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Evidence that a Very Brief Psychological Intervention Boosts Weight Loss in a Weight Loss Program

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Evidence that a Very Brief Psychological Intervention Boosts Weight Loss in a Weight Loss Program

Abstract

Reducing morbidity and mortality associated with being overweight is a crucial public health goal. The aim of the present research was to test the efficacy of a very brief psychological intervention (a volitional help sheet) that could be used as an adjunct to standard weight loss programs to support increased weight loss in an overweight sample. Seventy-two overweight participants currently participating in a weight loss program were randomly allocated to either an intervention (volitional help sheet) condition or a control (distracter task) condition. The main outcome measure was weight at one-month follow-up. Participants in both conditions lost significant amounts of weight, but those in the intervention condition lost significantly more than those in the control condition ($d = 0.66$). The findings support the efficacy of the volitional help sheet to promote additional weight loss in an overweight sample engaged in a weight loss program. The volitional help sheet therefore represents a very brief, low-cost, intervention that could be used to supplement ongoing weight-loss programs.

KEY WORDS: brief intervention, health behavior change, transtheoretical model, implementation intentions, overweight.

Evidence that a Very Brief Psychological Intervention Boosts Weight Loss in a Weight Loss Program

The World Health Organisation (2013) report that in 2008 more than 1.4 billion adults were overweight, of whom more than 500 million were obese, and that the prevalence of adult obesity doubled between 1980 and 2008, and continues to rise. The present study was designed to test a very brief, theory-based psychological intervention – a volitional help sheet – that could be used as an adjunct to standard weight loss programs to support increased weight loss (Chapman & Armitage, 2010).

Implementation Intentions

Implementation intentions (Gollwitzer, 1993) are "if-then" plans that promote health behavior change by encouraging people to link in memory a critical situation ("if") with an appropriate response ("then"). Laboratory studies show that specifying the "if" component of an implementation intention enhances the accessibility of critical situations and that linking "if" with "then" automates the response specified in the "then" component (see Gollwitzer & Sheeran, 2006). For example, one possible cue might be "if I am tempted to eat when I am at a party" that could be linked to "then I will tell myself that if I try hard enough I can keep from overeating" as an appropriate response. The idea is that when the temptation to eat at a party is encountered, the appropriate response ("trying hard" in this example) is triggered automatically (Gollwitzer & Sheeran, 2006). Gollwitzer and Sheeran's (2006) meta-analysis shows that implementation intentions are an effective means of changing behavior: Across 94 independent studies in laboratory and field settings, implementation intentions had an average effect size of $d = 0.65$. Implementation intention manipulations are usually self-directed and take fewer than five minutes to complete, thus from the perspective of augmenting weight loss programs,

implementation intentions offer a very brief, easy to use, low-cost intervention.

To date, Luszczynska, Sobczyk, and Abraham's (2007) study is the only one to have tested the ability of implementation intentions to promote objectively-measured weight loss. Women who were randomized to the experimental condition and asked to form implementation intentions with the help of feedback from a health professional lost significantly more weight than women in the control group. However, the question arises as to whether implementation intention formation, interacting with a health professional, or some combination of the two caused these positive effects. The present research tests a more cost-effective means of boosting weight loss than that reported by Luszczynska et al. (2007) by removing the need to provide participants with feedback.

Volitional Help Sheets

Volitional help sheets are designed to provide a standard means by which people can form their own implementation intentions (Armitage, 2008) and so overcome the need for participants to generate their own implementation intentions without support (e.g., Armitage, 2009) or to interact with health professionals (e.g., Luszczynska et al., 2007). The volitional help sheet draws on the transtheoretical model of change (Prochaska & DiClemente, 1983) by providing participants with the critical situations they may encounter and the responses they might use to ensure they change their behavior. The volitional help sheet works by encouraging people to form implementation intentions by linking temptations (i.e., situations in which health-risk behaviors might be triggered) with ten core strategies (labeled "processes of change") by which health-risk behavior is changed or health-protecting behavior is sustained (e.g., *contingency management,* namely, using rewards to make positive behavior changes). Thus, the volitional help sheet provides a theoretically-driven framework on which participants can build

their own implementation intentions without the need for input from a health professional, but with more support than the more common "self-generated" implementation intentions (e.g., Armitage, 2009).

