

Background

Social media has been increasingly prevailing for health promotion due to its synchronous ability, contents sharing, and customization. Social media-based obesity prevention programs have emerged recently.

China, affected by the alarming increase of obesity, owns the largest number of social media users worldwide. Previous studies have examined the effectiveness of social media-based obesity programs globally, but no China-related review has been conducted.

Objectives

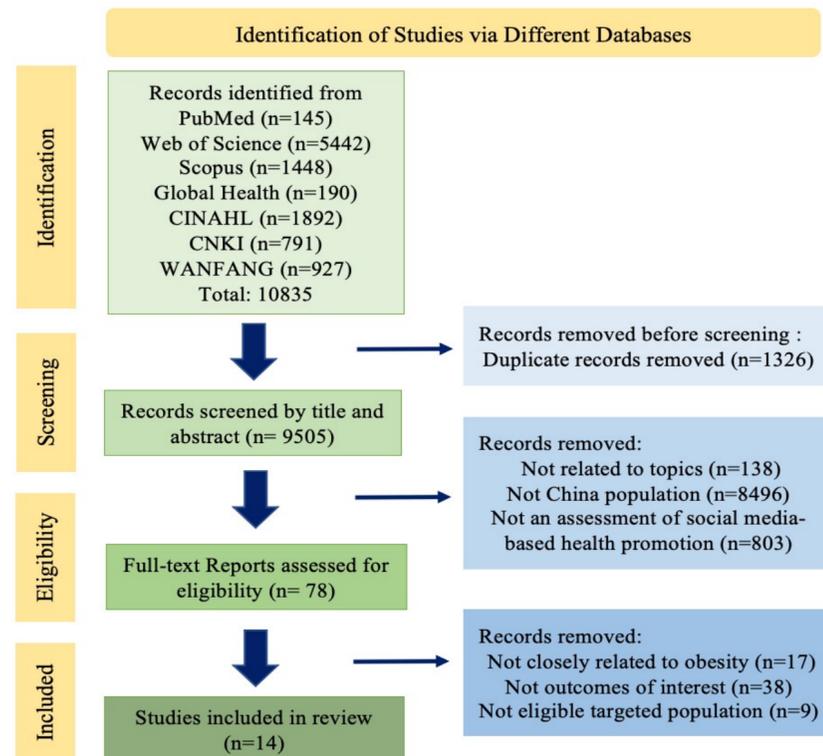
This review study aims to:

1. Describe the existing social media-based obesity intervention programs in China;
2. Examine and summarize the effectiveness of social media-based health promotion interventions on body weight and weight-related behavior modification among Chinese population;
3. Determine the existing gaps of the reviewed literature to provide evidence-based suggestions for future obesity research and interventions in China.

Methods

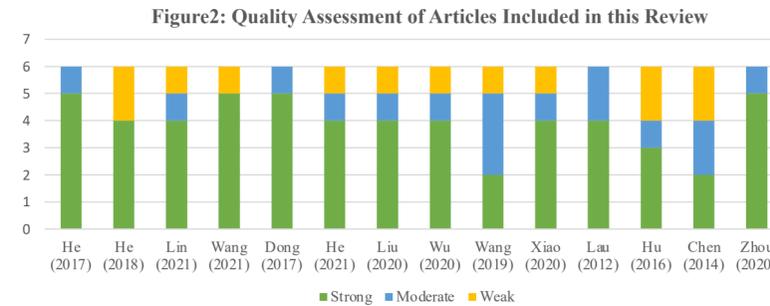
A systematic search was conducted via 8 online databases. Studies published in Chinese or English between January 1, 2010, and June 30, 2021, were reviewed for the following criteria: (1) using social media-based health promotion interventions; obesity-related; (2) including weight-related outcomes (e.g., body mass index, waist circumference) and (3) targeting Chinese residents. Study quality was assessed using the Cochrane Quality Assessment Tool for Quantitative Studies. After identifying studies that met inclusion criteria, the following data were extracted from each article by 2 independent reviewers: authors, publication year, geographic location, study design, sample size, study purpose, social media platform, characteristics of target population, intervention, and obesity-related outcomes. Review Manager 5.3 and STATA16.0 were used to conduct the meta-analysis. Mean differences, confidence interval, and study heterogeneity using I² index were estimated for weight conditions including body weight (kg), waist circumference (cm), and BMI (kg/m²).

