In control of weight: The relationship between facets of control and weight restriction

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Abstract

This study explored the moderating effects of body dissatisfaction (BD) on the relationships between various constructs of control and weight restricting and control behaviours (WRCBs). Participants were 167 female undergraduates who completed self-report measures of control, BD and WRCBs. It was found that higher external locus of control (LOC) was related to less dieting and exercise and that LOC was unrelated to purging. In addition, higher levels of general self-control were found to be related to higher levels of purging when BD was high but not low, and higher general self-control was associated with greater dieting and exercise behaviour. Finally, higher 'self-control as self-esteem' was strongly associated with greater dieting and exercise behaviour at both high and low levels of BD, whilst 'self-control as self-esteem' was related to purging only when BD was high. The results of this research suggest that different constructs of control have differential effects on WRCBs. The clinical implications of the findings are discussed.

Keywords: body dissatisfaction, control, dieting, exercise, purging

1. Introduction

Although the rates of obesity in Western women are high, so too are the social, aesthetic, and moral values placed on female thinness, and more recently athleticism (Grogan, 2008; Homan, 2010; United States Department of Health and Human Services, 2000; Wiseman, Gray, Mosimann & Ahrens, 1992). As a consequence, many Western women are considerably dissatisfied with their body shape and size, express a strong desire to be thinner, fitter and more toned, and as a result engage in various methods of weight restriction (Cash & Fleming, 2002; Tiggemann, 2005). Dieting, exercise and purging are three weight restriction and control behaviours (WRCBs) engaged in by women. Although the health benefits associated with healthy eating and regular, moderate exercise are indisputably large, the combination of an intense desire to lose weight and extreme or compulsive weight restriction practices, can lead to a myriad of negative consequences. Indeed, dieting, exercise and purging have all been linked to the development of clinical eating disorders (Brewerton, Stollefson, Hibbs, Hodges & Cochrane, 1995; Hsu, 1996; Peñas-Lledó, Vaz Leal & Waller, 2002). Given the high prevalence and potentially deleterious consequences associated with high-level WRCBs, it is important to investigate associated factors that might be targeted in intervention strategies.

“Control” is a construct that has long been theorised as being important in the development and maintenance of clinical eating disorders (Fairburn, Cooper & Shafran, 2003; Fairburn, Shafran & Cooper, 1999; Garner & Bemis, 1982; Slade, 1982). However, empirical research is fragmented, as is any attempt by investigators to determine whether a link exists between control and sub-clinical weight restricting behaviours. One difficulty it would seem, is that the few empirical studies that do exist, not only employ different measures of control, but in fact measure different constructs of control entirely. This paper is interested in three alternative constructs frequently included under the more general banner of

“control”, namely locus of control (LOC), general self-control, and ‘self-control as self-esteem’.

LOC refers to the perceived control an individual feels they have over their lives (Mills, 1994). An external LOC refers to the belief that outside forces such as fate, luck, and other people determine the circumstances in one’s life (Fouts & Vaughan, 2002). In contrast, an internal LOC refers to the belief that one’s own behaviour and intentions are influential in controlling one’s environment and shaping one’s life outcomes (Rotter, 1966). Fouts and Vaughan (2002) have suggested that an external LOC may incline women to accept and internalise pressures to be thin from external sources. These women are then more likely to make comparisons between thin-ideal images and themselves, in turn develop a sense of body dissatisfaction, and subsequently engage in weight restriction practices. Conversely, Fouts and Vaughan (2002) argue that women with an internal LOC pay less attention to, or are better able to resist the pressure of external sources, do not develop the same sense of body dissatisfaction as women with an external LOC, and therefore are less likely to engage in weight restriction methods. Although there are exceptions (e.g., Garner, Garfinkel, Stancer & Moldofsky, 1976; Hood, Moore & Garner, 1982; Tylka & Subich, 1999), it has generally been shown that both anorexic and bulimic women report significantly greater external control beliefs than non-clinical dieters and non-dieting controls (Rost, Neuhaus & Florin, 1982; Sing Lee, Chan, Kwok & Hsu, 2005; Tiggemann & Raven, 1998; Williams, Chamove & Millar, 1990; Williams et al., 1993). However in community samples, the findings are mixed. Although some researchers have found that an external LOC is associated with greater eating problems and pathological weight restriction methods than an internal LOC (e.g., Fouts & Vaughan, 2002; Rost et al., 1982; Sing Lee et al., 2005; Tiggemann & Raven, 1998; Williams et al., 1990; Williams et al., 1993), others have failed to find this association (e.g., Cachelin, Striegel-moore & Paget, 1997; Iannos & Tiggemann, 1997). Furthermore,