The volitional help sheet has been tested using randomized controlled designs in several domains. For example, Armitage (2008) tested the ability of the volitional help sheet to encourage smokers to quit. The results showed that significantly more people reported quitting in the experimental group (19%) compared with a control group (2%). Similar findings have been obtained when the volitional help sheet has been used to reduce alcohol consumption (Arden & Armitage, 2012; Armitage & Arden, 2012) and increase physical activity (Armitage & Arden, 2010). To date, however, the volitional help sheet has not been tested in the domain of weight loss, in clinical samples, nor has it been evaluated against an objective outcome measure.

Based on the research reviewed above, it is hypothesized that a volitional help sheet will significantly augment weight loss among people engaged in a weight loss program. This is the most exacting test of the volitional help sheet to date because it needs to demonstrate impact over and above the effects of an ongoing weight loss program.

Method

Participants

In order to maximize the ecological validity of the study, the sample was recruited from people who were already enrolled on a commercial weight loss program in the north of England. A trained consultant delivered the commercial weight loss program. Participants stay in the program for as long as they wish and meet on a weekly basis at a cost of approximately $8 per week. People receive one-to-one advice as well as group sessions organized by the consultant. The sessions were oriented around support and encouragement and included eating plans, goal

setting, daily menus, recipes, and image therapy. With the exception of our implementation intention manipulation, the participants in the two arms received the same intervention components during the study period. The University ethics committee gave approval to conduct the research: Participants were assured of their confidentiality and anonymity (personal codes were used to identify individuals), and were made aware of their right to withdraw from the study or have their data removed at any point. Informed consent was obtained before the study began.

Participants were recruited from randomly-selected weight loss meetings and all 72 people who were initially approached agreed to participate in the study and completed the pre-randomization questionnaires. Participants were told that the study was "aiming to aid weight management." Although permission was given to approach members of the groups, the company who ran the program did not endorse the intervention and no incentive was offered to participants. Pre-randomization characteristics of the sample are presented in Table 1. The sample consisted of an equal number of males and females aged 19-64 years (M = 34 years, SD = 11.04). All participants were overweight with a body mass index (BMI) $\geq$ 25 and pre-randomization weight ranged between 60kg and 97kg (M = 80.50, SD = 8.42).

All participants were contacted again and were invited to complete follow-up questionnaires; however, 8 participants had dropped out of the program (5 from the intervention group, 3 from the control group) and did not complete the follow-up questionnaire (Figure 1). There was no differential drop-out between conditions, $\chi^2(1, N = 72) = 0.56$, $p = .453$.

Design

A mixed-measures design was employed with one between-participants factor and one within-participants factor. Condition (volitional help sheet versus active control) was the

between-participants independent variable; and time (pre-randomization versus follow-up) was the within-participants independent variable. The primary outcome measure was weight. The follow-up took place one month post-randomization.

Intervention

The volitional help sheet (see Appendix) consisted of a table with two columns each containing lists of 12 critical situations (temptations) and 12 appropriate responses (processes of change). The critical situations were taken from the weight efficacy lifestyle questionnaire (Clark, Abrams, Niaura, Eaton, & Rossi, 1991), and the appropriate responses were derived from items used to measure transtheoretical model processes of change (Cancer Prevention Center, 2011). The critical situations and appropriate responses that were elicited from these sources were too numerous to be practical for a very brief psychological intervention.

