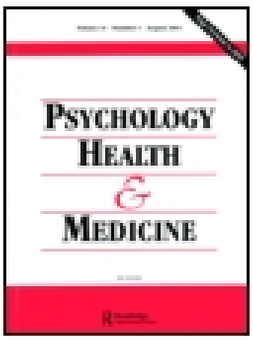

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Challenging body weight: evidence from a community-based intervention on weight, behaviour and motivation

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ABSTRACT

The objective of this study was to examine the effectiveness of a 12 week weight loss intervention within a commercial fitness centre on body weight, moderate to vigorous physical activity (MVPA), dietary intake, and behavioural regulations for exercise and healthy eating. Using a quasi-experimental design, the intervention group received weekly coaching sessions and bi-weekly seminars designed to increase MVPA and improve dietary intake. Outcome variables were assessed at three time points over a six month period. Results showed a significant interaction for body weight ($p = .04$) and dietary changes ($p < .05$) following the weight loss challenge but were not maintained across the six month period. Changes in behavioural regulations favoured the intervention condition. Results imply that a 12 week weight loss challenge within a commercial fitness centre may be effective at prompting short-term weight loss and support the internalization of behavioural regulations specific to healthy eating and exercise.

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KEYWORDS
Weight loss challenge; Organismic Integration Theory; body weight; moderate to vigorous physical activity; dietary intake

Evidence-informed recommendations have been advanced offering insight into best practices when designing multi-component lifestyle management interventions for weight loss (Kirk, Penney, McHugh, et al., 2012; Shaw, Gennat, O'Rourke, et al., 2006; Silva, Vieira, Coutinho, et al., 2010). Financial incentives have further been used to encourage weight loss (Jeffery, Wing, Thorson, et al., 1998; Moller, McFadden, Hedeker, et al., 2012). Once incentives are removed, however, an inverse relationship with weight loss has been reported over time (Moller et al., 2012) which may be due to the 'undermining effect' of the financial incentives on intrinsic motivation (Hagger, Keatley, Chan, et al., 2014). As such, developing an enhanced understanding of the motivational implications of weight loss incentives warrants further attention.

Organismic Integration Theory (OIT; Deci & Ryan, 2002) presents a multi-dimensional view of human motivation. A central assumption embedded within OIT is that motivation varies along a continuum ranging from non-self-determined (or controlled)

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to self-determined (or autonomous) forms of behavioural regulation (Deci & Ryan, 2002). Autonomous behavioural regulations predict more adaptive outcomes such as increased exercise (Wilson, Mack, & Grattan, 2008), healthier eating (Pelletier, Dion, Slovinec-D'Angelo, et al., 2004) and weight management (Teixeira, Going, Houtkooper, et al., 2006).

The objective of this study was to examine the feasibility of a weight loss challenge on body weight, MVPA and dietary intake when compared against a control group over short (12 weeks) and long (6 months) durations. The secondary objective was to examine changes in motivational mechanisms linked to MVPA and dietary intake. Consistent with Stubbs and Lavin (2013), it was hypothesized that participation in the weight loss challenge would be associated with greater reductions in body weight, increased MVPA and improved dietary intake when compared against the control. Changes noted post intervention would not be sustained when measured at 6 months (Stubbs, Whybrow, Teixeira, et al., 2011). Aligned with Silva, Markland, Carraca, et al. (2011), it was hypothesized that those participating in the weight loss challenge would demonstrate greater autonomous behavioural regulations for exercise and eating behaviours than those in the control condition.

Methods

Study design and procedures

Following ethical clearance (11-096) participants ($N = 88$; $n_{\text{intervention}} = 42$) were recruited from the membership of a commercial fitness facility. Participants self-selected their condition with those in the weight loss challenge paying $170 per month across the intervention period. Anthropometric measurements, behavioural and motivational variables were measured over three time points. Time 1 data was collected immediately prior to the launch of the weight loss challenge with Time 2 and Time 3 at 12 weeks and 6 months respectively.

The weight loss challenge consisted of weekly nutrition and exercise coaching sessions and bi-weekly educational programming.[1] Participants in the control condition were instructed to 'do-as-they-do'. A financial reward was provided to the 3 individuals who lost the greatest amount of body weight in the intervention condition by the end of the weight loss challenge.

Instrumentation

Demographic and lifestyle information

Relevant demographic, medical and weight control history was collected.

Body weight

Each participant's weight (kg) was measured using a Seca (Chino, CA) scale calibrated to standard.

Physical activity

A modified version of the Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985) was used to measure the self-reported frequency and duration of MVPA performed in bouts of 10 min or more during a typical week.

Table 1. Analysis of variance, means and standard deviation for body weight, physical activity and dietary intake.