there are a number of studies suggesting that higher internal LOC is associated with better weight loss program adherence (e.g., Saltzer, 1982), better engagement in healthy eating and exercise practices (Speake et al., 1991), better weight maintenance (Nir & Neumann, 1995) and greater likelihood of seeking information on nutrition to improve diet (Saturnino-Springer et al., 1994). Indeed, it makes intuitive sense that for non-clinical women, the more they believe that their own actions and intentions influence outcomes more generally, the more likely they will believe themselves capable of controlling their weight and the more likely they will subsequently engage in WRCBs. Thus, although there remains considerable debate regarding the role of LOC in non-clinical forms of eating and weight restriction practices in the literature, it can be predicted that higher internal LOC (and therefore lower external LOC) in women without eating disorders will lead to higher engagement in WRCBs.

The second control construct of interest to the present study is that of general self-control which refers to the act of directing behaviour and controlling impulses (Horesh, Zalsman & Apter, 2000). Common to the cognitive theories developed by Garner & Bemis (1982), Slade (1982) and Fairburn et al., (2003; 1999) is the notion that within the individual with Anorexia Nervosa is a fundamental desire for control. Garner & Bemis (1982) contend that it is when an individual senses loss of control that they seek an area in their life upon which to exert self-control. Slade (1982) suggests that low self-esteem and perfectionism compel the individual to take absolute control over an area in their life. Fairburn et al., (1999) argue that a heightened sense of ineffectiveness (i.e. feelings of inadequacy, low self-worth, and insecurity) combined with low self-esteem triggers a desire for self-control in general within the individual. There has been little empirical investigation of general self-control in relation to non-clinical WRCBs with research generally being limited to related findings. For example, studies have shown that higher levels of general self-control are associated with greater fruit and vegetable consumption and less fatty food consumption (Gerrits et al.,

2010), less money spent on junk food (Junger & van Kampen, 2010), successful dieting, and the maintenance of regular exercise (Carels, Cacciapaglia, Douglass, Rydin & O'Brien, 2003; Goodrick, 2000).

The third type of control relevant to weight and eating issues is described here as 'self-control as self-esteem'. The theories of both Slade (Slade, 1982) and Fairburn et al., (Fairburn et al., 2003; Fairburn et al., 1999) assert that the self-worth of the individual with a clinical eating disorder becomes defined to a large extent in terms of their control over eating. Indeed, Slade (Slade, 1982) advocates that it is this concept of 'self-control as self-esteem' specifically, that both initiates and maintains the shift between non-pathological time-limited dieting and anorexia. Despite the centrality of this construct to cognitive theories of eating disorders, empirical research is limited. It has been shown that both anorexic and bulimic patients score significantly higher on a measure specifically designed to assess 'self-control as self-esteem' compared to normal controls, and that women with anorexia view self-control as very important to their self-esteem (Butow, Beumont & Touyz, 1993; Mizes, 1992). Thus, there appears to be some support for the role of 'self-control as self-esteem' in clinical eating disorders. As yet however, there has been no research examining the role of self-control as self-esteem with respect to WRCBs in community samples.

From the above discussion, it is clear that control has been conceptualised and measured in a variety of ways and that the results of its influence on clinical and non-clinical weight restriction are mixed. It is the contention of this paper that the mixed results may be due to the variety of conceptualisations of control employed and the presence of a third variable, namely body dissatisfaction (BD) that may interact with control in determining these relationships. Specifically, despite the controversy surrounding the association of LOC and WRCBs, it is suggested here that lower external LOC (i.e., greater internal LOC) will be associated with higher levels of dieting, exercise and purging, but only when BD is high.

When BD is low, it is predicted that the relationship between LOC and weight restriction will be weaker or non-existent. Second, it is hypothesised that when BD is high, there will be a significant and positive relationship between level of general self-control and the weight restricting practices of dieting and exercise, as successful maintenance of dieting and exercise regimes requires self-control. In contrast, it is predicted that when BD is high, there will be a significant negative association between general self-control and purging, as purging implies that bingeing has first taken place, thus implying a *lack* of general self-control. When BD is low, the desire to engage in dieting, exercise and purging with the intention to control is weight is likely to be low and therefore the relationship between general self-control and weight restricting behaviours are predicted to be weaker or non-existent. Finally, it makes sense to suggest that if an individual's self-esteem is very much linked to their ability to control their weight, then that individual is more likely to diet and exercise to do so. Furthermore, if that individual does lose control of their dietary intake and binge, they are more likely to purge in order to regain control and hence regain their self-esteem. It is therefore further predicted that the relationship between 'self-control as self-esteem' and all three types of WRCBs (dieting, exercise and purging) will be positive and significant at both high and low levels of BD.