To ensure adequate coverage of Clark et al.'s (1991) five domains (i.e., negative emotions, availability, social pressure, physical discomfort, and positive activities), the items that loaded highest on each of the factors in Clark et al.'s (1991) factor analysis were selected, ensuring that at least two items per domain were chosen for the critical situations. All items chosen had factor loadings greater than .50. A similar procedure was attempted to derive one item for each of the processes of change associated with weight loss. However, published factor analyses of items used to assess the processes of change have yielded between four and twelve factors. To ensure adequate coverage, Prochaska, Norcross, Fowler, Follick, and Abrams' (1994) twelve factor model was adopted with reference to published factor analytic work elsewhere (Andrés, Saldaña, & Gómez-Benito, 2011; Cancer Prevention Center, 2011; Rossi, Rossi, Rossi-DelPrete, Prochaska, Banspach, & Carleton, 1994). The processes were: Consciousness raising, self-reevaluation, self-liberation, counterconditioning, stimulus control,

contingency management, helping relationships, dramatic relief, environmental reevaluation, social liberation, interpersonal control and substance use (see Prochaska et al., 1994). Again, all factor loadings were greater than .50.

The temptation items were translated into "if" statements, for example: "If I am tempted to eat when I am at a party"; the processes of change items were translated into "then" statements, for example, "then I will tell myself that if I try hard enough I can keep from overeating" in accordance with standard means of formulating implementation intentions (e.g., Chapman, Norman, & Armitage, 2009). Each critical situation and appropriate response had a tick-box next to it.

Participants in the control and intervention conditions were both told that identifying situations in which they might be tempted to eat and identifying ways to overcome those temptations had been shown to lead to greater success in weight loss. Participants in the control condition were then asked to *tick* as many or as few critical situations and appropriate responses that applied to them personally, but did not link them together. Participants in the intervention condition were asked to *draw links* between as many critical situations and appropriate responses as they wanted (see Appendix). The instructions to participants in the intervention condition thus conformed to Gollwitzer's (1993) conceptualization of implementation intentions as *links* between critical situations and appropriate responses.

Measures

Prior to randomization, clinic staff who were independent of the research team and who were blind with respect to condition, measured participants' weight and height. All participants were overweight (i.e., BMI > 25). In addition to demographic information, participants were also asked how many serious dieting attempts they had made in the preceding year and how long

they had been members of the weight loss program. At follow-up, weight (kg) was again measured independently of the research team, meaning that assessment was carried out blind to condition. Behavioral intention was measured using, "I intend to lose weight," to which participants responded on a 7-point *definitely do not* (1)-*definitely do* (7) Likert-type scale.

Procedure

Potential participants were approached at the end of a session and were invited to participate in a study that was "aiming to aid weight management." The interventions were placed at the end of identical-looking questionnaires, which were sorted into random order using coin tosses by the researcher prior to data collection. The researcher then distributed these identical-looking questionnaires and participants were left alone to complete the pre-randomization questionnaire. Once the pre-randomization questionnaire was completed, the participant returned it to the researcher in a sealed envelope. The researcher then obtained contact details and arranged to meet the participant one-month later at a subsequent weight loss appointment in order to collect follow-up data. Contact information was thus separate from completed questionnaires; pre-randomization and follow-up data were matched using personal codes. Consistent with the aims of delivering a very brief psychological intervention, the volitional help sheet was therefore administered independent of the techniques used in the commercial weight loss program.

Statistical Analysis

Assuming .80 power and alpha = .05 we required at least 30 participants per condition at both pre-randomization and follow-up to detect the average effect size of implementation intentions, namely, $d = 0.65$ (Gollwitzer & Sheeran, 2006).

Examination of potential pre-randomization differences between the intervention and control groups was tested using independent *t*-tests for the continuous variables (e.g., BMI, duration of program membership) and chi-square was used to test gender.

The effect of the volitional help sheet on weight was tested using a mixed modeling, with *condition* (intervention versus control) as the between-participants independent variable and *time* (pre-randomization versus follow-up) as the within-participants independent variable. Mixed modeling nests repeated weight measures within randomized participants and uses the covariance between pre-randomization and follow-up observations among those with complete data to calculate the parameter estimates and standard errors for model parameters. Reanalyzing the data using repeated measures ANOVA according both to intention-to-treat (last observation carried forward) and per protocol led to identical patterns of findings.

