Preventive Medicine Reports 34 (2023) 102275

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: www.elsevier.com/locate/pmedr

Evaluation of a workplace weight management program based on WeChat platform for obese/overweight people in China using the RE-AIM framework

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ARTICLE INFO

Keywords:
Obese adults
Weight management program
Health promotion
WeChat
Implementation evaluation

ABSTRACT

A Weight Management Program (WMP) is a critical and promising approach to losing excess weight and maintaining a healthy lifestyle for obese/overweight people. This study used the RE-AIM framework to retrospectively evaluate a WeChat-based workplace WMP that include low- and high-intensity interventions — self-management (SM) and intensive support (IS) — designed for employees with varying levels of health risk at a Chinese company. Both interventions incorporated with a variety of m-health technologies and behavioral strategies. While the IS group additionally received personalized feedback on diet record and intensive social support. Approximately 26% of all overweight/obese employees in the company enrolled in the program. Both groups lost a significant amount of weight at the endpoint ($P < 0.001$). In comparison to the SM group, the IS group had significantly higher level of compliance with self-monitoring. At six-month, 67% of individuals reported no additional weight gain. The WeChat-based WMP has received widespread praise from program participants and intervention providers in spite of difficulties encountered. This comprehensive and meticulous evaluation revealed both the strengths and weaknesses of the program, which will assist in improving implementation and balancing the cost and effectiveness of online WMP.

1. Introduction

Globally, obesity has become a major health concern, with the overweight/obese rate approaching one-third and at least 2.8 million people dying annually from being overweight/obese. (World Health Organization, 2021) Increasing prevalence of obesity/overweight places a significant burden on the global health system, (Dobbs et al., 2014; Tremmel et al., 2017) as excess weight gain is associated with an increased risk of chronic disease, such as cardiovascular disease, diabetes, and certain types of cancer. (World Health Organization, 2021; García-Jiménez et al., 2016) In China, the proportion of overweight or obese individuals has increased from 3.1 percent in 2014 to 8.1 percent in 2018. (Wang et al., 2021) There is a growing need for effective prevention and treatment strategies to address the lifestyle factors that contribute to obesity in the population. (Ellulu et al., 2014; Williams et al., 2015).

Weight management programs (WMPs) and lifestyle interventions are essential approaches to addressing the overweight/obesity issue. Studies have shown that lifestyle interventions can result in 7%-10% weight loss and a lower risk of chronic diseases. (Wadden et al., 2012) Workplaces in particular are regarded as ideal settings for weight management due to a variety of reasons, including the substantial amount of time people spend at work, (Weerasekara et al., 2016) easy access to populations that are difficult to reach in other settings. (Sorensen et al., 1999) A comprehensive WMP consists of a variety of behavioral strategies to encourage health behavior change, such as self-

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https://doi.org/10.1016/j.pmedr.2023.102275
Received 2 August 2022; Received in revised form 31 May 2023; Accepted 1 June 2023
Available online 5 June 2023

monitoring and goal setting. (Nutrition and Metabolic Management Branch, China International Exchange and Promotive Association for Medical and Healthcare, Chinese Diabetes Society, Chinese Medical Association, Chinese Society of Parenteral and Enteral Nutrition, Chinese Medical Association, et al. Chinese Medical Doctor Association Chinese guidelines for medical nutritional treatment of overweight/obesity, 2021) These strategies are also referred to as behavior change techniques (BCTs), which are defined as observable, replicable and irreducible procedures that are used as part of a behavioral intervention. (Michie et al., 2013).