2. Material and Methods

2.1. Participants

The sample comprised 167 female first year psychology students from the University of Queensland, Brisbane, Australia aged 17-25 years ($M=19.22$ years, $SD=1.79$ years), who participated in the study for course credit. The majority of participants (82%) were born in Australia, and their BMI scores ranged from 15.11 to 33.46 ($M=21.52$, $SD=2.84$). According to the classification of BMI by the National Centre for Chronic Disease Prevention and Health Promotion (2011), 12.6% of the sample were considered underweight (Body Mass

Index (BMI) < 18.5), 76.6% normal weight (BMI= 18.5 – 24.9), 10.2% overweight (BMI= 25 - 29.9) and 0.6% obese (BMI= >30).

As 96.4% of participants were full-time students and 64.3% lived at home, socioeconomic status (SES) was determined by parental occupation. Occupations were coded according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO: Australian Bureau of Statistics, 2006), which divides occupations into nine categories ranging from 1 (highest socioeconomic category) through to 9 (lowest socioeconomic category), with the addition of two further categories for homemakers and deceased persons.

2.2 Measures

2.2.1. *Body Mass Index.*

Participant height and weight measurements were taken by the researchers using standardized equipment. Body Mass Index (BMI) was calculated by dividing participant weight in kilograms by their height in metres squared.

2.2.2 *Body Dissatisfaction.*

The nine-item Body Dissatisfaction subscale of the Eating Disorders Inventory-2 (EDI-2-BD: Garner, 1991) was used to assess participants' satisfaction with their stomach, thighs, buttocks, hips, and overall body. High internal reliability estimates for the have been demonstrated, with Cronbach coefficient alpha levels ranging from .76 to .92 with clinical samples (Garner, 1991; Steinhausen, Neumärker, Vollrath, Dudeck & Neuma'rker, 1992) and from .74 to .93 with non-clinical samples (Fekken, Boland & Vanderheyden, 1988; Rathner & Rumpold, 1994). Similarly, test-retest reliabilities for the EDI-2-BD have also been shown to be high, ranging from .75 (1-year retest: Crowther, Lilly, Crawford & Shepherd, 1992) to .97 (3-week retest: Wear & Pratz, 1987).

2.2.3. *Weight Restricting Behaviour.*

Weight restricting behaviour was measured by the Weight Restriction / Control Questionnaire (WRCQ) developed by the authors. The questionnaire comprises 39 items and assesses the extent to which an individual actively engages in weight restriction practices (See Appendix A). Thus, unlike many other scales and questionnaires that tend to measure attitudinal aspects of weight restriction, the WRCQ assesses weight restriction in a purely behavioural manner. In addition, the WRCQ incorporates three subscales that measure dieting, exercise, and purging behaviours. The WRCQ is unique in this way, as no other scale to the author's knowledge has assessed all three weight restriction components within one measure. The WRCQ incorporates three subscales that measure dieting (14 items), exercise (17 items), and purging (8 items) behaviours and requires participants to indicate on a 6-point likert scale from 'Never' (0) to 'Always' (5), the extent to which they engage in each weight restriction behaviour with the intent to lose or control weight. Coefficient alphas of .95, .92 and .96 were found for the dieting, purging and exercise subscales respectively in this study. The suitability of a three component structure was evaluated using Principal axis Factor analysis with an Oblique rotation. The total variance explained was 60.90% (exercise – 22.54%; diet – 20.56%; purging – 17.80%). A Kaiser-Meyer-Olkin (KMO) value of .92 and Bartlett's Test of Sphericity of $< .001$ supported the factorability of the correlation matrix.

2.2.4. *Locus of Control.*

Locus of control was assessed using Rotter's Internal-External (I-E) Locus of Control Scale (RLOC: Rotter, 1966). The 35-item scale consists of 29 items assessing generalised expectancies for internal versus external control and six additional diversion items. Each item contains two statements, one relating to internal locus of control, and the other to external locus of control and higher scores indicate a greater external locus of control. Internal consistency for the RLOC has been shown to range from .65 to .79 (Rotter, 1966), and a test-retest reliability of .61 has been found over a 26-month period (Lange & Tiggemann, 1981).

