

BRIEF
REPORT

Rigid and flexible control of eating behavior and their relationship to dieting status

C.A. Timko*, and J. Perone**

*Center for Counseling and Student Development, University of Delaware, Newark, DE, and **West Chester University, Department of Counseling & Psychological Services, West Chester, PA, USA

ABSTRACT. *This study examined whether or not rigid and flexible dimensions of restraint could differentiate between women who self-identified as dieting to lose weight versus those who self-identified as dieting to maintain weight. Four hundred thirty-three women responded to dichotomous questions regarding their dieting status and completed the Eating Inventory and Rigid and Flexible Control Scales (RC16 and FC12, respectively). Logistic regressions were conducted using dieting status as the dependent variable and RC16 scores, FC12 scores, susceptibility to overeating, and BMI as the independent variables. Scores on the RC16 and BMI correctly identified 73.6% of women as dieting to lose weight; scores on the RC16 and FC12 correctly identified 52.6% of women as dieting to maintain weight. Susceptibility to overeating was unrelated to dieting status. Results indicate that rigid control over eating is strongly related to dieting to lose weight and that both rigid and flexible control are related to dieting to maintain weight. This latter relationship is in need of further exploration. Results of this study support the contention that restraint and dieting are related, however, they are not equivalent constructs.*

(*Eating Weight Disord.* 11: e90-e95, 2006). ©2006, Editrice Kurtis

INTRODUCTION

Restraint theory posits that individuals who tend to cognitively restrict their intake (restrained eaters) experience a failure in restraint when forced to consume a food that violates their rigid dietary rules (1). This so-called counter-regulatory eating pattern has been found in restrained eaters when restraint status is determined by Herman and Polivy's Restraint Scale (2) but not by other measures of restraint (3). This lack of replication has led to a number of investigations as to what exactly the restraint scales measure (3). Though some researchers characterize restrained eaters as chronic dieters and, therefore, use the terms restraint and dieting interchangeably (3), others have argued that dieting and restraint are not equivalent (4). Frequent dieters tend to have higher restraint scores than infrequent dieters (5), and not all restrained eaters self-report as being on a diet (6-8). In fact, recent research has indicated that restraint status, regardless of the scale used to determine it, is not related to caloric intake (9), calling into question whether or not restraint and dieting are dif-

ferent conceptualizations of the same or similar construct.

One possible explanation for the confusion between dieting and restraint is the assumption that restraint is a homogeneous construct and, therefore, will always serve the same function for all individuals. If restraint is not homogeneous but rather a linear combination of differing types of restraint then the confusion between restraint and dieting may be explained. Westenhoefer (10) postulated that restraint is a combination of what he termed rigid and flexible control of eating behavior. Rigid control of eating behavior is characterized by a very dichotomous approach to food and eating; whereas, flexible control over eating is characterized by a more elastic approach to eating in which all foods are allowed in reasonable quantities (11, 12).

In the course of validating the Rigid and Flexible Control over Eating Scales (RC16 and FC12, respectively), Westenhoefer et al. (11) found that high rigid control was associated with high levels of susceptibility to overeating and that high flexible control was associated with lower susceptibility to overeating (as measured by the Disinh-

Key words:

Dieting, restraint, flexible control, rigid control.

Correspondence to:

C. Alix Timko, Ph.D.
University of Pennsylvania
Dept. of Psychology
3720 Walnut St.
Philadelphia, PA, USA
E-mail:
catimko@psych.upenn.edu

Received: October 27, 2005

Accepted: February 15, 2006

hibition, or DIS, sub-scale of the Eating Inventory; EI, (13). In one of a series of studies, Westenhofer (14) found that individuals who dieted frequently had increasing scores on both the RC16 and FC12. Those who tended to diet in order to lose weight had increases in their RC16 scores above and beyond that of their FC12 scores. This rise in rigid control was associated with higher scores on the DIS. Those who tended to diet regularly in order to maintain weight had higher FC12 scores and lower DIS scores. In short, individuals who dieted frequently had higher levels of rigid control and disinhibition and medium levels of flexible control. On the other hand, individuals who lost weight and kept it off or who were consistently dieting in order to maintain weight had higher levels of flexible control and lower levels of disinhibition.

