Eating-Related and Psychological Outcomes of Health at Every Size Intervention in Health and Social Services Centers Across the Province of Québec

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Abstract

Purpose: To report the outcomes of a Health at Every Size (HAES) intervention in a real-world setting.

Design: Quasi-experimental design evaluating eating behaviors and psychological factors.

Setting: The HAES intervention is offered in Health and Social Services Centers in Québec (Canada).

Participants: For this study, 216 women (body mass index [BMI]: 35.76 [6.80] kg/m^2) who participated to the HAES intervention were compared to 110 women (BMI: 34.56 [7.30] kg/m^2) from a comparison group.

Intervention: The HAES intervention is composed of 14 weekly meetings provided by health professionals. It focuses on healthy lifestyle, self-acceptance, and intuitive eating.

Measures: Eating behaviors (ie, flexible restraint, rigid restraint, disinhibition, susceptibility to hunger, intuitive eating, and obsessive-compulsive eating) and psychological correlates (ie, body esteem, self-esteem, and depression) were assessed using validated questionnaires at baseline, postintervention, and 1-year follow-up.

Analysis: Group, time, and interaction effects analyzed with mixed models.

Results: Significant group by time interactions were found for flexible restraint ($P = .0400$), disinhibition ($P < .0001$), susceptibility to hunger ($P < .0001$), intuitive eating ($P < .0001$), obsessive–compulsive eating ($P < .0001$), body-esteem ($P < .0001$), depression ($P = .0057$), and self-esteem ($P < .0001$), where women in the HAES group showed greater improvements than women in the comparison group at short and/or long term.

Conclusion: The evaluation of this HAES intervention in a real-life context showed its effectiveness in improving eating-, weight-, and psychological-related variables among women struggling with weight and body image.

Purpose

Overweight and obesity are a serious public health issue, particularly considering their rising prevalence and their association with considerable health hazards.[1] The prevalence of obesity worldwide is 13%, while 39% of the population is overweight.[1] In Canada, obesity affects 20% of the population, while an additional 34% is overweight.[2] These prevalence rates are similar for the province of Québec, with obesity and overweight rates of 18% and 33%, respectively.[3] Excess body weight has been identified as a risk factor for cardiovascular diseases and some forms of cancers,[4] which are considered

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leading causes of mortality in both Québec[5] and Canada.[6] Currently, in Québec, around 1.5 billion dollars are devoted yearly to obesity direct and indirect costs, and this economic burden is expected to rise significantly over the next years considering the aging population.[7]

Considering the prevalence of obesity and its related health consequences, the Québec government launched, in 2006, an innovative public health action plan promoting healthy and active lifestyle habits to prevent weight-related problems and their consequences.[8] One target identified by the action plan was to improve health services offered to individuals struggling with weight problems. The government promotes the development and implementation of sustainable strategies that recognize the complexity of weight problems and the fact that those problems clearly go beyond the issues of body weight; it is also a matter of global health. Yet, traditional approaches to weight management have mainly focused on calorie-restrictive diets as well as on promoting physical activity. Although weight loss can be achieved, these losses are usually not maintained.[9] Restriction of food intake, which is a central part of these traditional interventions, is associated with increases in appetite sensations,[10] a higher frequency of obsessive thoughts about food and eating,[11] a greater risk of depression[12] as well as with overeating in response to negative emotions and stress,[13,14] which have all been related to weight regain.

Therefore, one of the strategies of the Québec action plan was to disseminate an alternative weight management program in Health and Social Services Centers (HSSC) across the province. This program, the Health at Every Size (HAES; Health at Every Size and HAES are registered trademarks of the Association for Size Diversity and Health), was based on a nondieting paradigm. This paradigm proposes a shift from the traditional weight-centered approach to a more health-centered approach, arguing that lifestyle habits are key determinants of health and can be optimized regardless of body weight status.[15-19] HAES programs focus on a nondieting philosophy as well as on self-acceptance. Such an approach promotes the regulation of eating based on the decrease in restraint eating, and the appropriation of internal cues of hunger and satiety, in order to achieve a healthier and more intuitive relationship with food.[20]

Several descriptive and controlled studies have demonstrated that HAES interventions improve physiological and psychological functioning of participants.[20,21] Thus far, 3 randomized controlled studies have reported significant improvement in physiological measures such as blood pressure and blood lipids.[22-24] Several other studies have shown improvements in depression, self-esteem, body dissatisfaction, and eating disorder symptoms.[23,25-29] Furthermore, in HAES interventions, these positive changes are observed independent of weight loss.[22,23,30] Conversely, in traditional approaches, where weight loss is considered as the main outcome, psychological improvements are more tightly related to weight changes,[31] which are less likely to last.[32] Therefore, it may be hypothesized that psychological changes observed during HAES interventions will be maintained over a longer period, since they are not initially driven by a weight loss.