2.2.5. *General Self-Control.*

Self-control was measured using the Rosenbaum Self-Control Schedule (SCS: Rosenbaum, 1980), which is a 36-item self-report inventory designed to measure the extent to which cognitive strategies are used to: a) control emotional and physiological responses; b) solve problems; c) delay immediate gratification and; d) to obtain a sense of self-efficacy (Rosenbaum, 1980). Internal consistency estimates of the SCS range from .78 to .81, and test-retest reliability has been found to be .86 over four weeks and .77 over 11 months (Redden, Tucker & Young, 1983; Rosenbaum, 1980). Convergent and divergent validity have been adequately demonstrated for the SCS with various measures (Richards, 1985; Rosenbaum, 1980).

2.2.6. *Self-Control as Self-Esteem.*

‘Self-control as self-esteem’ was measured using the Self-Esteem Based on Excessive Self-control subscale (SC as SE) of the Mizes Anorectic Cognitions Scale (MAC: Mizes & Klesges, 1989). The six-item subscale assesses the extent to which strict dietary control determines an individual’s self-esteem. The SC as SE scale has demonstrated an adequate internal consistency of .78 (Mizes & Klesges, 1989). Test-retest reliability has been found to be .78 over a two-month period (Mizes, 1992), and the MAC has shown adequate to high convergent and divergent validity with a range of other associated measures (Mizes, 1992).

3.0 Results

Table 1 presents the means, standard deviations, Cronbach alphas, and bivariate correlations for each of the measures used in the study. A series of hierarchical multiple regression (HMR) analyses were conducted in order to test for the potential moderating effect of BD on the relationship between control and weight restricting behaviour. Specifically, three sets of HMR analyses were performed; one for each dimension of control (i.e. LOC, general self-control, and ‘self-control as self-esteem’). Each of the three sets of analyses

themselves comprised three HMR analyses; one for each of the outcome measures (i.e., dieting, exercise, and purging). Thus, a total of nine HMR analyses were conducted. For each of the nine analyses, socioeconomic status and BMI were entered on the first step as control variables. On the second step, BD and the particular control measure under investigation were entered. Scores for these variables were centered around their means and following the guidelines of Aiken and West (2000), interaction terms were calculated using the product of the mean centered BD and control measure variables. The interaction between BD and the particular measure of control was then entered into the regression equation at step 3. Table 2 outlines the beta values, *t*-values, significance levels, and semi-partial correlations (sr^2) for each HMR analysis. For the sake of brevity, and because neither BMI nor SES were significant predictors in any of the analyses, the statistics for BMI and SES are not presented in Table 2.

Insert Tables 1 & 2 about here

3.1. Locus of Control.

As is evident from Table 2, BD was not found to moderate the relationship between LOC and any of the weight restricting behaviours. Instead, BD was found to be a significant, unique predictor of dieting, exercise and purging. Furthermore, LOC was found to be a significant unique predictor of dieting and exercise such that lower levels of external LOC (i.e., greater levels of internal LOC) were associated with higher levels of dieting and exercise. LOC was found to be unrelated to purging.

3.2. General Self-Control.

As can be seen in Table 2, significant interactions between general self-control and BD were found for both purging and dieting. Subsequent simple slopes analyses

demonstrated that the relationship between general self-control and purging was significant at high ($t=-3.28, p=.001$) but not low ($t=1.20, p=.231$) levels of BD. As predicted, when BD was high, lower general self-control was associated with greater purging behaviour and at low levels of BD, general self-control and purging were unrelated. In contrast to what was predicted, it was found that the relationship between general self-control and dieting was significant at low ($t=3.69, p=.000$) but not high ($t=-0.53, p=.596$) levels of BD. When BD was low, greater general self-control led to greater dieting behaviour. When BD was high, general self-control was not related to dieting. These relationships are illustrated graphically in Figures 1 and 2. BD was found to be a significant unique predictor of dieting, exercise and purging, and general self-control was a significant unique predictor of dieting and exercise, but not purging.

