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BRIEF CUTTING EDGE REPORT

Clinical Trials and Investigations

Impact of the COVID-19 pandemic on initial weight loss in a digital weight management program: A natural experiment

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Abstract

Objective: The aim of this study was to assess the impact of the coronavirus disease 2019 (COVID-19) pandemic on initial weight loss during a digital weight management program.

Methods: Participants (n = 866,192; BMI 33.6 [SD 7.4] kg/m^2) who joined a digital weight management program (WW) in the first 30 weeks of 2020 (COVID-19 cohort) were compared with participants (n = 624,043; BMI 33.1 [SD 7.2] kg/m^2) who joined the same program during the same time period in 2019 (control cohort). Weight change (percentage) and self-monitoring over the first 4 weeks of enrollment were compared between the cohorts. Significance was defined as meeting the criteria for a small effect ($d \geq 0.2$).

Results: Over the 30-week enrollment period, the COVID-19 cohort experienced significantly less weight loss than the control cohort but only for 7 weeks of enrollments. The COVID-19 cohort also had fewer days of food tracking but only for 3 weeks of enrollments. There were no differences in the self-monitoring of weight and activity at any time between the two cohorts.

Conclusions: Over a 30-week enrollment period, COVID-19 had negative effects on both weight loss and food self-monitoring, but the effects were short-lived. Those participating in evidence-based weight management programs can expect similar levels of initial weight loss as those experienced before the pandemic.

INTRODUCTION

With the onset of the coronavirus disease 2019 (COVID-19) pandemic, several studies have shown changes in health-related behaviors, including dietary behaviors, quality and quantity of sleep, and time spent in physical activity and sedentary behaviors (1,2). Individuals with obesity have reported engaging in less exercise time and intensity and increased stress eating during COVID-19 (3,4), which could make weight management efforts more difficult. Recent studies have shown that following shelter-in-place orders, people are gaining weight at a rate of 1.5 kg per month (5).

During a time when it is challenging to participate in face-to-face obesity treatment, evidence-based digital treatments have become more frequently used. It is unknown, however, the degree to which the efficacy of these programs is affected by COVID-19. Within the United States, the COVID-19 pandemic lockdown period has been considered to start around the week of March 23, with restrictions starting to lift around the end of April in some states. In order to address this question, we conducted a natural experiment among those who enrolled in a popular, evidence-based digital weight management program (WW). We examined the effects of the COVID-19 pandemic through the comparison of initial weight change (percentage) and in-app self-monitoring among participants who joined the digital WW program over a 30-week period in 2020 (during the COVID-19 pandemic) and those who joined during same time the prior year in 2019 (when COVID-19 was not present).

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METHODS

Participants were WW digital members in the United States who joined during the first 30 weeks of 2020 as well as those who joined during the same time period in 2019. Participant characteristics are described in Table 1. Weight change (percentage) and self-monitoring (in-app tracking of weight, food, and activity) data were assessed during the first 4 weeks of WW membership. Four-week weight loss was chosen as the outcome because weight loss during the first month of a behavioral weight loss program is predictive of long-term weight loss (6-9). All data were self-reported as entered into the WW app. Data from weekly cohorts were analyzed independently (i.e., weight loss for members joining in Week 1 of 2020 was compared with weight loss for members joining in Week 1 of 2019). Members who logged their weight during their first week of their membership and entered a subsequent weight in weeks 3-5 were included in the analysis. Weight from week 4 was used as the follow-up weight, when available. If a member had missing weight data for week 4, weight data from week 5 were used. If neither were available, weight data from week 3 were used. If weight was not reported in weeks 3 to 5, then the member was excluded from the analysis. The data included in the analyses were normally distributed. Weight loss outliers were identified and removed using thresholds calculated on weight loss percentage: low (25th weight change % percentile − 1.5*interquartile range [IQR]) and high (75th weight change % percentile + 1.5*IQR). Using these criteria, only 2.5% of the data were considered weight loss outliers, equating to approximately ≤−9.3% weight loss and ≥3.3% weight gain in 4 weeks. We compared the excluded outliers sample to the remaining sample and found some differences, including outlying members on average were 3 years younger than nonoutliers (42.5 years old vs. 45.5), more likely to be male (14.5% vs. 11.0%), and had higher start weights and BMIs, likely due to misentering weights (11.9 kg heavier at first weigh in and 3.5kg/m^2 higher BMI).