The expected effects of the HAES intervention, such as improved eating behaviors and psychological well-being, could significantly contribute to better weight management among the population of women with weight-related problems[33] and most importantly to significant improvements in their overall health. Previous controlled experimental and quasi-experimental studies by our research team have demonstrated short- and long-term beneficial effects of the HAES intervention on eating behaviors, psychological functioning, and body weight following the program.[34-36] Although it was not the objective of the intervention, a statistically significant 2% weight loss was also maintained over 1 year following the intervention, which was related to improvements in disinhibition and susceptibility to hunger.[34,35] Even if the intervention has already been evaluated through controlled experimental and quasi-experimental research designs,[34-37] documenting its outcomes in a natural setting, with less severe inclusion/exclusion criteria, is crucial in order to be able to generalize the outcomes observed (efficacy) to real-life context (effectiveness). In real-life studies, participants differ greatly regarding age, ethnic background, education, socioeconomic level, involvement in any parallel treatments, and the treatment characteristics also vary (eg, setting, professionals, materials).[38] The evaluation of the impact of the HAES intervention in real-life settings is essential to ensure that human and financial resources dedicated to this intervention are well invested but also to extend our empirical findings to a broader range of people, thus increasing ecological validity.[39]

Thus, the main objective of this study was to report the outcomes of an HAES intervention in a real-world setting on (1) eating behaviors (restraint, intuitive eating, disinhibition, susceptibility to hunger, and obsessive–compulsive eating), (2) psychological factors (body esteem, self-esteem, and depression), and (3) body mass index (BMI). Outcomes are assessed immediately after the intervention (short term) and 1 year later (long term) and are compared to a waiting-list comparison group.

Methods

Sample

Participants were 326 weight-preoccupied adult women who were seeking help for weight issues in local HSSC in the province of Québec, Canada. Data collection was conducted in HSSC from 9 different regions of the province of Québec. Twenty-four HSSC (80% from urban areas and 20% from rural areas) participated in the study either during the fall or the winter/spring sessions of the program in 2010 and 2011. Recruitment procedures and participating HSSC are described elsewhere.[40] In the present study, 216 women who took part in the HAES intervention group were compared to 110 women who were on waiting lists for the program (ie, comparison group). Two participants in the HAES and 1 in the comparison group were excluded because of pregnancy. No other inclusion/

exclusion criteria were applied in order to maximize the external validity of the sample.

Design

Participants were evaluated at baseline (T = 0), at postintervention (T = 4 months), and 1 year after the intervention (1-year postintervention; T = 16 months). The program was completely provided under the responsibility of each HSSC, with no interference from the research team, which allows the evaluation of the program in a real-world natural setting. Note that the evaluation of the program's implementation is beyond the scope of this article and will be further reported. The HSSC health professionals gave participants' questionnaires to complete at home before the first intervention session (ie, baseline) as well as at the end of the program (ie, postintervention), with prepaid return envelopes. The comparison group was evaluated following the same schedule, but they received all questionnaires by mail. Questionnaires for the 1-year follow-up were mail delivered to all participants. All participants signed an informed-consent document approved by the Laval University Ethics Committee and the Montreal Health and Social Services Agency Research Ethics Committee at the beginning of the study. This study was conducted according to the guidelines of the Declaration of Helsinki.

Intervention

The HAES intervention, named "*Choisir de Maigrir?*" ("What about losing weight?"), focuses on general well-being as well as positive ways of adopting healthy and satisfying lifestyle habits.[17] This program is conducted in small groups of 10 to 15 women for 14 weekly sessions (13 three-hour evening sessions and 1 six-hour intensive day). A registered dietitian and a social worker or a psychologist provided the intervention. The health professionals leading the sessions received an intensive training to deliver the program (see http://www.equilibre.ca for more details). Supported by lectures, guided self-examination and observations, group discussions, and practical exercises, the program aims at enhancing awareness and knowledge about biological, psychological, and sociocultural aspects of body weight. Different topics are discussed during sessions such as internal cues of hunger and satiety, enjoyment of physical activity and healthy nutrition, setting realistic objectives with regard to weight loss, and acceptance of one's and others' body image. A weekly food diary and group discussions are used to facilitate the recognition of internal cues of hunger and satiety and the identification of external influences on eating behaviors and food intake. At the end of the intervention, women are invited to take an informed decision about how they want to take care of their health (this may include revisiting their initial weight loss expectations) and to define their individualized action plan to be followed in the long-term. This action plan includes self-directed behavioral goals related namely to dietary habits, eating behaviors, physical activity, and well-being.

