Assessing the Psychological Processes Impacted by a Technology-Assisted Weight Loss Maintenance Program (NULevel Trial)

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OVERVIEW

Background

The **NULevel trial** was a registered [1] **randomized control trial** to evaluate a technology-assisted **weight loss maintenance (WLM) program** in the UK [2,3].

The **program was designed to target psychological processes** that have been linked to weight-related behaviours (e.g., see Appendix).

An evaluation of the trial found **no difference in WLM** between the intervention and control groups after 12 months [3]. **It is unclear whether the program failed to alter targeted processes, or whether changes in these processes failed to influence WLM outcomes**. The current study is a registered project [4] to examine this question.

Methods

Participants were 288 adults:

- Who Lost 5% or more of their weight in the 12 months preceding the trial
- Who had a pre-weight loss BMI of $\geq$ 30 kg/m^2
- Were 77% female, had a mean age of 41.8, and a mean baseline BMI of 30.9. See [3] for detailed demographics.

The **intervention group** (N = 144) received:

- a face-to-face goal-setting session;
- access to an internet platform, a pedometer, and a wirelessly connected scale: to monitor and report diet, physical activity, and weight;
- regular automated feedback delivered via SMS, tailored to participants' goal progress.

The **control group** (N = 144) received:

- A wirelessly connected scale to monitor weight
- Standard lifestyle advice once every 3 months, via an SMS link

Assessments of weight (in kilograms), and of 16 psychological processes (Table 2) were established at:

1. Baseline (pre-intervention)
2. 6 months (post intervention)
3. 12 months (post intervention)

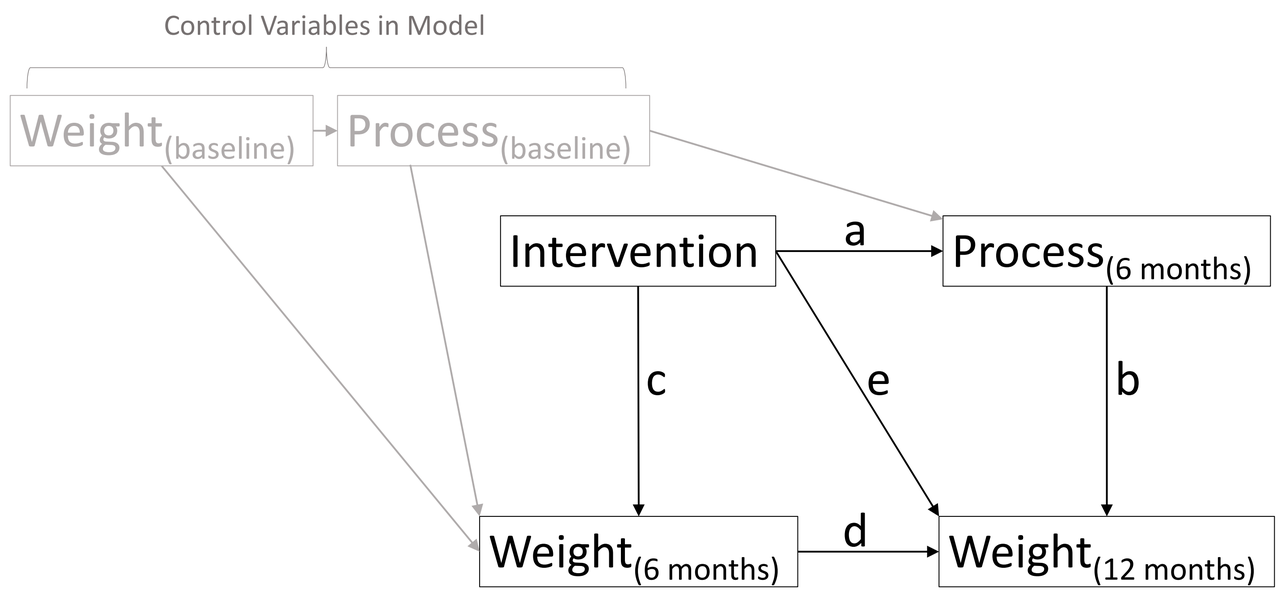
Analyses: A path analysis model specified according to **Figure 1** was computed separately for each psychological process variable.