Because of the large sample sizes, *p* values were not calculated. Instead, significant differences were defined as meeting the criteria for Cohen's convention for a small effect (10) ($d \geq 0.2$).

Study Importance

What is already known?

► Survey data suggest that the coronavirus disease 2019 (COVID-19) pandemic has resulted in abrupt changes to daily routines, creating behavioral barriers for effective weight management. Little is known about how the COVID-19 pandemic affects weight loss among those enrolled in a weight management program.

What does this study add?

► Over a 30-week enrollment period, COVID-19 significantly decreased initial weight loss but only over a 7-week period (enrollment week of March 8 through enrollment week of April 19). For individuals who joined after that time, weight loss was comparable to the prior non-COVID-19 year.

How might these results change the direction of research or the focus of clinical practice?

► These data suggest that initial weight loss success was compromised only during the initial period of the pandemic. They also suggest that those participating in evidence-based weight management programs can expect similar levels of initial weight loss as those experienced before the pandemic.

RESULTS

Over the first 30 weeks of enrollment, the COVID-19 cohort had significantly less weight loss (mean weight change percentage) than the control cohort during 7 weeks of enrollment (enrollment weeks of March 8 through April 19; Figure 1). During this period, the effect sizes by week were 0.29, 0.51, 0.53, 0.49, 0.43, 0.27, and 0.24, respectively, and the percentage point differences in weight loss between the groups were 0.67%, 1.18%, 1.24%, 1.14%, 0.98%, 0.62%, and 0.54%. There were no significant differences in weight loss between the two cohorts during the other 23 weeks of enrollment (prior to the enrollment week of March 8 and in the enrollment weeks of April 26 and beyond). The COVID-19 cohort had fewer days of food self-monitoring during the first 4 weeks of membership, which was limited to 3 weeks of enrollment (enrollment weeks of March 8 through March 22). Effect sizes for those three weeks were 0.20, 0.27, 0.27, respectively. Food tracking prior to and following this period were not significantly different between the two cohorts. Days of self-monitoring weight and activity were not significantly different between the cohorts during the study (Figure 2).

DISCUSSION

In this natural experiment of almost 1.5 million enrollees in a digital WW program, we examined the effects of COVID-19 on initial weight loss and self-monitoring behavior during 30 weeks of enrollment in 2020 (COVID-19 cohort) and 2019 (control cohort). There were several principal findings.

The first was that COVID-19 produced significantly less weight loss but its effects were short-lived. Weight loss was less among the COVID-19 cohort for only 7/30 weeks of enrollment (enrollment weeks of March 8 through April 19). The effects were most pronounced (effect sizes approximating 0.5) for the enrollment weeks of March 15, 22, and 29. After 7 weeks, however, weight loss returned to prepandemic levels, with no difference between the cohorts. The

precise reasons for the decrease relative to prepandemic weight losses are difficult to identify. However, it is likely that the conditions associated with the earlier stages of the COVID-19 outbreak (stress, disruption of routines, more proximal access to food, social isolation, closure of in-person gyms) served as barriers to effective weight management. In support of that hypothesis, recent studies examining changes in weight (5,11) after shelter-in-place orders report that on average, people gained ~1.5 kg per month during this time period. The weight loss patterns observed in our study do show that by the end of April, initial weight loss returned to 2019 prepandemic levels. These patterns suggest that at the start of the strict stay-at-home order time period, members may have paused their health-related routines and over time, began to adapt to the "new normal," focusing on their health and weight-related goals again. They also suggest that participants in evidence-based weight management programs can expect similar levels of initial weight loss as those experienced before the pandemic.

We also examined the effects of COVID-19 on participants' self-monitoring of weight, food, and activity. Research examining the effects of the pandemic on obesity, eating behaviors, and physical activity during the COVID-19 lockdown found a large number of people reporting snacking more frequently and having more difficulties with excess food consumption, compared with before lockdown (12), but little has been reported on the tracking of health behaviors during this period. We found that the COVID-19 cohort had fewer days of food self-monitoring than the control cohort, but it was limited to 3 weeks of enrollment (enrollment weeks of March 8 through March 22), suggesting that at the start of the COVID-19 pandemic, members were tracking their food less often but returned to pre-COVID-19 tracking levels after that initial 3-week period. Among those beginning treatment in the end of March and beyond, differences in food tracking between cohorts no longer existed. It is not surprising that periods of decreased weight loss and decreased self-monitoring intake overlapped to some degree, given the strong relationship between dietary self-monitoring and weight (13). It was surprising that there were no effects of COVID-19 on weight and activity tracking. It may be because they are, in general, less