A summary of the activities/intervention at each week during the HAES program has been previously published.[40]

Measures

All questionnaires were completed by participants in both groups at baseline, at postintervention, and 1-year postintervention.

Eating behaviors. The Three-Factor Eating Questionnaire (TFEQ),[41] a well-known 51-item questionnaire, is composed of 3 scales: cognitive dietary restraint, disinhibition, and susceptibility to hunger. The cognitive dietary restraint scale is divided into 2 subscales, namely, rigid restraint, which refers to an "all-or-nothing" approach to dieting with strict self-imposed eating rules, and flexible restraint, characterized by a softer approach where unhealthy foods can be eaten in limited quantities without feelings of guilt.[42] In the present study, the cognitive dietary restraint scale of the TFEQ had a Cronbach α coefficient of .74. Note that from now on, dietary restraint measured with the TFEQ will only be referred to as rigid restraint/control and flexible restraint/control. The disinhibition scale measures the tendency to overeat in response to different stimuli, whereas the susceptibility to hunger scale assesses the susceptibility to eat in response to feelings and perceptions of hunger. In the present study, both subscales had good internal consistency (Cronbach α's = .72 and .84). Restrained eating was also measured by the Restraint Scale,[43] which is a 10-item scale assessing participants' behavioral and attitudinal concerns about dieting and weight control. The scale showed a satisfactory internal consistency with a Cronbach α coefficient of .61. From now on, the restriction measured with the Restraint Scale will be referred to as "restraint (RS)". Two measures of restriction were used because the Restraint Scale has been described as a measure of unsuccessful dieting, whereas the TFEQ restraint scale is associated with actual restriction of food intake in everyday life.[44] The Intuitive Eating Scale[45] assessed the extent to which participants ate in response to hunger and satiety cues and respected physical body signals to determine when, what, and how much to eat. In this study, the scale showed good internal reliability (Cronbach α coefficient = .79). The Eating Obsessions and Compulsions Scale[46] is a 20-item questionnaire that measures obsession around food, ruminations (ie, focus attention on eating which generate negative affect), as well as compulsive eating behavior. The Cronbach α coefficient was .93 in our sample.

Psychological distress. Three questionnaires were used to evaluate psychological distress. Two factors of body esteem (appearance-related and weight-related) were measured by the Body Esteem Scale[47] (BES; Cronbach α coefficients = .89 and .84). The BES is a 23-item questionnaire measuring body esteem related to appearance, weight, and attribution. Self-esteem was assessed with the Rosenberg Self-Esteem Scale.[48] This 10-item questionnaire allows us to measure how people

Table 1. Baseline Participants' Characteristics.

Characteristics	HAES Group, n = 216	Comparison Group, n = 110	t/χ^2
Mean age (SD); range	50.93 (11.37); 21-83	49.20 (12.82); 19-80	t (n = 321) = 1.24, P = .22
Postmenopausal	53.2%	56.4%	χ^2 (1, n = 321) = 0.29, P = .59
Marital status			χ^2 (6, n=321) = 4.53, P = .61
In a relationship	60.5%	64.1%	
Divorced/widowed	24.6%	15.7%	
Single	14.0%	18.3%	
Education			χ^2 (4, n = 321) = 3.81, P = .43
Less than high school	3.2%	5.5%	
High school	31.5%	35.5%	
College	29.2%	30.9%	
University	34.7%	28.2%	
Income			χ^2 (6, n = 321) = 7.18, P = .30
0-19 000$	10.6%	12.8%	
20 000-39 999$	29.6%	26.6%	
40 000-59 999$	13.9%	22.0%	
60 000-79 999$	11.1%	12.8%	
80 000$ et +	22.7%	18.4%	
Mean BMI (SD); range	35.76 (6.80); 22.27-64.55	34.56 (7.30); 24.56-62.85	t (n = 319) = 1.46, P = .14
Past 3-month weight loss	24.8%	37.6%	χ^2 (1, n = 321) = 5.66, P = .02
Past 3-month weight gain	49.5%	43.1%	χ^2 (1, n = 321) = 1.28, P = .26

Abbreviations: BMI, body mass index; HAES, Health at Every Size; SD, standard deviation.