The mixed modeling analyses were repeated with three different covariance matrices specified (compound symmetry, unstructured, and autoregressive). The three covariance matrices produced almost identical findings, but the analyses that specified compound symmetry are reported because of a marginally lower AIC (Akaike's Information Criterion) value.

Results

Randomization Check

Examining whether there were pre-randomization differences in age, gender, BMI, height, weight, number of serious weight loss attempts, duration of program membership, and

behavioral intention between the intervention and control groups served as a randomization check. All the tests were non-significant, meaning randomization was achieved (Table 1).

Effects of the Volitional Help Sheet

There was no significant main effect of condition, $F(1, 70) = 0.40$, $p = .531$, but there was a main effect of time, $F(1, 62) = 177.03$, $p < .001$, with participants losing weight over time. Consistent with predictions, there was a significant condition *x* time interaction, $F(1, 62) = 6.65$, $p = .012$. Over the course of the study, participants in the intervention group lost $M = 0.60$kg more weight than participants in the control group lost meaning the volitional help sheet boosted the effectiveness of the weight loss program by 47.62% (i.e., 0.60kg ÷ 1.26kg *x* 100, Table 2).

The effect size associated with the *F* test for the condition *x* time interaction was $d = 0.66$, showing that the volitional help sheet exerted a medium-sized effect (see Cohen, 1992). According to Wolf (1986) a Cohen's *d* of 0.50 represents a practically/clinically significant effect and that effects of this magnitude reflect the fact that something really changed. The US National Heart, Lung and Blood Institute (2005) define successful weight loss as reducing body weight by 10% from baseline in six months. In the present study, participants in the experimental condition reduced their body weight by 2.31% (see Table 2) over a one-month follow-up period (versus 1.58% in the control condition).

All participants in the intervention group made at least one link between critical situation and appropriate response ($M = 4.31$, $SD = 1.70$); no participants in the control group made links between critical situations and appropriate responses. The correlation between the number of links made between critical situations and appropriate responses, and weight loss, $r(36) = -.23$, $p = .18$, indicating a weak, but non-significant, relationship between the number of links made and the amount of weight lost.

Discussion

Summary

This is the first study to have tested a volitional help sheet in overweight people seeking to reduce their weight. The key finding was that the volitional help sheet – a very brief psychological intervention – was effective in significantly increasing weight loss, over and above the effects of ongoing weight management program. The results also extend the literature on the volitional help sheet by investigating weight loss and using an objective outcome measure in a clinical sample. The following discussion considers the practical and theoretical implications of the findings.

Weight Loss and Implementation Intentions

The present study showed that implementation intentions (formed using a volitional help sheet) were effective in reducing weight in an overweight sample in a field setting, with an effect size almost identical to that observed in a meta-analysis of implementation intention interventions (d = 0.66 in the present study versus d = 0.65 in Gollwitzer & Sheeran, 2006). The present research provides a particularly exacting test of the volitional help sheet because it was able to reduce weight over and above the effects of an ongoing weight management program (see also Luszczynska et al., 2007). Thus, the present findings help to rule out the possibility that the effects of implementation intentions can be ascribed to techniques such as goal setting that are common in therapy, or that such findings can be explained by increased salience, elaboration or feedback/support, because all participants were enrolled in a weight loss program and did not receive support in forming their implementation intentions.

There was a weak, non-significant relationship between the number of critical situation-appropriate response links and the amount of weight that participants lost. This finding is

consistent with research elsewhere showing that the number of critical situation-appropriate response links may be less important than the quality of those links. For example, Armitage and Arden (2012) randomly allocated participants to form single or multiple critical situation-appropriate response links using a volitional help sheet and showed equivalent reductions in alcohol consumption in the two conditions.