The technology advances have further enhanced and broadened the application and implementation of various BCTs. It has become increasingly common for WMPs to incorporate a website (Collins et al., 2012; Dunn et al., 2016), a mobile application (Collins et al., 2012; Allen et al., 2013; Hurkmans et al., 2018), and/or wearable devices. (Hernández-Reyes et al., 2020; Yu et al., 2018) A mobile applications is launched as the most convenient, satisfying and effective m-Health approach to achieve weight loss goals by increasing treatment adherence. (2020) Although mobile applications offer numerous benefits, they are still unable to cover all aspects mentioned above and serve as stand-alone weight-control tools. (Ghelani et al., 2020) In an online intervention, the interaction between the healthcare provider and the participant is significantly poorer than in a face-to-face intervention. A middle ground exists between expensive face-to-face communication and inefficient online communication in the form of instant messaging (IM). WeChat is the largest IM application in China, with over 1 billion monthly active users. (Zhang et al., 2017) It includes a variety of features, including instant messaging, browsing and posting for real-time information sharing, and built-in mini-programs. (Baidu encyclopedia, 2022) It has become deeply engrained in people's daily lives and subsequently has become a powerful tool for healthcare education, communication, and promotion of preventive actions. (Zhang et al., 2017; Sun et al., 2020).

The study examined a comprehensive workplace WMP called Health Diary for Lifestyle Change (HDLC) for obese/overweight office workers. The program combined a team of health professionals with the WeChat platform to increase individuals' awareness and ability to engage in healthy eating and exercise to control weight. It incorporates a variety of BCTs, such as goal setting, self-monitoring, behavioral feedback, and social support, tailored to individuals with low and high levels of health risk and obesity. To evaluate such an integrated WMP, a systematic implementation framework, such as the RE-AIM framework, would be the best choice. The RE-AIM framework indicated that the public health impact of an intervention research is determined by reach ("characteristics of those who receive the intervention"), effectiveness ("intervention outcome"), adoption ("characteristics of settings or staff who adopt the intervention"), implementation ("fidelity, cost, facilitators and barriers of implementation") and maintenance ("long-term effectiveness and implementation"). (Glasgow et al., 1999) It has been widely used to assess the strengths and weaknesses of health promotion interventions during their implementation.

Study objectives were to retrospectively evaluate the HDLC program in a workplace setting using the RE-AIM framework to determine its effectiveness, and to identify strengths and weaknesses of the implementation process based on the WeChat platform. This evaluation will provide insight into the differences between implementation costs, effects, facilitators, and barriers of interventions of varying intensities in order to identify areas for improvement and for future application to other workplaces.

2. Methods

2.1. Design

The HDLC was an online lifestyle intervention program that combined multiple interventions supported by health professionals and technology. The program was applied to a 28-day WMP targeting a group of obese/overweight office workers in an effort to help them develop a healthy lifestyle and lose weight. The program required a body mass index (BMI) of 24 kg/m^2 or higher, as well as employment with Uniview, an IT company in China. First, the company's Human Resources (HR) department distributed recruitment notices throughout the organization. Employees who met the inclusion criteria and were interested completed the baseline survey with the assistance of the on-site dieticians. And dieticians referred individuals who fit any of the following criteria for participation in the intensive support (IS) group upon payment of an enrollment fee: hypertension with systolic pressure greater than 140 mmHg or diastolic pressure greater than 90 mmHg, fatty liver, hyperuricemia, or dyslipidemia. The self-management (SM) group was free of charge for participants who did not meet any of the above criteria or declined to join the IS group. Informed consent was obtained from each participant in the study. The study was approved by the ethics committee of Zhejiang University's School of Public Health (approved number ZGL202112-2), and was registered at https://www.chictr.org.cn (registration number is ChiCTR2200055548).

2.2. Intervention content

After allocation, participants downloaded the WeChat application to their phones and registered on a WeChat mini-program that allows them to manually enter data and take photos to record daily meals. Dieticians can track and manage client data via a web platform after gaining authorization by reviewing, commenting and offering suggestions. Participants were notified about dietary advice in real time via WeChat (see Appendix Figs. A1–A4). The entire system was created by Zhejiang University's Institute of Medical and Health Information Engineering.

