The Effectiveness of Pre- and During-pregnancy Weight Management Interventions on During- and After-Pregnancy Obesity in China: A Systematic Review

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Background/Objectives

In China, with the development of economy and lifestyle changes, the prevalence of maternal obesity/overweight has increased in recent years.

Evidence has shown that maternal obesity is related to higher risks of both maternal and fetal health problems (e.g., gestational diabetes mellitus, large-for-gestational-age infants, congenital malformations, stillbirth, etc.). Therefore, it is important to identify and promote perinatal weight control interventions to prevent maternal obesity among Chinese women.

This systematic review aims to assess the effectiveness of pre- and during-pregnancy weight management interventions on pregnancy and postpartum obesity prevention among Chinese women.

Methods

- Nine online databases were searched up to July 15, 2021.
- Studies in English or Chinese were eligible if they contained:
  1) weight control interventions implemented before or during pregnancy;
  2) any weight-related outcomes during or after pregnancy;
  3) interventions targeting Chinese women.
- All the studies were assessed by the quality assessment tool for quantitative studies provided by the Effective Public Health Practice Project (EPHPP).
- Review Manager 5.3 were used to conduct meta-analysis.

Figure 1. PRISMA Flow Chart of Study Selection Process
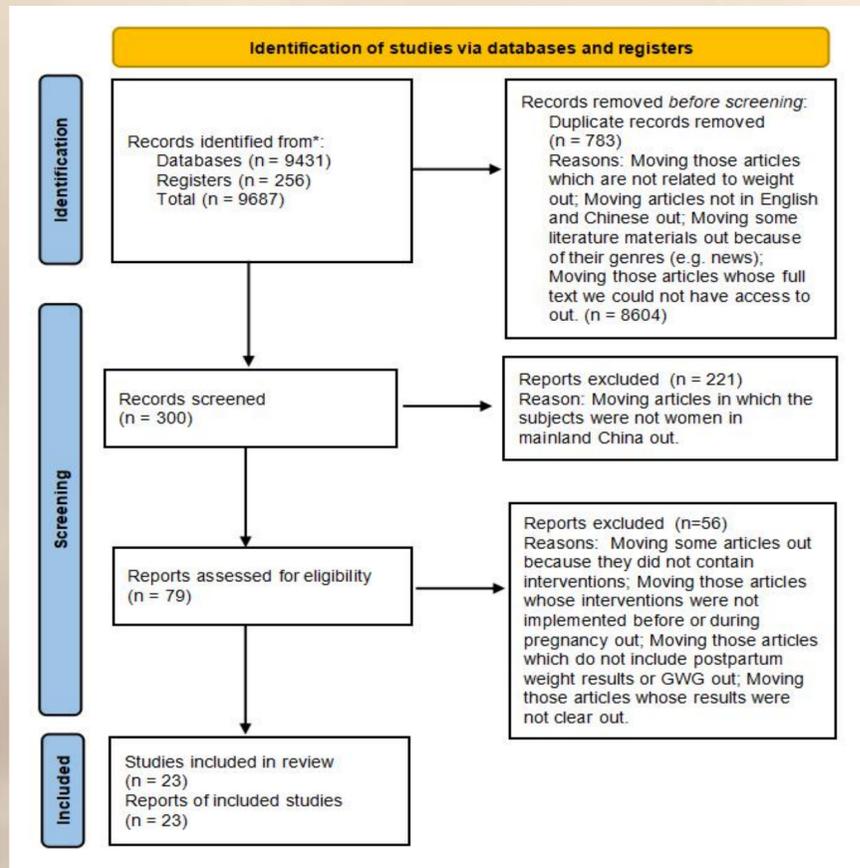
Results

- A total of 9,687 articles were identified through multiple database search, and 23 studies were included in this review (**Figure 1.**).
- All the 21 RCTs were assessed as 'STRONG' while the other 2 studies (1 quasi-experimental and 1 cross-sectional study) were assessed as 'MODERATE'.
- Overall, all the interventions showed effective, especially more effective on overweight and obese women. The pooled effects of the interventions were measured by average weight change (**Table 1.**), BMI change (**Table 2.**), and the degree of achievements of the proper weight gain targets (**Table 3.**).