If this is the case, then flexible and rigid control (together with disinhibited eating) may be related to dieting status and, consequently, clarify the relationship between dieting status and restraint. Someone who is currently dieting to lose weight may have higher levels of rigid control over eating and disinhibition than someone dieting to maintain weight and, therefore, may be more susceptible to overeating. Though this hypothesis is in contradiction to findings regarding the lack of counter-regulatory eating in current dieters (7, 15, 16), restraint status in those studies was measured by a homogenous measure and not a measure that takes into consideration the possibility of differing types of restraint. As a result, it is possible that heterogeneity of restraint and its possible relationship to dieting status were not captured. In addition, dieting in these studies was assessed by a singular dichotomous measure querying whether or not individuals were dieting to lose weight. Though a valid way of assessing self-reported dieting (8), it does not take into consideration individuals who may be dieting for other reasons than weight loss (e.g., those dieting to maintain weight).

The purpose of this study was to use participants' scores on measures of flexible and rigid control to determine self-reported dieting status. Based on Westenhofer's (14) research, it was hypothesized that high RC16 and high DIS scores would be able to categorize whether or not someone was on a diet to lose weight; whereas, high FC12 scores and low DIS scores would be able to classify those who were on a diet to maintain their weight. Research has shown that individuals may have different reasons for dieting (17) and may, therefore, make a distinction between dieting to lose versus dieting to maintain weight. Furthermore, these differing behaviors and/or attitudes may be differ-

entially related to the flexible and rigid dimensions of restraint. If the hypothesis is supported it would indicate that restraint and dieting may, in fact, be interchangeable when restraint is conceptualized as differing types of control that may affect consummatory behavior differently. Furthermore, results in support of the hypothesis would indicate that different dimensions of restraint are used for different purposes.

MATERIALS AND METHODS

Study design

This was a cross-sectional study using self-report measures.

Participants

Participants were a non-clinical convince sample recruited from three United States' universities in Philadelphia and West Chester, Pennsylvania and Newark, Delaware. Data were collected from a total of 472 female university students between the ages of 18 and 55 ($M = 20.82$, $SD = 3.54$) with 95.6% of the sample age 18-25. Thirty-nine questionnaires were excluded from the study due to participants answering "yes" to both dieting questions. This resulted in a total sample of 433. Based on self-reported weight and height, the majority of the sample were of normal weight (74.1%, $N=321$), 18.7% ($N=81$) were overweight or obese ($BMI \geq 30.0$), and 7.27% ($N=31$) were underweight ($BMI \leq 18.5$).

The samples reflected the ethnic make-up of the student body at each institution. The sample was overwhelmingly Caucasian (82.9%) with 9.9% of the sample identifying as Black/African American, 2.1% identifying as Hispanic, and 2.8% identifying as Asian. The remainder of the sample identified as "other." This group often includes individuals who identify with more than one ethnic group. In terms of year of study, 13.9% were in their first year of study, 33.5% in their second year of study, 22.4% in their third year of study, 24.9% were in their fourth year, and 5.3% of the participants were beyond their 4th year of study.

Procedure

In order to assure a large sample size, the authors approached various professors of lecture classes who agreed to provide time in class for students to complete a questionnaire packet on eating habits and body image. The authors described the study in class, reviewed the consent form, and administered the questionnaires. Students who chose to participate were given time in class to complete and return

questionnaires. Participants volunteered and were given no incentives for completing this battery, nor were there any disincentives for not participating. Due to the size of lecture classes and the desire to retain anonymity, it was not possible to determine the number of female students present the day data were collected; therefore, response rate cannot be calculated. However, based on the enrollment rosters, response rate is believed to be over 90%. The appropriate board at each university approved the protocol.

Measures

The questionnaire packet included a variety of measures, some of which are not relevant to this study and will not be discussed. The demographic data included self-reported weight and height and questions pertaining to dieting status. The two dieting status questions asked participants to answer "yes" or "no" to the following items: "Are you currently on a diet to lose weight?" and "Are you currently on a diet to maintain your weight?" It was decided to ask these two questions as evidence has indicated that individuals who diet to lose weight engage in different behaviors than those who diet to maintain weight (18). Participants may have different reasons for dieting (17), and they may make a distinction between the two types of dieting. Furthermore, these differing behaviors and/or attitudes may be differentially related to flexible and rigid dimensions of restraint. Additionally, Westenhoefer's research (14) indicated that RC and FC were related to those who unsuccessfully diet versus those who successfully diet. Participants were considered "current dieters" if they answered "yes" to either question.