Although we deployed this intervention on a minimal basis by incorporating it into a questionnaire, there is much scope for employing the strategy in clinical practice. Alongside other treatment techniques, implementation intentions could be developed on a one-to-one basis, with the health professional and client identifying critical situations and appropriate responses using the volitional help sheet, similar to the procedure reported by Luszczynska et al. (2007). Alternatively, the volitional help sheet offers an efficient and cost-effective means of encouraging people to form theory-based implementation intentions, without the need for additional support from health professionals.

Limitations

It is important to acknowledge some potential limitations of the study when considering the current findings. First, although adequately powered to demonstrate the observed effects, the sample was of relatively modest size and it would be valuable to replicate the effects in a larger sample. Second, it would be valuable to replicate the present findings over a longer period than a month because maintenance of behavior is commonly defined as commencing six months after initial performance of the health behavior (e.g., Prochaska & DiClemente, 1983). Nevertheless, there is some evidence to support the view that maintenance can be achieved within weeks in the case of behaviors that have high frequency of performance (Armitage, 2005) and that greater initial weight loss is associated with large improvements in ongoing weight loss (e.g., Jeffery,

Wing, & Mayer, 1998; Nackers, Ross, & Perri, 2010). Third, although the observed effect size was of a "medium" magnitude according to Cohen's (1992) taxonomy, the clinical significance of the observed effect was more modest (but see Wolf, 1986). Nevertheless, research shows that implementation intentions can both support and augment initial changes in behavior to sustain behavior change. For example, Chapman and Armitage (2010) showed that implementation intentions increased fruit and vegetable intake by 9.45% between baseline and 3-month follow-up, and that repeated administration of implementation intentions at 3-months further boosted fruit and vegetable consumption by 6.38% between 3-month and 6-month follow-up. Given that the volitional help sheet is a very brief, low-cost, intervention, it has the potential to be used as a tool to initiate and maintain weight loss as an adjunct to standard weight loss programs.

A fourth possible limitation concerns the lack of data on true baseline weights and attendance after randomization, which were not released by the company operating the weight loss clinics because these data are commercially sensitive. This means that we cannot rule out completely the possibility that the change in weight we observed was due to natural changes and not the intervention. Nevertheless, both groups had been in the program for the same amount of time prior to randomization, had the same weight at entry into our study and did not differ on any other variables we measured. Although unknown, we would argue that it is unlikely that the two groups would have differed in their true baseline weights, given that all other comparisons were non-significant. Relatedly, a fifth limitation was that questionnaires, as opposed to participants, were randomized. However, as noted above, neither group differed significantly on any baseline variables, thereby enhancing confidence in our randomization procedures.

Conclusion

The present study reports a test of the efficacy of a very brief psychological intervention to enhance ongoing weight reduction efforts. The volitional help sheet was successful in increasing weight loss, with a medium-large effect size despite the brevity of the intervention. The volitional help sheet represents a very brief, low-cost, intervention that could be used to supplement ongoing weight-loss programs.

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Table 1

Pre-Randomization Characteristics of the Sample

Variables	Full Sample, $N = 72$		Intervention, $n = 36$		Control, $n = 36$		
	M	*SD*	*M*	*SD*	*M*	*SD*	p^a
Age (years)	34.08	11.04	35.33	12.95	32.83	8.73	0.340
BMI	27.82	1.68	27.52	1.63	28.12	1.71	0.127
Height (meters)	1.70	0.10	1.72	0.11	1.68	0.08	0.122
Weight (kg)	80.50	8.42	81.28	8.95	79.73	7.91	0.437
Number of Serious Weight Loss Attempts	1.62	1.01	1.44	1.05	1.81	0.95	0.131
Duration of Program Membership (Days)	89.39	99.31	93.03	108.94	85.75	90.07	0.758
Behavioral Intention	6.36	0.89	6.28	0.85	6.44	0.94	0.432
	N	%	*n*	%	*n*	%	
Gender							1.000
Women	36	50	18	50	18	50	
Men	36	50	18	50	18	50	

Note. [a]*p* values associated with: (a) the independent *t*-tests testing for differences pre-randomization between intervention and control conditions in continuous variables, and (b) the chi-square for gender. All comparisons are non-significant.