CONCLUSIONS

- The intervention group showed **significant improvements on 10 of the 16 target processes**, relative to the control group.
- However, **few processes were associated with WLM**, leading to a lack of indirect effects of the intervention on WLM.
- Overall, we find **little evidence that the targeted psychological processes were sufficient to elicit meaningful change in WLM**.
- Future works should consider **alternate processes** as interventions targets, as well as how such processes relate to **behavioral outcomes** in a WLM context

RESULTS

Figure 1. Path Diagram Describing our Analyses



Legend & Findings

a path: Effect of intervention on psychological process at 6 months. See Table 1.
b path: Effect of psychological process on weight at 12 months. See Table 1.
a*b path: The composite of the a and b paths signifies the indirect effect of the intervention on weight at 12 months attributed to changes on the process at 6 month. See Table 1.
c path: Effect of the intervention on weight at 6 months. Path was never statistically significant.
d path: Effect of weight at 6 months on weight at 12 months. This effect was always significant (standardized beta consistently around .90)
e path: Direct effect of the intervention on weight at 12 months, controlling for indirect effects. This path was never statistically significant.

Table 1. Summary of Key Results

Psychological Process	Pathways (standardized betas)		
	a	b	a*b
1. Satisfaction with Experienced Changes	.18*		
2. Perceived Behavioural Control: Healthy Foods	.21*	-.09^t	-.02^t
3. Perceived Behavioural Control: Physical Activity		-.05*	
4. Weight Loss Confidence	.16*		
5. Weight Loss Maintenance Confidence	.31*		
6. Self-Efficacy: Emotional Eating			
7. Self-Efficacy: Unhealthy Food context	.15*		
8. Self-Efficacy: Physical Activity Barriers			
9. Action Planning: Physical Activity			
10. Action Planning: Healthy Eating	.20*		
11. Coping Planning: Physical Activity	.11*		
12. Coping Planning: Healthy Eating	.19*		
13. Automaticity: Healthy Eating	.14*	-.14*	-.02^t
14. Automaticity: Physical Activity		-.05^t	
15. Automaticity: Self-Weighing	.25*		
16. Energy and Drive		.07*	

***p <.05; ^{t}p<.10**
Note. Blank cells indicate that pathway was not significant

APPENDIX – Description of Each Psychological Process (Click here for full measures)

Processes & Descriptions

1. Satisfaction with Experienced Changes. Satisfaction with weight related outcomes (e.g., weight change, self-esteem).
2. Perceived Behavioural Control: Healthy Foods. Perceived ability to eat healthy foods in moderation.
3. Perceived Behavioural Control: Physical Activity. Perceived ability to be physically active every day.
4. Weight Loss Confidence. Confidence in ability to lose weight
5. Weight Loss Maintenance Confidence. Confidence in ability to maintain weight loss
6. Self-Efficacy: Emotional Eating. Perceived ability to resist eating unhealthy foods when experiencing negative affect (e.g., when feeling sad).
7. Self-Efficacy: Unhealthy Food Context. Perceived ability to resist eating unhealthy foods when facing varied contextual barriers (e.g., under social pressure)
8. Self-Efficacy: Physical Activity Barriers. Expectations one can engage in physical activity even in the face of various barriers (e.g., when tired)

Processes & Description

9. Action planning: Physical Activity. Having detailed plans to be physically active.
10. Action planning: Healthy Eating. Having detailed plans to be make healthy food choices.
11. Coping planning: Physical Activity. Having detailed plans to overcome barriers for engaging in physical activity when they arise (e.g., dealing with setbacks)
12. Coping planning: Healthy Eating. Having detailed plans to overcome barriers for healthy eating when they arise (e.g., plans to overcome social pressures)
13. Automaticity: Healthy Eating. Engaging in healthy automatically (e.g., without thinking).
14. Automaticity: Physical Activity. Engaging in physical activity automatically (e.g., without thinking).
15. Automaticity: Self-Weighing. Engaging in self-weighing automatically (e.g., without thinking).
16. Energy and Drive. Feeling energetic and driven, as opposed to exhausted and fatigued.

References & Links

1. Sniehotta et al., 2014, *ISRCTN Registry* [Trial Registration]
2. Evans et al., 2015, *Trials*. [Protocol Paper]
3. Sniehotta et al., 2019, *PLOS Medicine* [Report of Primary Findings]
4. Joyal-Desmarais et al., 2019, *OSF Registries* [Registration for Current Analyses (embargoed)]

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