An overview of the intervention can be found in Appendix Table A.1. Initially, a general group was established on WeChat, where most intervention sessions were delivered in a standard pattern by a health manager and a health assistant (see Appendix Fig. A5). The health education content was specifically designed for the office workers (see Appendix Table A.2). Participants were encouraged to collaborate and form their own teams. Every day, they were instructed to log their weight, exercise, and daily meals in the mini-program and to share their progress with the team group. And they were informed that the winning teams would receive cash prizes for their weight-loss efforts. Participants in the IS group received personalized dietary advice, exercise programs, weight-loss reviews, and reminders from a health assistant if they forgot to log their weight and daily meals during the intervention period.

2.3. Program assessment using RE-AIM framework

HDLC was evaluated using the RE-AIM framework. (Table 1). Reach was determined by the baseline characteristics of participants and the company's participation rate. A description of the intervention providers and the company implementing the program was considered as Adoption. Effectiveness was assessed by within- and between-group difference in the change in weight and BMI. Implementation and maintenance were assessed at both the individual level and organizational level.

2.4. Data collection

The mini-program registration process collected demographic information. The participants were weighed on site at baseline and at the end point (28th day). One researcher collected the system log files to assess the compliance with the intervention. Information about intervention configuration, staffing and implementation was gathered from the staff work reports and informal discussions with the primary dietician in IS group and the director who had overall responsibility as program manager. After 6 months, a maintenance questionnaire was

Table 1
RE-AIM description and specific measurements for the program.

Dimension	Description	Measure	Data source
Reach	How far did the program reach the target population?	1) Initial sample size and the characteristics of participants at baseline, and 2) proportion of participants in the company.	Baseline measurements and HR interview
Effectiveness	How successfully did the program achieve its intended outcomes?	Change in weight and BMI between baseline and the endpoint.	Weight measured onsite
Adoption	What are the characteristics of the program adoption based on the intervention facility and the sponsor?	Description of intervention providers and the company adopted the program.	Staff work report, director interview and HR interview
Implementation	*Organizational level* Was each intervention component implemented as intended? What are the facilitators and barriers to the implementation of the program?	1) Intervention cost and fidelity, 2) implementation facilitator and barriers.	Staff work report and system log files
	Individual level What was the individual's level of compliance with the intervention?	Individual compliance to self-monitoring and engagements of online educational courses.	System log files
Maintenance	*Organizational level* To what extent do the sponsors wish for the program to continue? What are the facilitators and barriers to the long-term adoption of the program?	Attitudes and suggestions on program from intervention supervisor and sponsor.	HR interview and director interview
	Individual level What is the long-term sustainability of the intervention effect? How did participants respond to program sustainability	Maintenance of weight-loss effectiveness after 6 months and participants' attitudes and expectations on program.	6th month follow-up questionnaire (online)

sent to the WeChat group. The interview was conducted by telephone with HR personnel involved in the program.

2.5. Measures

Demographics included age, gender and labor intensity. The weight was measured at baseline and endpoint (28th day). BMI is calculated by dividing weight (kilograms) by height (meters) squared. Log files were used to extract information regarding intervention fidelity and compliance with self-monitoring of weight and health behavior, which consisted of counting the number of recorded weights, exercises, and diets during the intervention.

Log files were used to extract information regarding intervention fidelity and compliance with self-monitoring of weight and health behavior, which consisted of counting the number of recorded weights, exercises, and diets during the intervention. Another indicator of self-monitoring compliance was the number of days when at least two eating occasions were recorded. (Turner-McGrievy et al., 2019) The staff work reports contained information about daily working hours on average, encountered implementation barriers and reflections on the use of WeChat in delivering interventions. The 6-month follow-up questionnaire was used to survey participants about 1) recent self-measured weight and self-perceived weight-loss effect maintenance that is categorized as weight regain, ongoing loss or maintenance, 2) intention to participate again in the WMP (4-point Likert scale), 3) expectation that a WMP would be held regularly, and 4) expectation of frequency and duration. A semi-structured interview was conducted with HR with the following questions: 1) whether the company considers regular weight management services as an employee welfare system; 2) expectations of frequency and duration; 3) suggestions for improving the program.