		Time 1		Time 2		Time 3	
		M	SD	*M*	SD	*M*	SD
Weight	Intervention	192.77	55.61	188.52	53.60	190.03	54.95[a]
	Control	181.67	38.11	181.68	38.76	180.16	38.86
MVPA	Intervention	42.52	19.35	48.58	16.97	50.24	20.40
	Control	46.73	16.97	43.81	22.29	46.70	24.60
Fruit/Veg	Intervention	2.42	0.60	2.77	0.45	2.59	0.55[a]
	Control	2.62	0.58	2.64	0.44	2.68	0.38
Fibre	Intervention	2.67	0.60	2.18	0.73	2.24	0.71[b]
	Control	2.54	0.65	2.43	0.69	2.46	0.65
Fat	Intervention	2.62	1.90	2.92	0.38	2.62	0.48
	Control	2.42	0.72	2.43	0.59	2.57	0.63
Meat	Intervention	2.45	0.74	2.76	0.65	2.72	0.52[b]
	Control	2.61	0.53	2.72	0.53	2.70	0.56
Sugar	Intervention	2.47	0.52	2.78	0.49	2.72	0.36[a]
	Control	2.51	0.61	2.29	0.71	2.60	0.42
Calcium	Intervention	2.44	0.72	2.31	0.74	2.19	0.82
	Control	2.27	0.84	2.22	0.71	2.22	0.85

Note: *M* = mean; SD = standard deviation; *F* = *F* statistic; *p* = significance of *F* statistic; η^2 = partial eta squared. MVPA = Moderate-Vigorous Physical Activity.
[a]Significant interaction with differences between conditions Time 1 and Time 2.
[b]Significant differences in Time 2 and Time 3 scores from Time 1.

Dietary intake

The Rapid Eating and Activity Assessment for Participants – Short Version (REAPS; Segal-Isaacson, Wylie-Rosett, & Gans, 2004) was used as a brief measure of dietary intake. Response options for 11-item REAPS range from 1 (*Usually/Often*) to 3 (*Rarely/Never*).

Behavioural regulations

The 23-item Behavioural Regulation in Exercise Questionnaire-2 Revised (BREQ-2R; Markland & Tobin, 2004; Wilson, Rodgers, Loitz, et al., 2006) contains six subscales that measure behavioral regulations using a 5-point scale ranging from 0 (*Not true for me*) to 4 (*Very true for me*). The Regulation of Eating Behaviors Scale (REBS; Pelletier et al., 2004) is a 24 item self-report instrument designed to assess motives for eating. Participants were asked to respond to each item across a 7-point Likert-type scale ranging from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*). Items comprising the amotivation were removed as they lacked relevance for this study.

Data analysis

A series of mixed model Analyses of Variance (ANOVAs) were conducted with one between (intervention or control) and one within (Time) groups variable. Effect size estimates (i.e. Cohen's d and η_p^2) were calculated as complementary information.

Results

Eighteen participants ($n_{\text{intervention}} = 9$) dropped out prior to study completion. Drop-outs were older and more likely to have heart disease or osteoporosis than those who completed the study ($p < .05$). Participants ($N = 70$; $n_{\text{female}} = 53$) providing data at all three time points

Table 2. Analysis of variance, means and standard deviation for behavioral regulations for exercise and eating.

		Time 1		Time 2		Time 3	
		M	SD	*M*	SD	*M*	SD
BREQ-2R							
Extrinsic	Intervention	0.83	1.17	0.51	0.79	0.39	0.62[a]
	Control	0.61	0.75	0.40	0.66	0.54	0.84
Introjected	Intervention	2.60	1.13	2.25	0.98	2.13	0.82[b]
	Control	1.88	1.33	1.70	1.29	1.78	1.28
Identified	Intervention	3.42	0.74	3.54	0.58	3.41	0.67
	Control	3.35	0.82	3.32	0.82	3.27	0.86
Integrated	Intervention	2.88	0.99	3.36	0.81	3.08	0.90[c]
	Control	3.00	1.14	2.99	1.11	2.84	1.21
Intrinsic	Intervention	2.74	0.93	3.04	0.78	2.91	0.89[d]
	Control	3.12	1.02	3.02	1.10	2.99	1.06
REBS							
Extrinsic	Intervention	2.00	1.14	1.92	1.10	1.89	1.13
	Control	1.79	1.16	1.52	0.80	1.56	0.82
Introjected	Intervention	3.93	1.31	3.73	1.44	3.64	1.31
	Control	3.37	1.61	3.34	1.85	3.20	1.72
Identified	Intervention	6.38	0.66	6.31	0.80	6.33	0.65
	Control	6.09	0.95	5.85	1.09	6.00	1.07
Integrated	Intervention	5.53	1.24	5.90	0.97	5.91	1.06[c]
	Control	5.42	1.55	5.40	1.56	5.26	1.60
Intrinsic	Intervention	5.13	1.49	5.25	1.66	5.39	1.45
	Control	4.84	1.88	4.97	1.92	4.96	1.84

Note: *M* = Mean; SD = Standard Deviation; BREQ-2R = Behavioural Regulation in Exercise Questionnaire-2 Revised; REBS = Regulation for Eating Behaviors Scale.
[a]Significant decrease in scores from Time 1 to Time 2 regardless of condition.
[b]Significant differences between conditions at all time points.
[c]Significant increase for those in the intervention at Time 2 from Time 1 scores.
[d]Significant increase for those in the intervention from at Time 2 from Time 1 scores.

ranged in age between 23 and 65 years (M = 44.83 years; SD = 8.78 years), were primarily Caucasian (93%), married (67%), university educated (87%) and employed (77%). Most (94%) indicated that they would like to weigh less (94%).