Insert Figures 1 & 2 about here

3.3. Self-Control as Self-Esteem.

As is evident from Table 2, the results for ‘self-control as self-esteem’ largely supported the hypotheses. For dieting, exercise and purging, the interaction term was significant, ‘self-control as self-esteem’ was found to be a significant unique predictor, and BD was not found to be a unique significant predictor. Subsequent simple slopes analyses revealed that the relationship between ‘self-control as self-esteem’ and purging was significant at high ($t=3.49, p=.001$) but not low ($t=0.53, p=.600$) levels of BD. When BD was high, higher ‘self-control as self-esteem’ was associated with higher levels of purging behaviour. However, when BD was low, ‘self-control as self-esteem’ and purging were unrelated. For dieting, it was found that the relationship between ‘self-control as self-esteem’ and dieting was significant and positive at both high ($t=8.12, p=.000$) and low ($t=6.87,$

$p=.000$) levels of BD. Similarly, for exercise, it was found that the relationship between ‘self-control as self-esteem’ and exercise was significant at both high ($t=6.79$, $p=.000$) and low ($t=5.85$, $p=.000$) levels of BD. Figures 3, 4 and 5 illustrate these relationships graphically.

 Insert Figures 3, 4 & 5 about here

4.0 Discussion

The aim of the present study was to examine whether body dissatisfaction (BD) moderated the relationship between three different conceptualisations of control (locus of control (LOC), general self-control, and ‘self-control as self-esteem’) and the weight restricting and control behaviours (WRCBs) of dieting, exercise and purging. The results for each conceptualisation of control will now be discussed in turn.

It was first hypothesised that when BD was high, those with a more internal LOC (and therefore a lower external LOC) would engage in more dieting, exercise and purging behaviours, and that when BD was low, the relationship between LOC and weight restriction would be weaker or non-existent. The results for LOC partially supported the hypotheses. BD was not found to moderate the relationship between LOC and any of the measures of weight restriction. However, higher internal LOC was found to be associated with higher levels of dieting and exercise (although it was not related at all to purging). The results for LOC are in opposition to the supposition of Fouts and Vaughan (Fouts & Vaughan, 2002) who argued that an external LOC might lead to greater internalisation of the thin ideal, which in turn might lead to greater BD and a tendency to engage in higher levels of WRCBs. However, they are in accordance with a number of studies that have found an association between internal LOC and various forms of weight control (e.g., Nir & Neumann, 1995; Saltzer, 1982; Saturnino et al., 1994; Speake et al., 1991). It would seem therefore, that in this sample,

greater internality was linked with assuming a sense of personal control over one's weight, and more specifically in the engagement of dieting and exercise.

The second set of hypotheses predicted that when BD was high, women with higher levels of general self-control would engage in more dieting and exercise behaviours, and fewer purging behaviours. When BD was low, the relationships between general self-control and weight restriction practices were predicted to be weaker or non-existent. The results supported the hypothesis for purging, but not for dieting or exercise. As predicted, when BD was high, higher levels of general self-control were associated with lower levels of purging and when BD was low, general self-control was unrelated to purging behaviour. This suggests that as predicted, if a woman's BD is high and she has a lack of general self-control, she is more likely to engage in binge eating and then attempt to compensate by purging.

In contrast to what was predicted for dieting, when BD was *low*, higher levels of general self-control were associated with higher levels of dieting and when BD was high, general self-control was unrelated to dieting. As Figure 2 illustrates, it would seem that when BD is high, women will diet regardless of how much general self-control they have. The overwhelming influence of BD seems to dilute any effect of general level of self-control. However, when women are satisfied with their body, the degree to which they diet may be more strongly linked to their level of general self-control. The results for exercise were different again. BD was not found to moderate the relationship between self-control and exercise. Instead, both BD and general self-control were found to be significant unique predictors. Thus, it would seem that the higher a woman's level of general self-control, the more she is likely to exercise, regardless of her level of BD. This finding is consistent with previous research suggesting that those with higher self-control are better able to maintain an exercise regime (Goodrick, 2000).

The third and final set of hypotheses predicted that women with higher levels of 'self-control as self-esteem' would engage in higher levels of dieting, exercise and purging at both low and high levels of BD. The results generally supported the hypotheses. It was found that, as predicted, the relationships between 'self-control as self-esteem' and both dieting and exercise were positive and significant at both high and low levels of BD. For purging, it was found that there was a significant and positive relationship between 'self-control as self-esteem' when BD was high, but not when BD was low. What is perhaps the most striking finding from this study, concerns the highly significant direct effects of 'self-control as self-esteem' on all measures of weight restriction. Indeed, it would seem that 'self-control as self-esteem' was considerably more important to weight restriction than the ever-so-well researched predictor of BD. 'Self-control as self-esteem' should therefore be targeted in prevention and treatment strategies. Specifically, therapists should be looking towards increasing the areas in which girls' self-esteem is dependent, such that self-esteem levels are not tied exclusively to the realm of self-control over food. Empirical investigation of the usefulness of these approaches in the treatment and prevention of high-level weight restriction would also contribute to important and exciting future research.

