

1 **Protocol**

2 **Research Design**

3 An open-label randomized controlled trial was conducted using two parallel
4 groups.

5 **Setting and Participants**

6 The participants underwent a self-weighing promotion workshop in September
7 2019. The recruitment exercise commenced in August via bulletins. Individuals
8 aged under 20 years, those unwilling to participate, pregnant women, those
9 receiving weight-related guidance from medical institutions, and those who failed to
10 submit the questionnaires were excluded.

11

12 **Allocation**

13 Participants were assigned numbers at the reception and allocated individually,
14 approximately halved using a random number table. The first author conducted the
15 allocation in accordance with the CONSORT statement. Blinding was not conducted
16 because of the nature of the study.

17

18 **Interventions**

19 We created the two groups: the “Negative-priming group” and the “Positive-
20 priming group”. The workshop, which lasted for 2 hours, proceeded, as follows:
21 (1) [Common to both groups: 5 min]: Initially, the participants were briefed on the
22 purpose of the study and ethical considerations.
23 (2) [Each group separately: 10 min]: Participants moved seats (the negative- and
24 positive-priming groups were seated on the first and second floors,
25 respectively, to prevent the contamination of the intervention effects and biases
26 caused by knowing the intervention content of the other group. The
27 interventions for each group were conducted by the lecturer for each group
28 using standardized intervention content.

29 *Negative-Priming Group (Individual Task)*

30 The participants were instructed to respond to and self-score a paper test on the
31 disadvantages of obesity (refer to the self-weighing prior study for details of the
32 questions). This name was adopted because taking a test that solely focuses on the
33 disadvantages of obesity could result in negative priming.

34 *Positive-Priming Group (Paired Task)*

35 A participant was allowed to present their experience about achieving success
36 after making an effort, and the other praised the efforts (refer to the self-weighing-

37 prior study for details of the pair task). This name was adopted because the task

38 fosters a growth mindset and positive priming.

39 (3) [Common to both groups: 100 min]: After returning the participants to their

40 original seats, the lecturer proposed the importance of self-weighing, stating

41 that, “in addition to a balanced diet and the promotion of physical activity, self-

42 weighing can help prevent obesity. It is more effective to obtain cooperation

43 from others about self-weighing and to record your weight”.

44 (4) [Common to both groups: 3 min]: The lecturer explained that the declaration of

45 implementation intentions have been demonstrated to positively affect weight

46 loss (Coupe et al., 2019). After the workshop, a participant declared “where

47 and when to self-weigh” to the person next to them.

48

49 **Survey and Outcomes**

50 The following items were surveyed using a self-administered questionnaire:

51 ***Basic Characteristics***

52 The self-weighing participants’ sex, age, body mass index (BMI), and smoking

53 habits were recorded.

54 ***Outcomes***

55 The primary outcome was the “self-weighing frequency,” “participants who
56 maintained their weights,” and the “weight change.” To ascertain the main
57 outcomes, the participants’ weights and self-weighing frequencies were obtained
58 immediately after the intervention [T1], after six months of intervention [T2], and
59 after one year of intervention [T3]. The secondary outcomes included “satisfaction
60 with the workshop at T1” and weight. The secondary outcomes were “support from
61 others at T2” and “recording of regular self-weighing at T2.” The secondary
62 outcomes were determined on a five-point scale, ranging from “applicable” to “not
63 applicable at all.” The questionnaires were managed by a linked anonymized list.
64 The T1 survey was conducted on-site, and T2 and T3 were surveyed via mail.

65

66 **Ethical Considerations**

67 The participants received written and verbal notifications regarding the voluntary
68 nature of their participation and the confidential nature of the study; they were
69 informed that their responses to the survey would be interpreted as consent. All
70 questionnaires were processed anonymously, and the number of questions was
71 minimized to avoid burdening the participants. The interventions were transparent,
72 with the lecturer explaining the types of nudges employed in the workshop. The

73 study was approved by the Research Ethics Committee and registered with the
74 Clinical Trials Registry. Additionally, we distributed the materials to all participants
75 after the study to allow them to know the other interventions.

76

77 **Statistical Analysis**

78 Assuming a power of 80%, an α -error of 5%, and that the positive-priming group
79 was more effective than the negative-priming group (effect size = 30%), a sample
80 size, $n = 88$ (44 in each group), was computed. Additionally, we assumed a final
81 valid response rate of 40% and set a recruitment target of 220 participants.
82 Furthermore, we excluded missing values from the analysis. The continuous
83 variables were analyzed by t-test and the categorical data were analyzed by the χ^2 -
84 test or Fisher's exact test. SPSS version 28 (IBM, Tokyo) was employed for the data
85 analysis and $p < 0.05$ (two-tailed test) was considered statistically significant.

86

87

Results

88 Finally, 80 met the criteria (42 and 38 in the negative- and positive-priming
89 groups, respectively) and were included in the analysis. In the negative-priming
90 group, 86.5% (n = 32) and 5% (n = 5) were highly and somewhat satisfied with
91 the workshop, respectively. In the positive-priming group, 77.8% (n = 28), 5% (n
92 = 5), and 8.3% (n = 3) were highly satisfied, somewhat satisfied, and neutral,
93 respectively (p = 0.271).

94 Regarding outcomes, the individuals who maintained their weights at T2 and T3
95 were 78.0% and 75.6%, in the negative priming group and the positive priming
96 group, respectively. In the positive-priming group, the individuals with more
97 frequent self-weighing increased from 34.2% (at T2) to 36.8% (at T3), while the
98 percentages that maintained their weights at T2 and T3 were 78.9% and 68.4%,
99 respectively. Although both groups exhibited weight losses at T2 and T3, they
100 exhibited 95% CI > 0.

101