Table 1. Forest Plot for Gestational Weight Change (kg) during Pregnancy
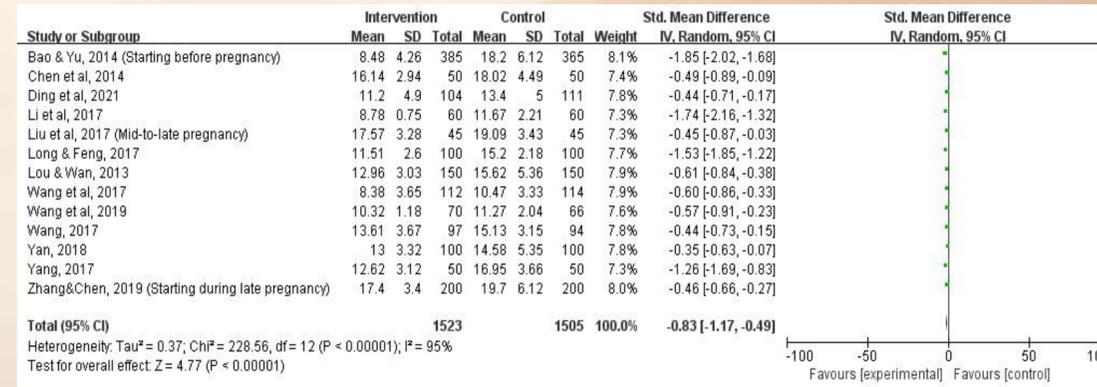

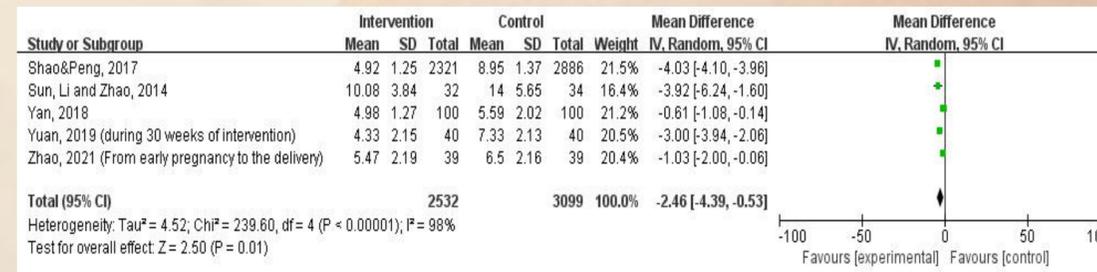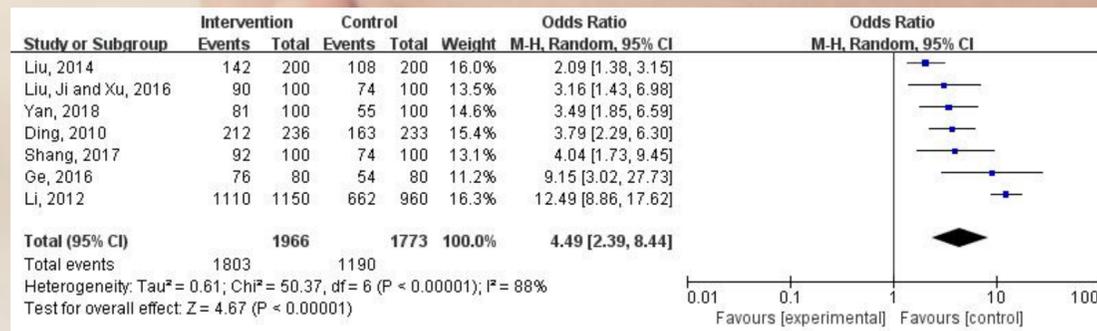### Table 2. Forest Plot for Body Mass Index (BMI) Change during Pregnancy

Table 3. Forest Plot for the Degree of Achievement of Gestational Weight Gain or BMI Change during Pregnancy

- The most effective intervention appeared to be the one that started before pregnancy, with the mean GWG of intervention group being approximately 10 kg less than that of control group.
- Two studies included follow-up periods ranging from 42 days to 12 months postpartum, the results of which indicate that the pre- and during-pregnancy interventions can also have lasting effects.