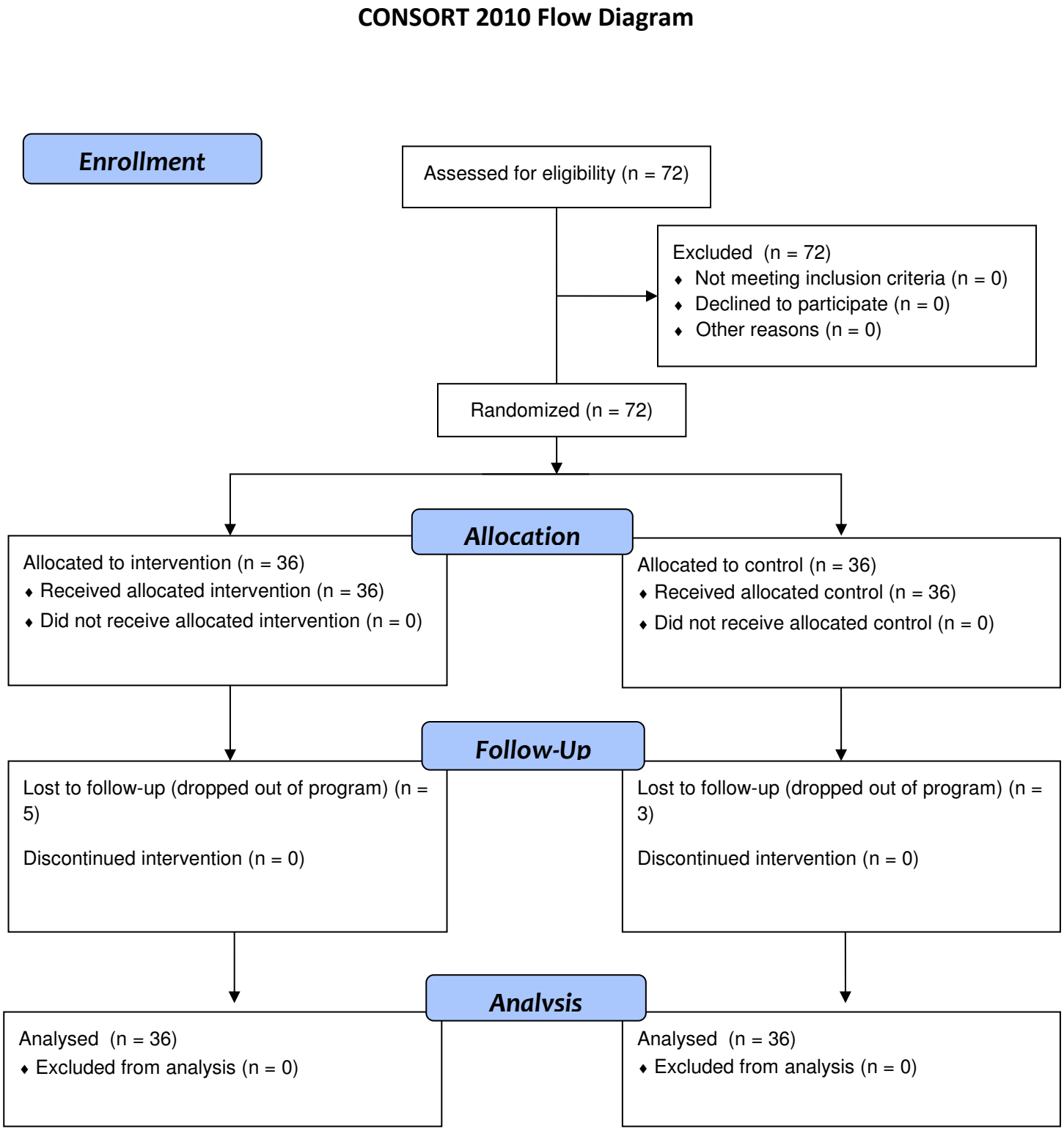
Table 2

Effects of the Volitional Help Sheet on Weight Between Pre-Randomization and Follow-Up