2.6. Statistical analyses

Continuous variables were presented as mean and standard deviation (SD) or median and quartile range (QR), while categorical variables were presented as counts and percentages. Normality was examined using probability plots and the Kolmogorov-Smirnov test or Shapiro-Wilk test. For continuous variables, between-group differences were tested with independent sample student t tests or Mann-Whitney U tests. For categorical variables, the Fisher test was performed. Change in outcome between groups was used in repeated-measure analysis of covariance. A p-value < 0.05 was considered to indicate statistical significance. Correlations between weight loss and intervention compliance were analyzed by Spearman correlation coefficients.

3. Results

3.1. Reach

At the baseline assessment, a total of 139 individuals who expressed interest (May-June 2020) were enrolled, with 32% referred to the IS group by dietitians. Sixty-seven participants signed the informed consent form, agreeing to provide data for study publication. Sixty-five participants were evaluated at the 28-day endpoint, with two subjects absent due to business travel. There were 55 participants in the SM group and 10 in the IS group. All participants completed the online questionnaire survey at 6th month, while only 33 reported weight data (response rate was 49%).

Baseline assessment found no difference in age, gender, labor intensity, weight or BMI between groups (Table 2). The median age was 29 years (QR 6.75, range from 24 to 48), and 83% were men. Participants with light intensity labor constituted the majority (80%), followed by those with moderate intensity (7%), and those with heavy intensity

Table 2
Baseline characteristics of participants.

	All participants	SM group	IS group	Between-group differences	
Sample size	65	55	10		
Age, years, mean (SD)	29.00(6.75)	29.00 (5.00)	30.50 (10.75)	Z = -1.96	0.051
Gender, count (%)				Fisher	0.675
Men	54(83)	45(82)	9(90)		
Women	11(17)	10(18)	1(10)		
Labor intensity, count (%)				Fisher	0.058
Light	45(69)	35(64)	10(100)		
Moderate	17(26)	17(31)	0(0)		
Heavy	3(5)	3(5)	0(0)		
Height, m, mean (SD)	1.73(0.08)	1.73 (0.08)	1.72 (0.06)	t(63) = -0.228	0.821
Baseline weight, kg, mean (SD)	80.65 (11.91)	80.21 (12.34)	83.06 (9.35)	t(63) = 0.692	0.491
Baseline BMI, kg/m^2, mean (SD)	26.96(2.67)	26.67 (2.69)	27.91 (2.36)	t(63) = 1.369	0.176

(1%). Mean body weight and mean height at baseline were 80.21 kg (SD 11.45) and 1.73 m (SD 0.08), and the mean BMI was 26.72 kg/m^2 (SD 2.43).

The company employs a total of 3,141 employees, (System, 2022) of whom 12% are overweight and 3% are obese. About 4% of the company's total workforce was enrolled in the program. And 26% of the company's overweight and obese employees were participants in the program. According to the 7th Census Yearbook of China, 64.8% of the employed IT population in the city is male, 15% of the workforce is under 25 years old, 53% between 25 and 34 years old, 24% between 35 and 44 years old, 7% between 45 and 54 years old, and 1% over 54 years old. (Office of the Leading Group of the State Council for the Seventh National Population Census, 2020).

3.2. Effectiveness

Overall speaking, a total of 59 (91%) of participants lost at least 1 kg and 44 (68%) at least 2 kg at 28 days after baseline. Twenty-one participants (32%) lost 3–5% of baseline weight, sixteen (25%) more than 5%. A single outlier of weight loss was detected according to the box figure, which was replaced by the average of two adjacent data, to avoid it distorting the overall results.