There were a number of weaknesses associated with this study that require acknowledgement. The cross-sectional design of the study did not allow for temporal associations to be determined and therefore future research should employ longitudinal designs. The study was conducted with a relatively small community sample of young women, and therefore future research should replicate this study with clinical samples and samples of different ages. Finally, limitations associated with the measures used in this study include the use of an author-developed questionnaire that has not yet been subjected to rigorous psychometric evaluation, the omission of a binge-eating questionnaire, and the inclusion of an older version of the Mizes Anorectic Cognitions Scale. Despite the limitations

of the current study however, the findings extend beyond past research by offering insight into the role that different types of control may play in different forms of weight restriction practices.

References

- Aiken, L. S. & West, S. G. (2000). Multiple regression. *Encyclopedia of psychology*. Washington, DC: American Psychological Association.
- Australian Bureau of Statistics (2006). *Australian and New Zealand Standard Classification of Occupations (ANZSCO)*. 1st ed. Retrieved July 2nd, 2008, from <http://www.abs.gov.au>.
- Brewerton, T. D., Stelfox, E. J., Hibbs, N., Hodges, E. L. & Cochrane, C. E. (1995). Comparison of eating disorder patients with and without compulsive exercising. *International Journal of Eating Disorders*, 17, 413-416. doi: 10.1002/1098-108x(199505)17:4<413::aid-eat2260170414>3.0.co;2-0
- Butow, P., Beumont, P. & Touyz, S. (1993). Cognitive processes in dieting disorders. *International Journal of Eating Disorders*, 14, 319-329. doi: 10.1002/1098-108x(199311)14:3<319::aid-eat2260140310>3.0.co;2-3
- Cachelin, F. M., Striegel-moore, R. & Paget, W. B. (1997). Comparison of women with various levels of dietary restraint on body image, personality, and family environment. *Eating Disorders*, 5, 205-215. doi: 10.1080/10640269708249226
- Carels, R. A., Cacciopaglia, H. M., Douglass, O. M., Rydin, S. & O'Brien, W. H. (2003). The early identification of poor treatment outcome in a women's weight loss program. *Eating Behaviors*, 4, 265-282. doi: 10.1016/s1471-0153(03)00029-1
- Cash, T. F. & Fleming, E. C. (2002). The impact of body image experiences: Development of the body image quality of life inventory. *International Journal of Eating Disorders*, 31, 455-460. doi: 10.1002/eat.10033
- Crowther, J. H., Lilly, R. S., Crawford, P. A. & Shepherd, K. L. (1992). The stability of the eating disorder inventory. *International Journal of Eating Disorders*, 12, 97-101. doi: 10.1002/1098-108x(199207)12:1<97::aid-eat2260120113>3.0.co;2-9

- Fairburn, C. G., Cooper, Z. & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: a “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, 41, 509-528. doi: 10.1016/s0005-7967(02)00088-8
- Fairburn, C. G., Shafran, R. & Cooper, Z. (1999). A cognitive behavioural theory of anorexia nervosa. *Behaviour Research and Therapy*, 37, 1-13. doi: 10.1016/s0005-7967(98)00102-8
- Fekken, G. C., Boland, F. J. & Vanderheyden, D. A. (1988). Critical variables associated with bingeing and bulimia in a university population: A factor analytic study. *International Journal of Eating Disorders*, 7, 321-329. doi: 10.1002/1098-108x(198805)7:3<321::aid-eat2260070303>3.0.co;2-h
- Fouts, G. & Vaughan, K. (2002). Locus of control, television viewing, and eating disorder symptomatology in young females. *Journal of Adolescence*, 25, 307-311. doi: 10.1006/jado.2002.0472
- Garner, D. M. (1991). *Eating disorder inventory-2: Professional Manual*. Odessa: Psychological Assessment Resources.
- Garner, D. M. & Bemis, K. M. (1982). A cognitive-behavioral approach to anorexia nervosa. *Cognitive Therapy and Research*, 6, 123-150. doi: 10.1007/bf01183887
- Garner, D. M., Garfinkel, P., Stancer, H. & Moldofsky, H. (1976). Body image disturbances in anorexia nervosa and obesity. *Psychosomatic Medicine*, 38, 327-336.
- Gerrits, J. H., O'Hara, R. E., Piko, B. F., Gibbons, F. X., de Ridder, D. T. D., Keresztes, N., Kamble, S.V., de Wit, J. B. F. (2010). Self-control, diet concerns and eater prototypes influence fatty foods consumption of adolescents in three countries. *Health Education Research*, 25, 1031-1041. doi: 10.1093/her/cyq055
- Goodrick, G. K. (2000). Inability to control eating: Addiction to food or normal response to abnormal environment? *Drugs & Society*, 15, 123-140. doi: 10.1300/J023v15n01_07