- The pooled effects of the interventions were also measured among subgroups (**Table 4.**), and the results indicated that:
  1) the interventions were more effective among obese or overweight women;
  2) those interventions characterized as comprehensive, personalized or individualized and face-to-face tend to be more effective;
  3) different types of interventions had different best-function periods;
  4) the longer duration of the interventions were, the more effective they were;
  5) the earlier starting of the interventions were, the more effective they were;
  6) the starting points seemed to play a more important role than the duration in the effectiveness of weight control interventions.

Table 4. Pool effects of interventions by subgroups

Subgroup analysis	Weight changes (kg)	BMI changes (kg/m²)	Odds Ratio
Participants' weight status			
Only Overweight or Obese	-1.15 [-2.29, -0.00] (n=2)	/	/
Only Normal Weight	-0.45 [-0.87, -0.03] (n=1)		
Overweight+Obese	-0.97 [-1.94, 0.01] (n=3)	-3.92 [-6.24, -1.60] (n=1)	/
All types of weight status	-0.72 [-1.03, -0.42] (n=7)	-2.18 [-4.32, -0.03] (n=4)	4.49 [2.39, 8.44] (n=7)
Intervention types			
Only D/N or Ex	-0.60 [-0.86, -0.33] (n=1)	-3.63 [-4.61, -2.64] (n=2)	/
D+Ex	-0.67 [-0.97, -0.36] (n=4)	-3.92 [-6.24, -1.60] (n=1)	/
E+Ex; E+D/N; E+Ex+D/N	-0.93 [-1.44, -0.42] (n=8)	-0.61 [-1.08, -0.14] (n=1)	4.69 [2.27, 9.71] (n=6)
E+Ex+D/N+P	/	-1.03 [-2.00, -0.06] (n=1)	/
E+D/N+S; D+Ex+S; E+Ex+D/N+S	-0.43 [-0.56, -0.31] (n=4)	-0.61 [-1.08, -0.14] (n=1)	3.49 [1.85, 6.59] (n=1)
Individualized/personalized interventions	-1.05 [-1.66, -0.44] (n=6)	-2.94 [-5.23, -0.65] (n=3)	4.65 [1.47, 14.70] (n=3)
Intervention duration			
3-6 months	-0.45 [-0.87, -0.03] (n=1)	/	/
6-9 months	-0.79 [-1.07, -0.51] (n=10)	-2.46 [-4.39, -0.53] (n=5)	4.49 [2.39, 8.44] (n=7)
>9 months	-1.16 [-2.52, 0.20] (n=2)		
Based on the starting points of interventions			
Started before pregnancy (3-6 months)	-1.85 [-2.02, -1.68] (n=1)	/	/
Started from early pregnancy	-0.79 [-1.07, -0.51] (n=10)	-2.46 [-4.39, -0.53] (n=5)	4.49 [2.39, 8.44] (n=7)
Started from mid-to-late pregnancy (over 20 weeks of gestation)	-0.45 [-0.87, -0.03] (n=1)	/	/
Started from late pregnancy (37-40 weeks of gestation)	-0.46 [-0.66, -0.27] (n=1)	/	/

Notes:
1. All the results are shown in the form of Std. Mean Difference using the random effect model.
2. "n" represents the number of articles. D: Dietary interventions; N: Nutritional interventions; Ex: Exercise interventions; E: Education; P: Psychological interventions; S: Social media-based interventions.

Conclusion

The type and timing of the interventions were essential in obesity prevention during and after pregnancy. To achieve the best outcomes, practitioners need to pay attention to the best-function periods of different types of interventions. Studies with rigorous design and longer follow-up period are needed to determine the long-term effects and characteristics of perinatal obesity prevention and treatment interventions.