It was observed that both interventions were able to reduce body weight and BMI (Table 3). The average weight loss was 2.74 (SD 1.94) kg and 3.71 (SD 1.46) kg respectively in SM and IS groups, separately accounting for 3.4% (SD 2.2%) and 4.5% (SD 1.7%) of initial body weight. Analysis of paired data revealed the mean weight reduced significantly in the SM group ($t_{54} = 8.06$, $P < 0.001$), and the IS group ($t_9 = 8.04$, $P < 0.001$). Significant changes within groups were also identified for BMI. (SM group $t_{54} = 8.26$, $P < 0.001$; IS group, $t_9 = 8.67$, $P < 0.001$). Neither change in weight nor BMI reached statistical significance between groups.

3.3. Adoption

The intervention team was composed of professionals who provide therapeutic lifestyle changes and weight management services at Zhejiang University's School of Public Health in China. Among the intervention team members were health managers, health assistants, dieticians, dietician assistants, and sport coaches. They attended a two-hour training session in advance to ensure that they understood their assigned tasks and were familiar with the entire process. the SM and IS groups were slightly different in terms of staffing, the SM group assigned one dietician and one coach for every 120 participants, while the IS group assigned one dietician, one assistant dietician, and two coaches for every 10.

The program was Implemented by Uniview, a Chinese IT company founded In 2011 In Hangzhou, Zhejiang Province, China. The company values its employees' health and has decided to create the position of Chief Health Officer in 2019. This will help them maintain a healthy balance between work and personal life. The officer organizes a variety of health promotion activities each year, including the HDLC program. The HR department plays an integral role in coordinating communication between health professionals and participants throughout the program.3.4. Implementation.

3.4. Implementation

During the intervention period, 3116 self-monitoring records were submitted by participants. However, compliance with the intervention decreased gradually in both groups. According to Table 4, the IS group recorded a median of 23 weights and 78.5 diets, which are significantly more than the 10 ($P = 0.04$) and 8 ($P < 0.001$) in the SM group. Also, the median number of days spent recording diets at least twice in the IS group was 26 days, which was significantly greater than the number of days spent in the SM group of 3 days ($P < 0.001$). No difference was identified in exercise records ($P = 0.98$). No significant correlation was found between weight change and intervention compliance.

During the 28-day intervention period, the daily work contents of the health manager and assistant were nearly identical. The health assistant worked approximately 2.5 h per day. Live broadcasts were conducted twice a week in which coaches instructed and led aerobics classes.

On average, the SM group dieticians spent 1.5 h per day (about 0.027 h per participant), primarily consulting with participants and summarizing unhealthy eating habits. Chat history revealed that the dietician in the SM group had a total of 44 chats. Although the primary dietician in the IS group worked with fewer participants, she spent more time on daily tasks (3.5 h per day). The dietician who assisted the primary dietician in IS group, worked two hours per day. Each dietician's service time cost 0.375 h per person. A total of 838 comments were made by two IS group dieticians during the intervention, an average of 3.2 comments per person per day.

Four staff members reported difficulties in motivating participants to do things like share food records, watch online courses, and so on (frustrating inactivity). As dieticians in the IS group reported, it was inevitable that the diet comments would become monotonous and unappealing at a later stage (monotonous feedback). There was also a

Table 3
Baseline and post-intervention weight measurements of participants.