- Grogan, S. (2008). *Body image: Understanding Body Dissatisfaction in Men, Women and Children*. NY: Routledge.
- Homan, K. (2010). Athletic-ideal and thin-ideal internalization as prospective predictors of body dissatisfaction, dieting, and compulsive exercise. *Body Image*, 7, 240-245. doi: 10.1016/j.bodyim.2010.02.004
- Hood, J., Moore, T. & Garner, D. M. (1982). Locus of control as a measure of ineffectiveness in anorexia nervosa. *Journal of Consulting and Clinical Psychology*, 50, 3-13. doi: 10.1037/0022-006X.50.1.3
- Horesh, N., Zalsman, G. & Apter, A. (2000). Internalized anger, self-control, and mastery experience in inpatient anorexic adolescents. *Journal of Psychosomatic Research*, 49, 247-253. doi: 10.1016/S0022-3999(00)00174-4
- Hsu, L. K. G. (1996). Epidemiology of the eating disorders. *Psychiatric Clinics of North America*, 19, 681-700. doi: 10.1016/S0193-953X(05)70375-0
- Iannos, M. & Tiggemann, M. (1997). Personality of the excessive exerciser. *Personality and Individual Differences*, 22, 775-778. doi: 10.1016/S0191-8869(96)00254-1
- Junger, M. & van Kampen, M. (2010). Cognitive ability and self-control in relation to dietary habits, physical activity and bodyweight in adolescents. *International Journal of Behavioral Nutrition and Physical Activity*, 7, 1-12. doi: 10.1186/1479-5868-7-22
- Lange, R. V. & Tiggemann, M. (1981). Dimensionality and Reliability of the Rotter I-E Locus of Control Scale. *Journal of Personality Assessment*, 45, 398-406. doi: 10.1207/s15327752jpa4504_9
- Mills, J. K. (1994). Interpersonal Dependency Correlates and Locus of Control Orientation Among Obese Adults in Outpatient Treatment for Obesity. *The Journal of Psychology*, 128, 667-674. doi: 10.1080/00223980.1994.9921295

- Mizes, S., J. (1992). Validity of the mizes anorectic cognitions scale: A comparison between anorectics, bulimics, and psychiatric controls. *Addictive Behaviors, 17*, 283-289. doi: 10.1016/0306-4603(92)90033-r
- Mizes, S., J. & Klesges, R. C. (1989). Validity, reliability, and factor structure of the anorectic cognitions questionnaire. *Addictive Behaviors, 14*, 589-594. doi: 10.1016/0306-4603(89)90081-6
- National Center for Health Statistics & National Center for Chronic Disease and Health Promotion. (2011). Obesity: Halting the epidemic by making health easier, from <http://www.cdc.gov/chronicdisease/index.htm>
- Nir, Z., & Neumann L. (1995). Relationship among self-esteem, internal-external locus of control, and weight change after participation in a weight reduction program. *Journal of Clinical Psychology, 51*, 482-490.
- Peñas-Lledó, E., Vaz Leal, F. J. & Waller, G. (2002). Excessive exercise in anorexia nervosa and bulimia nervosa: Relation to eating characteristics and general psychopathology. *International Journal of Eating Disorders, 31*, 370-375. doi: 10.1002/eat.10042
- Rathner, G. & Rumpold, G. (1994). Convergent validity of the eating disorder inventory and the anorexia nervosa inventory for self-rating in an Austrian nonclinical population. *The International journal of eating disorders, 16*, 381-393.
- Redden, E. M., Tucker, R., K. & Young, L. (1983). Psychometric properties of the Rosenbaum schedule for assessing self-control. *The Psychological Record, 33*, 77-86.
- Richards, S., P. (1985). Construct validation of the Self-Control Schedule. *Journal of Research in Personality, 19*, 208-218. doi: 10.1016/0092-6566(85)90029-7
- Rosenbaum, M. (1980). A schedule for assessing self-control behaviors: Preliminary findings. *Behavior Therapy, 11*, 109-121. doi: 10.1016/s0005-7894(80)80040-2