Participants completed the Eating Inventory (13), a 51-item inventory containing three factors: Cognitive Restraint (CR), Disinhibition (DIS), and Susceptibility to Hunger (H). For the purpose of this study, the DIS scale was of greatest interest. The DIS has a reliability of 0.91 and a test-retest reliability of 0.80 (11). The Flexible Control (FC12) and Rigid Control (RC16) scales (10, 12) consist of 14 items that are part of the CR scale and 14 additional items. The FC12 has a reliability of 0.79, and the RC16 has a reliability of 0.77. The internal consistency of these measures is 0.82 and 0.80, respectively (12, 14). The additional 14 items were added to the EI in order to calculate Flexible and Rigid Control, resulting in a 65-item inventory.

Statistical analysis

The sample resulted in a normal distribution. Consequently, Analysis of Variance (ANOVA)

with a Bonferroni correction was used to determine differences between groups (non-dieting, dieting to lose weight, dieting to maintain weight). Significance was set at $p \leq 0.05$.

Logistic regression was used to classify women's dietary status. This method of analysis was chosen as it best fits the data and allows a calculation of the probability that someone is dieting based on their restraint status (rigid or flexible). If restraint and dieting were equivalent, rigid and flexible control should be able to correctly classify individuals as dieters versus non-dieters. Two separate analyses were conducted, one investigating dieting to lose weight as the dependent variable, the other using dieting to maintain weight as the dependent variable. In both analyses, dieting was coded as 1 and not dieting as 0. Predictors were entered in two separate steps in order to control for BMI. The first included RC16, FC12, DIS, as the independent variables; the second included an individual's BMI. It was expected that BMI would have had a greater likelihood of correctly classifying individuals who were dieting to lose weight, given that their BMI was significantly higher than the other two groups. All predictors were continuous in nature.

RESULTS

About one quarter of the sample (24.5%, $N=106$) indicated that they were on a diet to lose weight and 22.4% ($N=97$) indicated that they were on a diet to maintain their weight. Just over half of the women (53.1%, $N=230$) indicated that they were not on a diet. An Analysis of Variance (ANOVA) indicated that there were significant differences in BMI between current dieters and non-dieters ($F(2,430)=23.31$, $p \leq 0.001$). Post-hoc tests revealed that women who identified as being on a diet to lose weight had significantly higher BMIs ($M=24.55$, $SD=3.99$, $p \leq 0.001$) than did those who were dieting to maintain weight ($M=22.27$, $SD=3.28$, $p \leq 0.001$) and those not dieting ($M=21.80$, $SD=3.29$; $p \leq 0.001$). Women who identified as being on a diet to maintain weight did not differ significantly in BMI from women who were not on a diet ($p=0.80$).

Whether or not the predictors could accurately classify women who were dieting to lose weight were investigated first. For ease, the first step is summarized in Table 1. In the final model, the total percentage of women correctly classified as dieting to lose weight or not dieting was 85.4%. This is higher than the 68.5% correct classification that would be expected via blind estimation. This model was significant

TABLE 1
 Summary of step-wise logistic regressions (N=433).

Variable	B	S.E.	Wald	p	exp ^(b)	95% CI
Dieting to lose weight						
Step I						
RC16	0.37	0.07	31.56	<0.001	1.46	1.28 - 1.66
FC12	0.08	0.07	1.12	0.29	1.08	0.94 - 1.24
DIS	0.07	0.05	1.18	0.19	1.07	0.97 - 1.17
Step II						
RC16	0.37	0.07	27.56	<0.001	1.45	1.26 - 1.67
FC12	0.13	0.08	2.84	0.09	1.14	0.98 - 1.32
DIS	0.03	0.05	0.39	0.53	1.03	0.93 - 1.14
BMI	0.25	0.05	21.00	<0.001	1.28	1.15 - 1.43
Dieting to maintain weight						
Step I						
RC16	0.18	0.06	10.11	0.001	1.19	1.07 - 1.34
FC12	0.25	0.07	14.28	<0.001	1.28	1.13 - 1.46
DIS	-0.01	0.05	0.42	0.84	0.99	0.91 - 1.08
Step II						
RC16	0.17	0.06	9.03	0.003	1.19	1.06 - 1.33
FC12	0.27	0.07	15.98	<0.001	1.31	1.14 - 1.50
DIS	-0.02	0.05	0.16	0.69	0.98	0.90 - 1.07
BMI	0.09	0.05	3.13	0.08	0.97	0.99 - 1.20

($\chi^2(4, N=336)=176.26, p<0.001$) and was able to correctly classify 90.9% as not dieting and 73.6% as dieting to lose weight. Only RC16 and BMI were significant predictors of a woman's tendency to identify herself as dieting to lose weight. The odds ratio for both RC16 and BMI were both greater than one, indicating that the odds of being on a diet to lose weight go up 1.45 times for every one point increase in RC16 and 1.28 times for every one unit increase in BMI.

