 10, 2023	Health management	3.6	7
Little Ann dietitian	Jun 15, 2021	Nov 4, 2023	Health management, Equipment management	4.6	6
Abbott Medical Nutrition Care	Sep 18, 2019	Oct 28, 2023	Health management	4.5	5
Peppermint nutrition Pro	Dec 10, 2018	Jan 10, 2023	Health management	3.7	4
Nutritionist world	Aug 12, 2022	Nov 2, 2023	Health care products, Food and beverage,	3.5	4
Nutritional meal companion	Jul 9, 2022	Oct 28, 2023	Catering information service	-	6
Better One Nutritional fat reduction	Jun 19, 2022	Oct 28, 2023	Beauty service	-	6
Nutrition weight loss service platform	Aug 28, 2023	Nov 4, 2023	Health management, Online fitness	-	8
Carkaka |Meal control card assistant	Feb 17, 2023	Oct 26, 2023	Recipe drinks, Community/Forum, Health management	4.1	6
High uric acid diet	Oct 27, 2017	Nov 6, 2023	Information inquiry, Health management, Community/Forum	4.3	6
Food diary	Mar 8, 2020	Nov 1, 2023	Catering information service, Medical information	4.7	3
AI Dietary dietitian	Dec 5, 2022	Nov 6, 2023	Information query, Video customer service, Health management	-	6
Little Doctor's diet diary	Nov 10, 2022	Jul 10, 2023	Health data statistics	-	5
High potassium diet	Dec 22, 2017	Nov 5, 2023	Information inquiry, Health management, Community/Forum	4.6	6
Chestnut food diary	Nov 27, 2018	Oct 28, 2023	Health management, Medical information,	4.3	8
Dietary calories	Oct 4, 2021	Sep 12, 2023	Information inquiry, Food and beverage Information service, Health management	4.2	5
Low carb diet assistant	Jun 21, 2019	Nov 12, 2022	Health management	4.4	4
Diet evaluation	Feb 28, 2023	Jun 12, 2023	Information, Health management, Drug information display	-	2
Food notes	Feb 1, 2023	Sep 12, 2023	Health management	4.1	4
Sanmao Health	Sep 20, 2019	Nov 6, 2023	Medical information, Community/Forum, Drug information display, Medical device manufacturer	-	9
Pick fruit health	May 27, 2020	Oct 13, 2023	Food and beverage, Equipment management, Medical equipment, Health products, Health management	4.0	6
Mint Health	Apr 26, 2017	Oct 13, 2023	Catering information service, Information inquiry	4.6	7
Peak Health Butler	Oct 11, 2022	Jul 13, 2023	Health management, Information inquiry	4.2	5

(1) Health management: Manage health through lifestyle changes. (2) Medical information: Information about diseases and health.
(3) Food and beverage: Information about food nutrients. (4) Health products: Goods for maintaining or improving well-being.(5) Drug information display: Platform for medication details and usage guidance. (6) Medical equipment sales platform: Marketplace for healthcare equipment transactions. (7) Educational information services: Provide information resources for health purposes. (8) Medical information: Information related to healthcare and treatments. (9) Equipment management: Access basic medical equipment data online. (10) Catering information service: Information hub for dining options and nutrition.(11)Beauty Service: Offerings for cosmetic and aesthetic treatments.(12)Online fitness: Exercise and wellness programs accessible via the internet.(13)Recipe drinks: Formulations for beverages with health benefits.(14)Community/Forum: Platform for discussions and interactions among users.(15)Video customer service: Support assistance provided through video communication.(16)Health data statistics: Analysis and presentation of health-related data.(17)Medical device manufacturer: Producer of healthcare equipment.

WeChat mini-program for nutritional management.

Table 2 WeChat mini-program for nutritional management

WeChat mini-program function	Number (n)	Percentage (%)
Main function		
Food record/management/analysis/clock in	23	85.2
Exercise recording/management/analysis/clocking	16	59.3
Weight recording/management/analysis/clocking	12	44.4
Nutrition class/video/popular science	19	70.4
Auxiliary function		
Food list	4	14.8
Food comparison	3	11.1
Food inquiry/analysis	8	29.7
Food/recipe recommendations	13	48.1
Blood pressure/blood sugar/sleep management	7	25.9
Nutrition assessment/questionnaire	8	29.7
Nutrition expert consultation	13	48.1
Nutrition mall	10	37.0
Nutrition report	7	25.9
Biochemical index	5	18.5
Nutrition sharing/friend circle/community	10	37.0
Health assessment	8	29.6

The five highest- and lowest-scoring mini-programs (N=27) based on the user version of the Mobile Application Rating Scale (uMARS). All the values were mean (SD).

Table 3 The five highest- and lowest-scoring mini-programs (N=27) based on the user version of the Mobile Application Rating Scale (uMARS). All the values were mean (SD).

WeChat applet	Engagement	Functionality	Aesthetics	Information	uMARS
Five highest scoring mini-program [a]					
	3.73(0.96)	3.83(0.72)	4.11(0.33)	3.92(0.67)	3.88(0.73)
	3.73(0.88)	3.67(0.49)	4.33(0.50)	3.83(0.58)	3.85(0.68)
	3.53(0.92)	3.67(0.49)	4.11(0.60)	4.08(0.79)	3.81(0.76)
	3.47(1.13)	3.67(0.49)	4.00(0.50)	4.00(0.60)	3.75(0.79)
	3.60(1.12)	3.67(0.65)	3.67(0.50)	4.00(0.74)	3.73(0.82)
Five lowest scoring mini-program [b]					
	2.80(0.86)	3.17(0.58)	3.44(1.01)	2.91(0.79)	3.04(0.82)
	2.73(1.03)	3.08(0.79)	3.33(0.50)	3.17(0.94)	3.04(0.87)
	2.93(1.22)	3.33(0.49)	3.11(0.93)	2.58(1.24)	2.98(1.04)
	2.93(1.16)	3.33(0.49)	3.11(1.05)	2.50(1.17)	2.96(1.03)
	2.53(1.89)	3.08(0.90)	3.22(1.09)	2.75(1.14)	2.85(1.09)

[a] Five highest scoring mini-program: (1) Mint health; (2) AI dietary dietitian; (3) Chestnut food diary; (4) Peppermint nutritionist; (5) Sannuo health.

[b] Five lowest scoring mini-program :(1) Long light nutrition diet therapy; (2) Nutritional meal companion; (3) Peppermint nutrition pro; (4) Diet evaluation; (5) Nutritionist world.

Multimedia Appendixes

Untitled.
URL: http://asset.jmir.pub/assets/5e282c17abd18ca92322318eb2437520.xlsx