perceive their own personal value. It showed high internal consistency in this study (Cronbach α coefficient = .88). Depressive symptoms were assessed with the Beck Depression Inventory,[49] a 21-item questionnaire. It measures severity of depressive symptoms based on the 4 following categories: minimal, mild, moderate, and severe. This questionnaire showed good internal consistency (Cronbach α = .93, in the present study) as well as a high concurrent validity, particularly with the Hamilton Psychiatric Rating Scale for Depression (r = .74) and clinical judgement (r = .60).[50]

Body mass index. Participants reported height and weight at each measurement time, enabling the calculation of BMI with self-reported measures. Body mass index was also measured by the HSSC health professionals for participants in the HAES group at baseline and postintervention only. When BMI was measured, anthropometric measures (weight and height) were determined according to standardized procedures as recommended at the Airlie Conference.[51] For participants in the HAES group, self-reported and measured BMI were thus available for baseline and postintervention. The correlation coefficients between measured and self-reported body weight and height at baseline were 0.96 and 0.93, respectively. Therefore, only self-reported measures were considered for the following analyses in both groups.

Analysis

All analyses were performed with the SAS statistical software (version 9.4), using an α level of 5%. Student t test analyses were performed to assess differences at baseline (1) between women who completed posttreatment assessment and women

who dropped out before the end of the intervention and (2) between women from the HAES and the comparison groups. In order to test the impact of the intervention, all variables studied were entered into linear mixed models according to a 2×3 (Group × Time) mixed design. In all models, groups (ie, HAES and comparison group) and time (ie, T = 0, T = 4 months, and T = 16 months) were treated as fixed effects and participants as random effect. The mixed model approach has been recommended for repeated measures designs with missing data.[52] Simple effects and interaction effects were observed to assess whether changes in the HAES group were significantly different from changes in the comparison group for all dependent variables. Body mass index can potentially influence most eating- and psychological related. Therefore, BMI was tested as a covariate in all models and kept in as a covariate only when it significantly influenced the model. Pearson correlations between changes in variables (at short and long term) were also performed.

Results

Participants were aged from 19 to 83 years (mean [SD] = 48.99 [12.85]). Demographics are presented in Table 1. No differences in sociodemographic were observed at baseline between the intervention and the comparison groups, except for weight loss in the past 3 months, which was slightly more frequent in the comparison group (post hoc test was not significant, and there was only a small relationship between the variables according to the ϕ test, ϕ = −0.133). There was no difference between participants who completed the postintervention assessment (n = 234) and participants who dropped out of study before posttreatment (n = 84). Means and standard

deviation for each variable at T = 0, T = 4 months, and T = 16 months are presented in Table 2.

Eating Behaviors

A significant Group ×Time interaction (P = .0400) was observed for flexible restraint as measured by the TFEQ, where women who participated in the HAES program significantly increased their score at T = 4 months (P = .0016), whereas it remained stable in the comparison group. However, flexible restraint did not differ between groups at any time. No significant Group ×Time interaction or simple time effect was observed for the rigid restraint (P = .65). A significant Group ×Time interaction was observed for the other TFEQ components (disinhibition and susceptibility to hunger, both Ps < .0001). More specifically, in the HAES group, women's scores at T = 4 months and T = 16 months were significantly lower than at T = 0 (Ps < .0001). Also, while the disinhibition and susceptibility to hunger scores did not differ between the 2 groups at T = 0, they were significantly lower in the HAES group compared to the comparison group at T = 4 months (Ps < .0001) and at T = 16 months (disinhibition: P = .0144; susceptibility to hunger: P .0025).

No significant Group ×Time interaction was observed for restraint (RS) (P = .07). However, a simple time effect was observed, where participants from the whole sample decreased their score at T = 4 months (18.1 [4.6]) and T = 16 months (17.5 [4.4]) compared to baseline (19.1 [4.4]; Ps < .0001).

A significant Group ×Time interaction was observed for the intuitive eating score (P < .0001). More specifically, whereas both groups increased their score from baseline to T = 4 months (HAES, P < .0001; comparison, P = .0302), women in the HAES group also increased their intuitive eating score at T = 16 months compared to T = 0 (P < .0001). Therefore, the intuitive eating score did not differ between the 2 groups at T = 0 but was significantly higher in the HAES group compared to the comparison group at T = 4 months (P < .0001) and at T = 16 months (P = .0012).

A significant Group ×Time interaction was observed for the obsessive-compulsive eating score (P < .0001), where women who participated in the HAES program significantly decreased their score at T = 4 months and T = 16 months (P < .0001), whereas it remained stable in the comparison group. Therefore, while the Eating obsession and compulsion scale score did not differ between the 2 groups at T = 0, it was significantly lower in the HAES group compared to the comparison group at T = 4 months (P < .0001) and at T = 16 months (P = .0058).