TABLE 1 Baseline demographics

Cohort	COVID-19	Control
Year	2020	2019
n	866,192	624,043
Age (y), mean (SD)	45.7 (13.6)	45.3 (13.4)
Sex (F/M), %	89.7%/10.3%	88.1%/11.9%
Weight (kg), mean (SD)	92.6 (22.5)	91.5 (22.2)
BMI (kg/m^2), mean (SD)	33.6 (7.4)	33.1 (7.2)

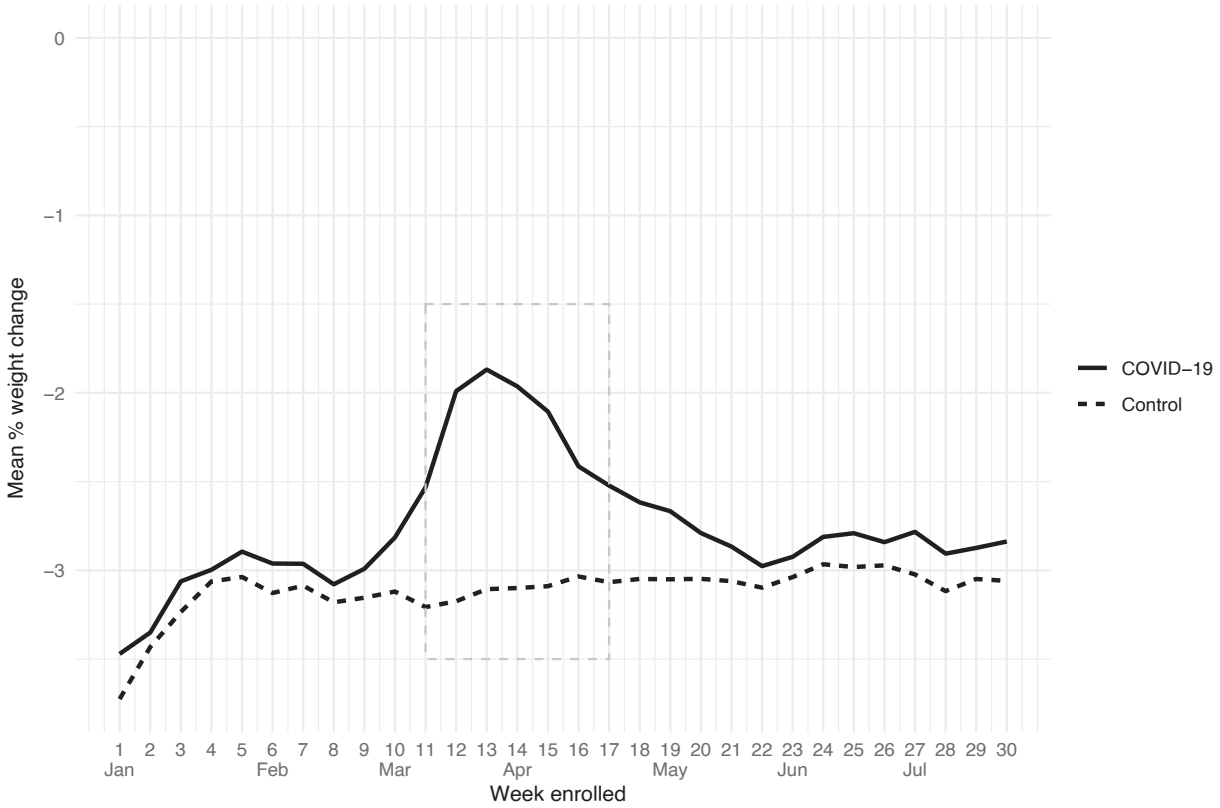

FIGURE 1 Mean weight change (%) in the first 4 weeks of WW membership by cohort (COVID-19 versus control). Dashed-line box indicates significance, defined as meeting criteria for a small effect size ($d > 0.2$)