Figure 1: PRISMA Flow Chart of Study Selection Process



Results

A total of 10,835 articles were identified through keyword search. After exclusion, 14 articles were included in this review (Figure 1.). In general, After review by two reviewers, 4 articles were global rating “strong” and 7 articles obtained “moderate” level. The rest of 3 articles rated “weak” (Figure2).



The major characteristics of the existing social media-based obesity intervention programs in China were summarized by study types, social media platforms, and target population.

Types of Studies

The most common study design was randomized control trials (RCTs), featured in 8 of the 14 articles (57%). Four articles (29%) used non-randomized trials based on intentions of participants. Meanwhile, there were 2 cross-sectional studies (14%) to tracking the outcomes of participants with social media-based health promotion interventions.

Social Platforms

WeChat (used by 13 of the 14 studies) was the most commonly used social media platform. Some of health interventions are only delivered via WeChat (Figure 3). Other mobile-based and web-based social media platforms such as Weibo and QQ were also utilized by the health intervention programs but with much less frequency that WeChat (Figure 4.).

Figure 3: Percentage of Health Promotion via WeChat only and Combined Platforms

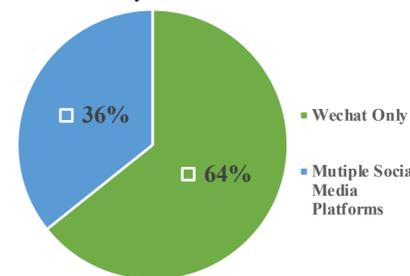
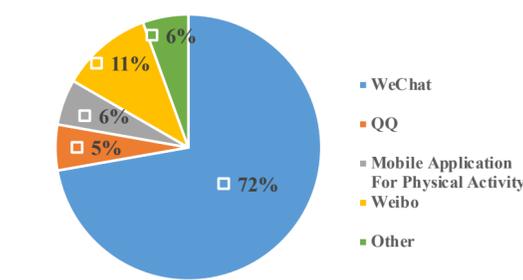


Figure 4: Percentage of Health Promotion via Different Social Media Platforms



Target Population

Five of 14 studies (35.7%) examined the effectiveness of social media-based health promotion among patients who were overweight/obese. One of them focused on pregnant women with obesity. Moreover, two studies focused on the occupational people with the possibility of being overweight and obesity.

Twenty-one percent of articles (3 of 14) targeted college students especially undergraduates. Most of studies targeted adults, of which owned specific medical conditions such as pregnant women (2 of 14, 14.28%) and patients with non-alcoholic fatty liver (1 of 14, 7.1%). Only one article (7.1%) demonstrated the impact of social media-based health promotion on school children who were aged below 18 years old. Meanwhile, there was one article (7.1%) targeting infants diagnosed with non-restrictive ventricular septal defect (VSD) after birth, closely associated with social media-based exposure of their parents.

The average duration of these interventions was 9.7 months. Except for two large-scale trials (sample size>10000) conducted by the government in China, the mean sample size of these studies was 288.

Meta-analysis

Overall, the meta-analysis results showed that social media-based obesity interventions were associated with significant BMI reductions (MD:1.72, 95% CI: 0.04-3.41) among participants (Table 1.).