Psychological Factors

For both factors of the BES (appearance-related and weight-related, both Ps < .0001), a significant Group ×Time interaction was observed. While both groups significantly increased their scores from baseline to T = 4 months (HAES, Ps < .0001; comparison group, P = .0328 and P = .0003, respectively for appearance-related and weight-related) and T = 16 months

(HAES, Ps < .0001; comparison group, P = .0019 and P = .0124, respectively), women in the HAES group had significantly higher scores at T = 4 months (P = .0004 and P < .0001, respectively) compared to the comparison group. No group difference was observed at baseline and T = 16 months.

The same pattern of Group ×Time interaction was observed for depression symptoms (P = .0057). Both groups significantly decreased their scores from baseline to T = 4 months (HAES, P < .0001; comparison group, P = .0177) and T = 16 months (HAES, P < .0001; comparison group, P = .0015). Women in the HAES group had significantly higher scores at T = 4 months (P = .0004) compared to the comparison group, whereas no group difference was observed at baseline and T = 16 months.

A significant Group ×Time interaction was observed for self-esteem (P < .0001). Women in the HAES group increased their score from baseline to T = 4 months and to T = 16 months (Ps < .0001), whereas women in the comparison group increased their self-esteem score only from baseline to T = 16 months (P = .0483). Therefore, the HAES group had a significantly higher score at T = 4 months (P = .0002), but no group difference was observed at baseline and T = 16 months.

Body Mass Index

No significant Group ×Time interaction was observed for the BMI (P = .20). However, a simple time effect was observed, where participants from the whole sample lowered their BMI at T = 4 months (34.8 [6.9] kg/m^2) and T = 16 months (34.1 [6.1] kg/m^2) compared to baseline (35.4 [7.0] kg/m^2; Ps < .0001), and from T = 4 months to T = 16 months (P = .0086).

Correlations

Correlations between changes in variables (at short and long term) are presented for the HAES group in Table 3. While all correlations are in expected directions, the analysis revealed that some variables may be more "central" to the HAES intervention, being associated with almost every other variables. Changes in intuitive eating and appearance-related body esteem are associated, with 10 of 11 variables in the short term and respectively to 8 and 9 variables in the long term. Changes in disinhibition and weight-related body esteem are associated with 9 variables in the short term and 8 in the long term.

Discussion

Globally, the intervention generated positive outcomes that were maintained over time. In the HAES group, all variables, except for rigid restraint, were improved during the intervention. All improvements observed at short term (ie, postintervention) were also maintained at long term (ie, 1-year postintervention), except for flexible restraint. Several short-term (restraint [RS], intuitive eating, body esteem, and depression) and long-term (restraint [RS], body esteem, self-esteem,

Table 2. Mean Scores and Standard Deviation for Outcomes.[a]