	All participants	SM group	IS group	Difference between groups [a]
Weight, kg, mean (SD)				
T0	80.65 (11.91)	80.21 (12.34)	83.06 (9.35)	
T1	77.50 (11.10)	77.16 (11.41)	77.50 (11.10)	t(63) = 0.570, p = 0.571
T1-T0 [b]	3.42(0.47)	3.05 (0.38)	3.42 (0.47)	F(1, 61) = 0.652, p = 0.422
BMI, kg/m^2, mean (SD)				
T0	26.96(2.67)	26.67 (2.69)	26.96 (2.67)	
T1	25.81(2.44)	25.54 (2.68)	25.81 (2.44)	t(63) = 1.212, p = 0.230
T1-T0 [b]	1.04(0.11)	1.01 (0.12)	1.04 (0.11)	F(1, 61) = 0.764, p = 0.386
Weight loss percentage, %	3.6(2.2)	3.4(2.2)	4.5(1.7)	F(1,61) = 2.389, p = 0.127
Percentage of losing 2 kg weight at T1, %	66	37	90	Fisher

[a] Repeated measure ANCOVA test (adjusted for age).
[b] Paired *t* test.

Table 4
Participant compliance to self-monitoring of weight and health behaviors during the 28-day intervention period.

	SM group	IS group	Difference between groups [a]
	Median (QR)	Median (QR)	
Self-monitoring of weight	10(19)	23(6)	Z = -2.068, p = 0.039
Self-monitoring of diet	8(24)	79(7)	Z = -4.649, p < 0.001
Number of days spent recording diet more than once	2(9)	26(3)	Z = -4.635, p < 0.001
Self-monitoring of exercise	3(5)	3(7)	Z = -0.360, p = 0.719

[a] Mann-Whitney tests.

significant barrier that the work was concentrated over a short period of time, resulting in a high level of stress (intense work). (See Appendix Table A.3).

3.5. Maintenance

Among 65 participants who self-reported change in weight at 6 months, 67% reported not gaining weight, with 15% reporting even <28-day measurements. While 65 participants reported categorically whether they experienced weight gain, loss, or maintenance, only 33 self-reported their weight at 6 months.

As shown in Table 5, participants expressed a high level of satisfaction in general. The majority of participants (92%) anticipated the company holding annual WMPs and expressed a strong desire to participate again in the future. There was a median expectation of 28 days and two times per year for duration and frequency. Intention score, expected frequency, and duration did not differ between groups. HR and the program director agreed that a 28-day duration with a biannual frequency was appropriate, in line with participants' expectations. While they spoke highly of the program, they did identify some areas for improvement. Besides, HR summarized five recommendations for improvement, two of which were specific to the exercise intervention. The following BCTs can be associated with them: restructuring the physical environment, adding object to the environment, instruction on how to perform the behavior, demonstration of the behavior and behavioral practice. (See Appendix Table A.4).

4. Discussion and conclusion

4.1. Discussion

This study evaluated a WeChat-based WMP targeted at overweight/obese office workers using the RE-AIM framework. A 26% participant rate was observed among overweight/obese employees. SM and the IS interventions were both effective in reducing excess weight among participants. The IS group participants presented significantly higher levels of intervention compliance with self-monitoring of weight and diet than the SM group participants. All interventions were implemented through the WeChat platform, with the IS group incurring higher implementation costs than the SM group. At 6-month follow-up, participants reported stable weight control and positive expectations of maintenance.

With Reach, the strength of the program is that intervention intensity has been tailored to different levels of health risk. Previous research has indicated that lifestyle interventions can have a distinct impact on disease outcomes and costs among various health-risk groups. (Breeze et al., 2017) It should be noted that for those who meet the inclusion criteria, there may be some barriers to enrollment in IS programs, such as enrollment fees, These barriers were, unfortunately, not explored in this study and are recommended for future research.