Table 1: Model Results of BMI from Meta-analysis

Study or Subgroup	Intervention		Control		Weight	Mean Difference		Mean Difference IV, Random, 95% CI
	Mean	SD	Mean	SD		IV, Random, 95% CI	IV, Random, 95% CI	
Dong 2017	4.3	3.34	62	1.5	3.43	61	19.5%	2.80 [1.60, 4.00]
He 2021	3.08	1.01	371	0.06	1.03	384	21.6%	3.02 [2.87, 3.17]
Wang 2019	0.1	0.5	87	0	0.5	23	21.5%	0.10 [-0.13, 0.33]
Xiao 2020	3.36	1.34	50	1.57	1.38	50	21.2%	1.79 [1.26, 2.32]
Zhou 2020	0.91	3.69	25	0.13	3.8	25	16.3%	0.78 [-1.30, 2.86]
Total (95% CI)			595			543	100.0%	1.72 [0.04, 3.41]

Heterogeneity: Tau² = 3.42; Chi² = 447.59, df = 4 (P < 0.00001); I² = 99%
 Test for overall effect: Z = 2.01 (P = 0.04)

Based on the use of social media platforms, combined multiple platform interventions were more effective than health promotion via single social media like WeChat for BMI reduction (MD: 2.43, 95% CI: 1.23-3.64 vs. MD: 1.20 95% CI: -0.73-3.14) (Table 2.).

Table 2: Effectiveness of Interventions via Different Social Media Platforms

Social Media	First author (years)	BMI	Body weight	Weight-related behavior
WeChat interventions	He (2017); He (2018); Lin (2021); Wang (2021); Dong (2017); Liu (2020); Wu (2020); Wang (2019); Hu (2016); Zhou (2020)	MD: 1.20 95% CI: -0.73-3.14 I ² index: 90% Z=1.22 P=0.22	MD: 0.30 95% CI: 0.19-0.41 I ² index: 0% P<0.00001	Increase self-weight management time, physical activity time and level (P<0.05). Decrease the frequency of eating out (P<0.05). Increase food intake level (P<0.05)
Combined multiple platform interventions	He (2021); Xiao (2020); Lau (2012); Chen (2014)	MD: 2.43 95% CI: 1.23-3.64 I ² index: 95% P<0.0001 Z=3.96	MD: 2.60 95% CI: -0.56-5.76 Z=1.61 P=0.11	Increase self-reported physical activity time. (P<0.05). Increase the ratio of participants keeping diet (P<0.05).

According to the different study settings, hospital-based weight control interventions demonstrated better effects on BMI reduction than community-based interventions (MD: 0.89, 95% CI: -0.51-2.30 vs. MD: 3.02 95% CI: 2.87-3.16) (Table 3.).

Table 3: Effectiveness of Social Media-based Interventions via Different Delivery Pattern

Settings	First author (years)	BMI	Body weight	Weight-related behavior
Community-based	Xiao (2020); Zhou (2020); Hu (2016); He (2018); Lau (2012); He (2017); Wang (2020)	MD: 0.89 95% CI: -0.51-2.30 I ² index: 94% P=0.21 Z=1.25	MD: 0.82 95% CI: -1.55-3.19 I ² index: 60% P=0.50 Z=0.68	Increase self-reported physical activity time (P<0.05); Decrease the frequency of eating out (P<0.05); Increase food intake and physical activity level. (P<0.05).
Hospital-based	Liu (2020); Chen (2014); Dong (2017); Wang (2019); Wu (2020); He (2021); Liu (2020)	MD: 3.02 95% CI: 2.87-3.16 I ² index: 0% Z=40.93 P<0.00001	MD: 0.31 95% CI: 0.19-0.43 Z=5.22 P<0.00001	Increase of physical activity time (P<0.05); Increase of self-weight management time (P<0.05), Increase the ratio of participants keeping diet (P<0.05).

Conclusion

Social media-based intervention can be a promising practice for obesity prevention among the Chinese population. Health promotion via combined social media platforms is relatively effective for health education and weight management. Future studies with larger sample sizes, longer duration, and follow-up periods are needed to enhance the effectiveness of such interventions.