In classifying women's self-identification as being on a diet to maintain weight, the final model was able to correctly classify 78.3% of the women (52.6% as dieting to maintain weight and 89.1% as non-dieters). This is higher than the 70.3% correct classification that would be expected via blind estimation. As BMI did not significantly differ between women dieting to maintain weight and women not dieting, it was not expected that BMI would be a significant predictor of dieting status in this analysis. The final model supported this assumption, with both RC16 and FC12 the only variables that significantly predicted dieting status ($\chi^2(4, N=327) = 104.67, p<0.001$). The odds ratio for RC16 indicated that with every one point increase in scores on the RC16, the odds of being correctly classified as dieting to maintain weight increased by 1.19. Likewise, the odds of being correctly classified as dieting to maintain weight increased by 1.31 with every one point increase in FC12 scores. Table 1 displays the full results of both steps of this regression model.

DISCUSSION

The purpose of this study was to investigate whether or not flexible and rigid control of eating (in conjunction with susceptibility to overeating) would be able to differentially predict an individual's self-reported dieting status. Expectations were that high scores on RC16 and DIS would correctly classify women as dieting to lose weight, and high scores on FC12 in conjunction with lower DIS would correctly classify women as dieting to maintain weight. These hypotheses were not supported. Scores on the DIS did not play a role in classification and were not related to increased odds that one would be dieting to lose or maintain weight. This indicates that one's susceptibility to overeating, in the presence of rigid and flexible control, is not related to self-reported dieting status.

As expected, rigid control was associated with increased odds of dieting to lose weight. The ability to predict dieting status using RC16 scores increased when BMI was entered into the model. This is not surprising given that women who self-identified as dieting to lose weight had significantly higher BMIs than all other women in the sample. The fact that RC16 was the only significant predictor of current dieting status lends support to Westenhoefer's (10) contention that restraint is not homogeneous. The final model correctly classified almost three-quarters of those dieting to lose weight. Though statistically significant, one would expect that if rigid control over eating and dieting to lose weight were equivalent (as is often assumed), then the percentage correctly classified would be higher. Though results indicate that there is a great deal of overlap between dieting to lose weight and the rigid aspect of restraint, they also indicate that the two are not identical constructs.

A different pattern emerged when those dieting to maintain weight were classified with the same independent variables. As expected, increasing scores on FC12 tended to increase the odds of correctly classifying individuals who self-identified as being on a diet to maintain weight. The presence of RC16 as a significant predictor in this analysis was surprising. Together, RC16 and FC12 were able to correctly predict dieting status for approximately half of the women who identified as dieting to maintain weight. This is a lower percentage than RC16 alone predicted for women dieting to lose weight. This indicates that the overlap between restraint and dieting to maintain weight is not as great as it is for dieting to lose weight. This could be due to a number of reasons. It is possible that "dieting to maintain

weight" is not as narrowly defined by participants as is "dieting to lose weight." Individuals who identify as dieting to maintain weight could be those who previously had a weight loss and now wish to maintain that loss, or it could be individuals who have never lost weight but diet in order to avoid weight gain. If this is the case, it is possible that rigid and flexible control are differentially related to various types of dieters within the broad category of "dieting to maintain weight."

This study demonstrated that styles of dieting may be differentially related to dimensions of restraint, though the relationship was not clarified for those dieting to maintain weight. Since neither form of restraint was able to completely predict a woman's dieting status, it indicates that these dimensions of restraint are not equivalent to dieting – though they are highly related. Additionally, it appears as if rigid control is more closely related to dieting to lose weight than either types of restraint are related to dieting to maintain weight. These distinctions between rigid and flexible control are not usually made in studies investigating restraint or dieting. This lack of distinction may play a role in some of the conflicting findings regarding the relationship between restraint, dieting, and consummatory behavior. The lack of relationship between susceptibility to overeating and dieting may account for some of the findings regarding dieters in counter-regulatory situations, namely that dieters tend to reduce the amount they eat after a disinhibitory stimulus.