Variables	Intervention Group (n = 216)			Comparison Group (n = 110)			Mixed Models Results		
	T = 0	T = 4 Months	T = 16 Months	T = 0	T = 4 Months	T = 16 Months	Group	Time	Group by Time
Eating behaviors									
Flexible restraint	3.68 (1.84)	4.21 (2.05)	3.76 (1.99)	4.06 (1.79)	4.02 (1.81)	4.27 (1.92)	$F_{1,343} = 1.96$	$F_{2,484} = 1.41$	$F_{2,484} = 3.24^{b}$
Rigid restraint	3.10 (1.62)	3.21 (1.59)	3.12 (1.56)	3.32 (1.43)	3.31 (1.76)	3.24 (1.75)	$F_{1,340} = 0.70$	$F_{2,475} = 0.17$	$F_{2,475} = 0.44$
Disinhibition	9.65 (3.09)	7.24 (3.02)	7.67 (3.29)	9.60 (3.43)	9.31 (3.19)	8.85 (3.07)	$F_{1,332} = 11.81^{c}$	$F_{2,480} = 40.99^{d}$	$F_{2,480} = 23.87^{d}$
Susceptibility to hunger	6.79 (3.82)	4.24 (3.13)	4.54 (3.42)	7.28 (4.09)	6.74 (3.76)	6.25 (3.88)	$F_{1,328} = 17.97^{d}$	$F_{2,476} = 34.11^{d}$	$F_{2,476} = 14.34^{d}$
Restraint (RS)	18.91 (4.24)	17.64 (4.48)	17.09 (4.13)	19.43 (4.80)	18.81 (4.66)	18.33 (4.96)	$F_{1,338} = 6.24^{b}$	$F_{2,470} = 14.94^{d}$	$F_{2,469} = 2.73$
Intuitive eating	2.76 (0.54)	3.18 (0.58)	3.05 (0.56)	2.67 (0.57)	2.79 (0.54)	2.75 (0.60)	$F_{1,334} = 23.63^{d}$	$F_{2,479} = 42.65^{d}$	$F_{2,479} = 12.43^{d}$
Obsessive-compulsive eating	26.97 (15.79)	17.91 (12.27)	19.38 (14.16)	29.84 (16.82)	27.57 (16.74)	25.44 (16.76)	$F_{1,324} = 20.97^{d}$	$F_{2,468} = 28.59^{d}$	$F_{2,468} = 17.38^{d}$
Psychological distress									
BES appearance	1.17 (0.75)	1.60 (0.79)	1.45 (0.80)	1.11 (0.70)	1.29 (0.80)	1.53 (0.80)	$F_{1,333} = 4.69^{b}$	$F_{2,474} = 40.73^{d}$	$F_{2,474} = 12.37^{d}$
BES weight	0.74 (0.61)	1.16 (0.72)	1.11 (0.73)	0.69 (0.60)	0.84 (0.71)	1.08 (0.76)	$F_{1,333} = 7.51^{c}$	$F_{2,477} = 42.10^{d}$	$F_{2,477} = 12.46^{d}$
Depression	15.04 (11.47)	9.57 (9.65)	10.03 (8.84)	16.54 (10.97)	13.77 (10.60)	10.68 (8.65)	$F_{1,326} = 7.64^{c}$	$F_{2,467} = 31.18^{d}$	$F_{2,468} = 5.22^{c}$
Self-esteem	29.08 (5.84)	32.02 (5.29)	31.69 (5.54)	28.74 (5.85)	29.89 (5.47)	31.09 (6.08)	$F_{1,326} = 6.16^{b}$	$F_{2,472} = 28.22^{d}$	$F_{2,472} = 11.63^{d}$
BMI	35.88 (6.78)	35.25 (6.67)	34.57 (6.08)	34.56 (7.30)	33.95 (7.31)	33.09 (6.10)	$F_{1,210} = 2.07$	$F_{2,232} = 12.27^{d}$	$F_{2,232} = 1.60$

Abbreviations: BES, Body Esteem Scale; BMI, body mass index.
[a]T = 0: baseline, T = 4 months: postintervention, T = 16 months: 1-year postintervention.
[b]P < .05.
[c]P < .01.
[d]P < .001.

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Table 3. Associations Between Changes in Variables in the Short Term (From Baseline to Postintervention; Below the Diagonal) and Associations Between Changes in Variables in the Long Term (Form Baseline to 1-Year Postintervention; Above the Diagonal) in the HAES Group.[a]

	1	2	3	4	5	6	7	8	9	10	11	12
1. Δ Flexible restraint	–	0.45[b]	–0.15[c]	–0.16[c]	0.02	0.08	–0.07	–0.02	–0.02	–0.08	0.17[c]	–0.27[d]
2. Δ Rigid restraint	0.42[b]	–	0.10	–0.02	0.10	–0.16[c]	–0.00	–0.03	–0.06	–0.08	–0.04	–0.14
3. Δ Disinhibition	–0.08	0.06	–	0.48[b]	0.27[d]	–0.61[b]	0.45[b]	–0.33[b]	–0.31[b]	0.18[d]	–0.34[b]	0.15
4. Δ Susceptibility to hunger	–0.14[c]	0.07	0.42[b]	–	0.23[d]	–0.41[b]	0.51[b]	–0.26[e]	–0.26[d]	0.13	–0.26[e]	–0.02
5. Δ Restraint (RS)	0.07	0.21[e]	0.18[d]	0.20[d]	–	–0.27[e]	0.31[e]	–0.24[e]	–0.22[d]	0.19[d]	–0.15[c]	0.12
6. Δ Intuitive eating	0.03	–0.20[d]	–0.59[b]	–0.31[b]	–0.24[d]	–	–0.47[b]	0.43[b]	0.42[b]	–0.32[b]	0.36[b]	–0.14
7. Δ Obsessive-compulsive eating	–0.19[d]	–0.10	0.39[b]	0.43[b]	–0.01	–0.43[b]	–	–0.30[b]	–0.25[d]	0.32[b]	–0.29[e]	0.12
8. Δ BES appearance	0.18[d]	–0.03	–0.33[b]	–0.27[b]	–0.20[d]	0.39[b]	–0.24[e]	–	0.74[b]	–0.38[b]	0.30[b]	–0.30[b]
9. Δ BES weight	0.05	–0.16[d]	–0.35[b]	–0.21[d]	–0.23[d]	0.36[b]	–0.18[d]	0.69[e]	–	–0.21[d]	0.17[c]	–0.39[b]
10. Δ Depression	–0.09	–0.05	0.17[d]	0.20[d]	0.09	–0.22[d]	0.29[e]	–0.26[b]	–0.08	–	–0.47[b]	0.06
11. Δ Self-esteem	0.19[d]	0.15[c]	–0.32[b]	–0.25[d]	–0.14[c]	0.30[b]	–0.39[b]	0.34[b]	0.22[d]	–0.5[b]	–	–0.03
12. Δ BMI	–0.15[c]	0.03	0.29[e]	0.09	0.09	–0.27[b]	0.13	–0.29[b]	–0.38[b]	–0.17[d]	–0.20[d]	–