Variables	Intervention, $n = 36$		Control, $n = 36$	
	M	*SE*	*M*	*SE*
Pre-randomization Weight (kg)	81.28	1.41	79.73	1.41
Follow-Up Weight (kg)	79.42	1.41	78.47	1.41
Change in Weight (kg)	-1.86	0.12	-1.25	0.11
Change in Weight (% from pre-randomization)	-2.31	0.16	-1.58	0.15

Note. Mean values are estimated marginal means that uses the covariance between baseline and follow-up observations among those with complete data to calculate the parameter estimates and standard errors for model parameters. There was a significant condition *x* time interaction, $F(1, 62) = 6.65$, $p = .012$.

Figure 1


CONSORT 2010 Flow Diagram
Enrollment
Assessed for eligibility (n = 72)
Excluded (n = 72)
♦ Not meeting inclusion criteria (n = 0)
♦ Declined to participate (n = 0)
♦ Other reasons (n = 0)
Randomized (n = 72)
Allocation
Allocated to intervention (n = 36)
♦ Received allocated intervention (n = 36)
♦ Did not receive allocated intervention (n = 0)
Allocated to control (n = 36)
♦ Received allocated control (n = 36)
♦ Did not receive allocated control (n = 0)
Follow-Up
Lost to follow-up (dropped out of program) (n = 5)
Discontinued intervention (n = 0)
Lost to follow-up (dropped out of program) (n = 3)
Discontinued intervention (n = 0)
Analysis
Analysed (n = 36)
♦ Excluded from analysis (n = 0)
Analysed (n = 36)
♦ Excluded from analysis (n = 0)

Appendix

Volitional Help Sheet for Weight Loss

We want you to plan to lose weight. Research shows that if people can spot situations in which they will be tempted to eat and then link them with a way to overcome those situations, they are much more likely to be successful in losing weight. On the left hand side of the page below is a list of common situations in which people feel tempted to eat; on the right hand side of the page is a list of possible solutions. For each situation that applies to you personally (left hand side), please draw a line linking it to a solution (right hand side) that you think might work for you. Please draw a line linking one situation to one solution at a time, but make as many (or as few) situation-solution links as you like.

SITUATIONS	SOLUTIONS
☐ If I am tempted to eat when I am anxious…	☐ then I will read about people who have successfully lost weight.
☐ If I am tempted to eat when I am depressed (or down)…	☐ then I will consider the belief that people who lose weight will help to improve the world.
☐ If I am tempted to eat when there are many different kinds of food available…	☐ then I will leave places where people are eating a lot.
☐ If I am tempted to eat when I am at a party…	☐ then I will be the object of discrimination because of my being overweight.
☐ If I am tempted to eat when I have to say "no" to others…	☐ then I will I have someone who listens when I need to talk about my losing weight.
☐ If I am tempted to eat when I feel it's impolite to refuse a second helping…	☐ then I will take diet pills to help me lose weight.

☐ If I am tempted to eat when others are pressuring me to eat…	☐ then I will reward myself when I do not overeat.
☐ If I am tempted to eat when I have a headache…	☐ then I will tell myself that if I try hard enough I can keep from overeating.
☐ If I am tempted to eat when I feel uncomfortable…	☐ then I will do something else instead of eating when I need to relax or deal with tension.
☐ If I am tempted to eat when I am watching TV…	☐ then I will remember studies about illnesses caused by being overweight that have upset me.
☐ If I am tempted to eat just before going to bed…	☐ then I will struggle to alter my view of myself as an overweight person.
☐ If I am tempted to eat when I am happy…	☐ then I will remove things from my home that remind me of eating.