Descriptive statistics were calculated across all time points (see Tables 1 and 2). Estimates of reliability (coefficient α) were calculated for BREQ-2R and REBS scores with values ranging from 0.83 to 0.94 and 0.71 to 0.95 respectively across the three test administration periods. Between group differences at Time 1 were only found for fruit and vegetable consumption ($p = .02$; $d = .52$) and introjected regulation ($p < .05$; $d_{\text{BREQ-2R}} = .58$ and $d_{\text{REBS}} = .43$).

Significant interaction terms for weight loss ($F(2, 118.35) = 3.32$, $p = .04$, $\eta^2 = .05$), fruit and vegetable consumption ($F(1.73, 117.91) = 5.26$, $p = .01$, $\eta^2 = .07$) and sugar intake ($F(2, 130) = 7.75$, $p = .01$, $\eta^2 = .11$) were found across the 12 week weight loss challenge. A main effect for time was found for fibre ($F(2, 136) = 5.11$, $p = .01$, $\eta^2 = .07$) and meat ($F(2, 136) = 5.48$, $p = .01$, $\eta^2 = .08$).

A significant main effect for time was observed for exercising for external ($F(2, 136) = 4.99$, $p = .01$, $\eta_p^2 = .07$) and introjected ($F(1, 68) = 5.21$, $p = .03$, $\eta_p^2 = .07$) regulations. Both integrated and intrinsic regulations for exercise showed a significant interaction effect ($F(2, 136) = 4.88$, $p = .01$, $\eta_p^2 = .06$; $F(2, 136) = 5.00$, $p = .01$, $\eta_p^2 = .07$) respectively. A significant interaction for eating for integrated reasons was observed ($F(2, 134) = 3.27$, $p = .04$, $\eta_p^2 = .05$).

Discussion

The modest weight loss and subsequent partial regain noted for individuals in the intervention condition is consistent with existing research (Stubbs & Lavin, 2013). Average weight loss of those in the intervention condition (i.e. 2% of total body weight) fell short of being sufficient to effect health risk status (Stubbs et al., 2011) which may be the result of several factors including the length of the intervention.

A significant increase in MVPA was not reported which may be reflective of the initial levels of engagement as noted in the literature (Conn, Hafdahl, & Mehr, 2011). On average, participants reported being sufficiently active to obtain both health and fitness benefits (Godin, 2011). Participation in the weight loss challenge was associated with improvements in self-reported dietary intake. With calls emerging to assess diet quality linked to weight loss (Grafenauer, Tapsell, Beck, & Batterham, 2014), insight is offered into changes in food intake patterns – namely increased fruit and vegetable consumption and reductions in sugar intake–that may lead to weight loss.

An increase in autonomous motives was reported by those in the intervention condition during the challenge that was partially sustained upon follow-up. The above finding is despite the inclusion of a competitive financial incentive for weight loss for those in the intervention condition. One explanation may be that participants did not interpret the reward as controlling (Hagger et al., 2014). Consistent with Silva et al. (2010) results of the present investigation reinforce this contention as enrollment in the weight loss challenge was linked with the maintenance of behaviours linked towards more controlling regulations.

Study limitations include the quasi-experimental design of this investigation and participants self-selected their condition which may have resulted in selection bias (Cawley & Price, 2012). Further, participants were likely not representative all patrons for whom a weight loss intervention is intended as 8 individuals in the intervention condition were of normal weight based on Body Mass Index (BMI) scores. Therefore caution is warranted when comparing study results to weight loss interventions whose inclusion criteria is limited to those who are labelled overweight/obese based upon anthropometric scores.

Results of this investigation suggest that weight loss interventions in commercial fitness facilities may be an effective means of facilitating weight loss in the short term. As the majority of individuals looking to lose weight are doing so independent of clinical programs and settings (Stubbs, Brogelli, Pallister, et al., 2012), combined with the increased offering of this program option in commercial fitness centres (Thompson, 2011), future research examining weight loss interventions is needed. Components of the intervention appeared to have supported the internalization process of exercise and eating behavioural regulations. Further research utilizing these components is warranted.

Note

1. Additional details of the weight loss challenge intervention can be gained by contacting dmack@brocku.ca.

Disclosure statement

No potential conflict of interest was reported by the authors.

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