Abbreviations: BES, Body Esteem Scale; BMI, body mass index; HAES, Health at Every Size.
[a]n = 150-156 for the short-term effects, and n = 118-125 for the long-term effects.
[b]<.001.
[c]<.10.
[d]<.05.
[e]<.01.

and depression) improvements were also observed among the comparison group. Despite these positive changes in the comparison group, overall, participants in the HAES group showed significantly greater improvements than the comparison group for all variables in the short term, except for flexible and rigid restraint, restraint (RS), and BMI. At 1-year postintervention, women who received the intervention still had significantly better scores then comparison women for intuitive eating, disinhibition, susceptibility to hunger, and obsessive–compulsive eating.

The HAES intervention evaluated in the present study generated psychological changes that are consistent with other nondiet interventions for self-esteem,[23-25,28,30,53-56] body esteem,[27,28,57] and depressive symptoms.[23,24,26,30,54,56,58-60] More precisely, results indicated that following the intervention, the women's depressive symptoms score changed from mild depressive symptoms to minimal symptoms, whereas in the comparison group, women depressive symptoms remain over the clinical threshold (mild symptoms). This result is particularly interesting considering that in our previous study conducted in a controlled environment, the presence of depression was an exclusion criterion, and thus, women were presenting minimal symptoms that prevented us to see significant changes following the intervention (floor effect).[34]

The eating-related changes observed in this study were also consistent with other studies for intuitive eating,[27,28,57,61] disinhibition,[23,24,60,62] and susceptibility to hunger.[23,24,60] The fact that the HAES intervention generated a significant reduction in disinhibition and susceptibility to hunger and that these behaviors were significantly lower in the HAES group compared to the comparison group at the end of the intervention as well as at 1-year follow-up allowed us to ascertain the added value of the HAES intervention with regard to eating

behaviors. Since disinhibition and susceptibility to hunger are known to be among the risk factors for weight gain,[33] we may hypothesize that the sustained improvement in those eating behaviors can have an impact on long-term weight management such as leading to a modest weight loss or preventing weight gain. The same pattern of results was documented in controlled environment.[35] Furthermore, our results also suggest that the HAES intervention induced a shift away from emotional and external eating to more intuitive eating behaviors. This shift is also noteworthy in the context where the improvement in intuitive eating had already been related to improvement in diet quality among our participants[40] and was significantly related to a short-term decrease in BMI (see Table 3), thus suggesting that all these changes in eating behaviors can promote a better relationship with food. Finally, women were less invaded by food, eating, and weight at the end of the intervention and 1-year postintervention, as their score on obsessive–compulsive eating decreased significantly. Considering that these women initially sought help in HSSC for their weight and food preoccupation, this result supports the positive impact of the intervention since it has a direct impact on what women were seeking help for.

While rigid restraint remained stable in the whole sample, flexible restraint increased in the HAES at short term, and the restraint (RS) decreased at short and long term in both the groups. The decrease in the restraint RS is in line with the expectations, since it reflects a decrease in food- and weight-related preoccupations. The absence of change in rigid restraint in the HAES group is however unexpected considering that the program is based on intuitive eating principles and aims at increasing reliance on body signals and at discarding eating rules. Bacon et al[22] had shown a decrease in rigid control during and after the intervention compared to baseline, but their

rigid restraint score at baseline was higher than in the present study (6.8 [3.0] in Bacon et al[22] compared to 3.1 [1.6] in the present study). Therefore, there was more room for improvement in their study. It is important to note that in the present study, participants had globally low levels of flexible and rigid restraint at any measurement time, based on the score categorizations proposed for the United States and the German populations (score from 3 to 4 are considered as "low", in a 5-point range from "very low" to "very high").[63]