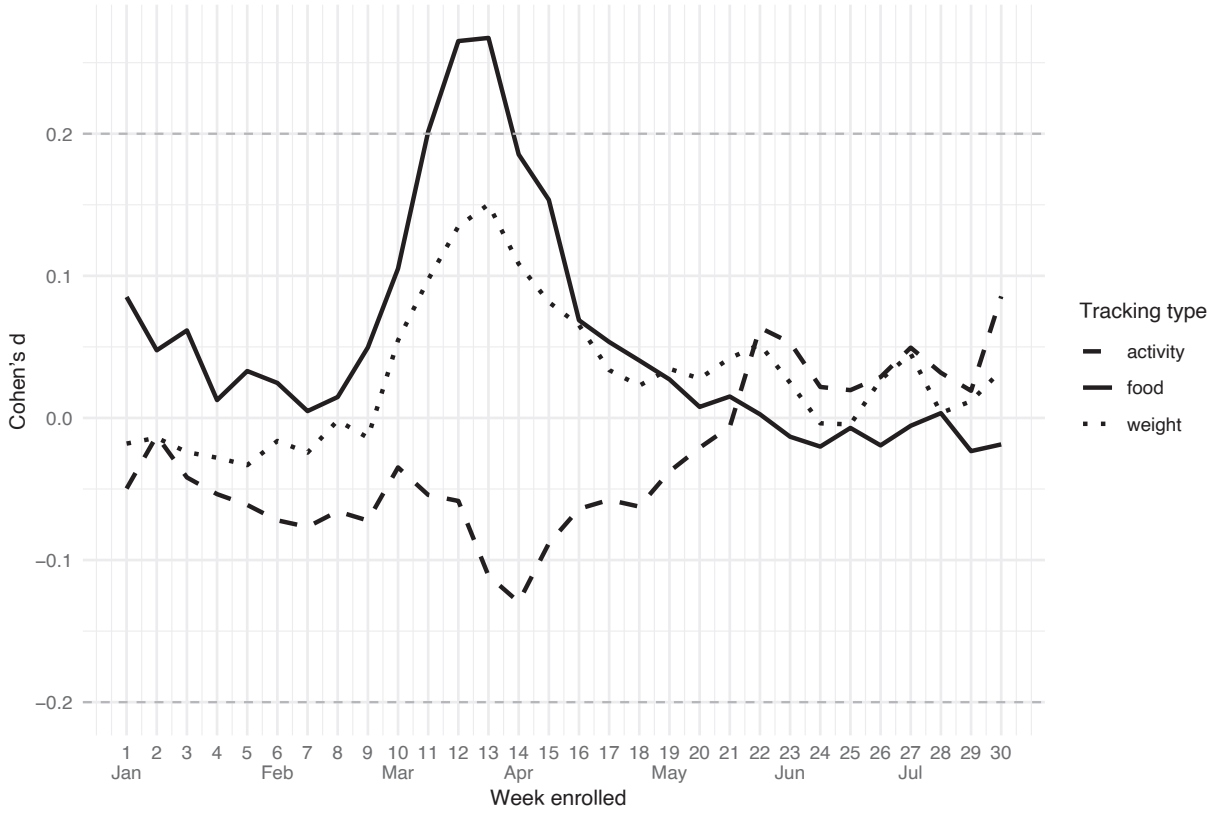

FIGURE 2 Cohen's *d* effect size by week for tracking weight, food, and activity in COVID-19 versus control cohorts. Significance defined as meeting criteria for a small effect size ($d > 0.2$)

frequent behaviors than food tracking so the short-term effects did not appear.

Our study had several strengths including leveraging a natural experiment, a sample of almost 1.5 million participants, examining outcomes in a digital weight management program and the use of real-world data outside of a clinical trial setting. The study also had limitations, such as the use of self-reported weight data and the inclusion of only those who had baseline and follow-up weights at 3 to 5 weeks, but those limitations were consistent across both cohorts likely minimizing any bias in the between-cohorts comparison. The generalizability of our findings may be limited as we provide data only on WW members in the United States, where the lockdown procedures have varied greatly from the rest of the world.

CONCLUSION

Among a large sample of those in a digital weight management program over 30 weeks of enrollments, the COVID-19 cohort experienced significantly less weight loss than the control cohort but only for 7 weeks of enrollments. The COVID-19 cohort also had fewer days of food tracking but only for 3 weeks of enrollments. There were no differences in the self-monitoring of weight and activity between the two cohorts. These data suggest that COVID-19 had negative effects on both weight loss and food self-monitoring, but the effects were short-lived. These data also suggest that those participating in evidence-based digital weight management programs can expect similar levels of initial weight loss as those experienced before the pandemic.O

CONFLICT OF INTEREST

TB, AM, and GF are employees of WW International. GF is a shareholder of WW International. CR was an employee and shareholder of WW International during the study.

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