A possible criticism of this study is that dieters were not classified as "restrained dieters" and "restrained non-dieters" as has been done by other researchers (4). This was done intentionally, as classifying individuals as restrained eaters usually requires performing a median split, creating a dichotomous variable out of a continuous one. There is no reason to believe that a median split would create two homogeneous groups; that is, one homogeneous group of unrestrained eaters and one homogeneous group of restrained eaters (19). Consequently, some of the self-reported dieters in this study would be classified as restrained eaters and others would not. Limitations of this study include the use of self-report, the cross-sectional design, and the use of a convenience sample. The strength in this study lies in its investigation of the relationship between restraint and dieting when conceptualized as heterogeneous constructs. Despite mounting evidence that there are different types of dieting and that dieting and restraint (when viewed as a homogeneous construct) are not equivalent, researchers still

tend to use these constructs interchangeably. The differentiation of dieting into dieting to lose weight versus dieting to maintain weight allows for a deeper understanding of how restraint and dieting may be related. In the future, it would be important to investigate the behaviors in which both women and men engage when they say they are dieting to lose or maintain weight to determine if there are, in fact, differences in consummatory behavior and attitudes towards food. In addition, it would be worthwhile to experimentally investigate the relationship between FC12, RC16, DIS, and dieting status to determine causal relationships to counter-regulatory behavior.

ACKNOWLEDGEMENTS

The authors wish to thank Alisa Crossfield for her assistance in data collection.

REFERENCES

1. Herman C.P., Polivy J.: A boundary model for the regulation of eating. In: Stunkard A.J., Stellar E. (Eds.), *Eating and its disorders*. New York, Raven Press, 1984, pp. 141-156.
2. Herman C.P., Polivy J.: Restrained eating. In: Stunkard A.J. (Ed.), *Obesity*. Philadelphia, Saunders, 1980, pp. 208-225.
3. Heatherton T.F., Herman C.P., Polivy J., King G.A., McGreeS.T.: The (Mis)measurement of restraint: An analysis of conceptual and psychometric issues. *J. Abnorm. Psychol.*, 97, 19-28, 1988.
4. Lowe M.R.: The effects of dieting on eating behavior: A three-factor model. *Psychol. Bull.*, 114, 100-121, 1993.
5. Lehrke S., Hubel R., Laessle R.G.: Essverhalten und psychosoziale Belastung von Personen mit hoher und niedriger wahrgenommener Diäthäufigkeit. *Zeitschrift für Gesundheitspsychologie*, 13, 21-28, 2005.
6. Dritschel B., Cooper P.J., Charnock D.: A problematic counter-regulation experiment: Implications for the link between dietary restraint and overeating. *Int. J. Eat. Disord.*, 13, 297-304, 1993.
7. Lowe M.R., Whitlow J.W., Bellwoar V.: Eating regulation: The role of restraint, dieting, and weight. *Int. J. Eat. Disord.*, 10, 461-471, 1991.
8. Lowe M.R., Timko C.A.: What a difference a diet makes: Toward an understanding of differences between restrained dieters and restrained nondieters. *Eat. Behav.*, 5, 199-208, 2004.
9. Stice E., Fisher M., Lowe M.R.: Are dietary restraint scales valid measures of acute dietary restraint? Unobtrusive data suggest not. *Psychol. Assess.*, 16, 51-59, 2004.
10. Westenhoefer J.: Dietary restraint and disinhibition: Is restraint a homogeneous construct? *Appetite*, 16, 45-55, 1991.
11. Westenhoefer J., Broeckmann P., Munch A., Pudel V.: Cognitive control of eating behavior and the disinhibition effect. *Appetite*, 23, 27-41, 1994.

12. Westenhoefer J., Stunkard A.J., Pudel V.: Validation of the flexible and rigid control dimensions of dietary restraint. *Int. J. Eat. Disord.*, 26, 53-64, 1999.
13. Stunkard A.J., Messick S.: The three factor eating questionnaire to measure dietary restraint, disinhibition, and hunger. *J. Psychosom. Res.*, 29, 71-81, 1985.
14. Westenhoefer J.: *Gezügelt Essen und Störbarkeit des Eßverhaltens* (2. Auflage). Göttingen, Verlag für Psychologie, 1996.
15. Lowe M.R.: Putting restrained and unrestrained non dieters on short-term diets: Effects on eating. *Addict. Behav.*, 16, 349-356, 1994.
16. Lowe M.R.: Restrained eating and dieting: Replication of their divergent effects on eating regulation. *Appetite*, 25, 115-118, 1995.
17. Putterman E., Linden W.: Appearance versus health: Does the reason for dieting affect dieting behavior? *J. Behav. Med.*, 27, 185-196, 2004.
18. French S.A., Jeffery R.W., Wing R.A.: Food intake and physical activity: A comparison of three measures of dieting. *Addict. Behav.*, 19, 401-409, 1994.
19. Ogden J.: The measurement of restraint: Confounding success and failure? *Int. J. Eat. Disord.*, 13, 69-76, 1993.