There was significant weight loss in both interventions, with 57% of participants losing more than three percent of their body weight. The short measurement interval and the small sample size of the IS group limit the reliability of the weight loss result. A further limitation was the absence of regular blood test results. Measures of blood pressure, glucose, and lipid levels are critical in evaluating the IS intervention, which was restricted to overweight/obese individuals with metabolic comorbidities. Therefore, this study was insufficient to demonstrate the effectiveness of the IS intervention. On the other hand, the weight loss benefit demonstrated in the SM group suggests its potential as a cost-effective solution for overweight/obese employees without metabolic comorbidities. Individual compliance was higher in the IS group than in the SM group, indicating a higher potential for sustainability, given that maintaining weight control requires high levels of compliance. (Greaney et al., 2009) The remarkable level of compliance can be attributed to intensive social support and immediate feedback on behavior. (Burke et al., 2011; Lim et al., 2016) The WeChat platform has been found to be a viable choice for organizational implementation due to its ease of use, diverse modes of information exchange, efficient communication, and low cost. (Chen et al., 2020) This makes it an ideal platform for carrying out a lifestyle intervention involving multiple BCTs. However, WeChat-based delivery poses new implementation challenges. First, it requires a paradigm shift for dietitians and sport coaches accustomed to traditional face-to-face interventions. Second, it has increased the workload and pressure on dieticians assigned to the IS group to provide immediate feedback on diets. Third, repeated diet comments and health education material make it increasingly difficult to attract participants. Future research is recommended to investigate possible solutions to these problems.

Sixty-seven percent of participants reported not gaining excess weight after 6 months. However, the low response rate regarding self-measured weight data has limited the reliability of the results. Future study is suggested to conduct rigorous evaluation to verify the long-term weight loss benefit. Most participants and HR have expressed positive feedbacks about the program. However, HR suggested that more effort be put into improving BCTs related to physical environment support and feedback on exercise and health outcomes. Future research is suggested to explore intelligent decision support technology for health professionals to aid in implementing feedback on behavior and to consider utilizing social-media technology to increase compliance with online health education.

Table 5
Participants' feedback on program maintenance at the 6-month follow-up.

	All participants	SM group	IS group
Self-perceived weight control after 6 months, count (%)			
I've regained weight.	18(28)	15(27)	3(30)
My weight has not changed.	34(52)	31(56)	3(30)
I've lost even more weight.	10(15)	9(16)	1(10)
Uncertain.	3(5)	0(0)	3(30)
Score of intention to attend again the WMP, median (QR)	4(3)	4(3)	3(3)
Expecting the company to hold WMP regularly, count (%)	60(92)	53(96)	7(70)
The expected frequency (times) for company to hold a WMP annually, median (QR)	2(1)	2(1)	1.5(1)
The expected duration (days) for single WMP, median (QR)	28(28)	30(28)	28(28)

4.2. Conclusion

The study applied the RE-AIM framework to conduct a comprehensive evaluation of HDLC, a WeChat-based WMP for overweight/obese office workers. The evaluation confirmed the efficacy and sustainability of the program as a workplace wellness program. Adoption and implementation assessments indicated that a high-intensity intervention would cost more to implement; however, it would result in a higher level of compliance. Nevertheless the introduction of the WeChat platform can contribute to a great deal of cost containment. Having the findings of this study can inspire cost-effective optimization strategies for interventions and provide a reference for designing workplace weight management programs that can be replicated.

Data availability statement

The data are available to the corresponding author Min Yang upon reasonable request.

Declaration of Competing Interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgments

The work was supported by the Key Research and Development Program of Guangxi, China [grant number 2020AB33002], the Key Research and Development Programs of Ningxia, China [grant number 2020BFG02002], and the National Key Research and Development Program of China [grant number 2020YFC2006405], the Fundamental Research Fund for the Zhejiang Provincial Universities [grant number 2021XZZX029], the Key Laboratory of Intelligent Preventive Medicine of Zhejiang Province [grant number 2020E10004], the Leading Innovative and Entrepreneur Team Introduction Program of Zhejiang [grant number 2019R01007], and the Key Research and Development Program of Zhejiang Province [grant number 2020C03002].

Tons of thanks to Anqi Xu, Jing He, Xiaojie Ma, Ziqiang Song, Yan Wang, Bugao Hu, Xi Jin and Jili Chen. As staff members, their hard work in this intervention program would always be appreciated.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2023.102275.

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