Flexible restraint is the softer part of dietary restraint and represents a more flexible control of everyday eating behaviors such as taking small helpings and eating slowly.[42] Our results show that short-term change in flexible restraint was positively associated with short-term change in appearance-related body-esteem and self-esteem and negatively associated with short-term change in obsessive–compulsive eating behaviors. In the long term, flexible restraint was negatively associated with BMI, suggesting that an increase in the flexible restraint could lead to a weight loss. These results are consistent with those obtained by our research team when we evaluated the HAES program in an experimental setting,[34] as the increase in flexible restraint was associated with a greater weight loss following the program. They suggest that increase in flexible restraint may be beneficial for participants and underline the relevance of examining dietary restraint by distinguishing flexible from rigid restraint, since they seem to behave differently.[63] Up until now, the majority of study had not differentiated those 2 types of dietary restraint.[23,25,27,28,30,53-55,58,60,62]

The HAES intervention presented in this study did not aim at achieving a significant weight loss among participants. The objective of the program was rather to ensure that women participating were able to make an informed decision on how they will take care of their health following the intervention, and this may include revisiting their initial weight loss expectations. As presented in the result, a significant decrease in BMI was observed for the whole sample, with no group difference. Significant weight losses were also documented in other studies,[24,26,58,60,62] but numerous other authors did not observe any change in weight during and after nondiet interventions.[23,27,30,53,54,57,59] Nevertheless, the fact that, in our study, changes in psychological and eating behaviors were obtained independent of weight loss, as we controlled for BMI, was in itself significant. It means that these improvements were presented no matter of weight loss. When we considered the low success of weight loss maintenance following traditional approaches and the negative impact of weight cycling on body esteem as well as on disinhibition,[64] we may propose that, by disentangling eating and psychological changes from weight loss, changes following the intervention may be more sustainable. To first generate a more positive relationship with food as well as an increase well-being may set the table for the pursuit of further changes.

Finally, intuitive eating, appearance and weight-related body esteem, and disinhibition could be considered the most critical components of the HAES intervention as their short- and long-term changes were related to changes in almost all other variables including BMI. These variables were also significantly improved, following the HAES intervention, when compared to a comparison group. In addition, body esteem was related to long-term changes in BMI; this association was also found in our previous controlled study measuring the effect of an HAES intervention.[34] Future research should address more directly these core components mainly in a context where interventions benefit from being cost effective. To identify more precisely the core components may help structure the program more efficiently (eg, decrease in the duration).

A major strength of this study was the fact that the comparison group was composed of women who were on the waiting list for the HAES program. Therefore, they had the same eating- and weight-related preoccupations and were at a similar stage of change than women who took part in the intervention. This strength is, however, not without limitations some of which were unexpected. The substantial improvements

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SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Health at Every Size (HAES) is a nondieting paradigm that proposes a shift from traditional "weight-centered" approaches to more "health-centered" approaches, arguing that lifestyle habits are key determinants of health and can be optimized regardless of body weight status. Descriptive and controlled studies have demonstrated that HAES interventions improve physiological and psychological functioning of participants.

What does this article add?

This study examined, in a real-life context, the effects of a HAES intervention and showed its effectiveness in improving eating-, weight-, and psychological-related variables in the short and the long term in women struggling with their weight and body image. The results of this study suggest that intuitive eating, body esteem, and disinhibition may be considered as the core components of such nondiet interventions.

What are the implications for health promotion practice or research?

These results support the psychological as well as eating behaviors changes following a HAES intervention for women struggling with weight preoccupation. They also reinforce the idea that healthy improvements in overweight and obese individuals are possible and that these improvements can be achieved independently of weight loss. These changes, which refer to food relationship and well-being, may pave the way for further improvements.

observed in the comparison group suggest that some of the comparison women, if not many, have found some other type of help during the intervention period. However, as such an important improvement in the comparison group could not be foreseen, women were not questioned on any type of support they might have benefited from during the course of the study. Also, it cannot be ruled out that the "question-behavior effect"[65] may explain part of the changes observed in the comparison group.

The evaluation of a nationally disseminated HAES intervention across the province of Québec, Canada, showed its effectiveness in improving eating-, weight- and psychological-related variables in the short and the long term in adult women. These results reinforce the relevance of this HAES intervention for women struggling with weight preoccupation and support its implementation. Intuitive eating, body esteem, and disinhibition could be proposed as the core components of this nondiet intervention.

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