- Rost, W., Neuhaus, M. & Florin, I. (1982). Bulimia nervosa: Sex role attitude, sex role behavior, and sex role related locus of control in bulimarexic women. *Journal of Psychosomatic Research*, 26, 403-408. doi: 10.1016/0022-3999(82)90014-9
- Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, 80, 1-28. doi: 10.1037/h0092976
- Saltzer, E.B. (1982). The Weight Locus of Control (WLOC) Scale: A specific measure for obesity research. *Journal of Personality Assessment*, 46, 620-628.
- Saturnino-Springer, N., Bogue, E.L., Arnold, M.L., Yankou, D., Oakley, D. (1994). Nutrition locus of control and dietary behaviors of pregnant women. *Applied Nursing Research*, 71, 28-31.
- Sing Lee, Y. Y., Chan, L., Kwok, K. & Hsu, L. K. G. (2005). Relationship between control and the intermediate term outcome of anorexia nervosa in Hong Kong. *Australian and New Zealand Journal of Psychiatry*, 39, 141-145. doi: 10.1111/j.1440-1614.2005.01535.x
- Slade, P. (1982). Towards a functional analysis of anorexia nervosa and bulimia nervosa. *British Journal of Clinical Psychology*, 21(3), 167-179. doi: 10.1111/j.2044-8260.1982.tb00549.x
- Speake, D.L., Cowart, M.E., Stephens, R. (1991). Healthy lifestyle practices of rural and urban elderly. *Health Values*, 15, 45-51.
- Steinhausen, H.-C., Neumärker, K.-J., Vollrath, M., Dudeck, U. & Neuma'rker, U. (1992). A transcultural comparison of the eating disorder inventory in former east and West Berlin. *International Journal of Eating Disorders*, 12, 407-416. doi: 10.1002/1098-108x(199212)12:4<407::aid-eat2260120408>3.0.co;2-p

- Tiggemann, M. (2005). Body dissatisfaction and adolescent self-esteem: Prospective findings. *Body Image*, 2, 129-135. doi: 10.1016/j.bodyim.2005.03.006
- Tiggemann, M. & Raven, M. (1998). Dimensions of control in bulimia and anorexia nervosa: Internal control, desire for control, or fear of losing self-control? *Eating Disorders*, 6, 65-71. doi: 10.1080/10640269808249248
- Tylka, T. & Subich, L. (1999). Exploring the construct validity of the eating disorder continuum. *Journal of Counseling Psychology*, 46, 268-276. doi: 10.1037/0022-0167.46.2.268
- United States Department of Health and Human Services, U. (2000). Physical activity and fitness Retrieved August 8, 2000, from <http://www.health.gov/healthypeople/document>
- Wear, R. W. & Pratz, O. (1987). Test-retest reliability for the eating disorder inventory. *International Journal of Eating Disorders*, 6, 767-769. doi: 10.1002/1098-108x(198711)6:6<767::aid-eat2260060611>3.0.co;2-v
- Williams, G.-J., Chamove, A. S. & Millar, H. R. (1990). Eating disorders, perceived control, assertiveness and hostility. *British Journal of Clinical Psychology*, 29, 327-335. doi: 10.1111/j.2044-8260.1990.tb00889.x
- Williams, G.-J., Power, K. G., Millar, H. R., Freeman, C. P., Yellowlees, A., Dowds, T., . . . Jackson, M. A. (1993). Comparison of eating disorders and other dietary/weight groups on measures of perceived control, assertiveness, self-esteem, and self-directed hostility. *International Journal of Eating Disorders*, 14, 27-32. doi: 10.1002/1098-108x(199307)14:1<27::aid-eat2260140104>3.0.co;2-f
- Wiseman, C. V., Gray, J. J., Mosimann, J. E. & Ahrens, A. H. (1992). Cultural expectations of thinness in women: An update. *International Journal of Eating Disorders*, 11, 85-89. doi: 10.1002/1098-108x(199201)11:1<85::aid-eat2260110112>3.0.co;2-t

WEIGHT RESTRICTION / CONTROL QUESTIONNAIRE

For each item, circle whether you engage in the behaviour always (5), very often (4), often (3), sometimes (2), rarely (1) or never (0).

	Always	Very Often	Often	Sometimes	Rarely	Never
1. Do you exercise for longer periods of time than you originally intended in order to restrict / control your weight?	5	4	3	2	1	0
2. Do you fast (not eat) for one day or more in order to restrict / control your weight?	5	4	3	2	1	0
3. Do you intentionally make yourself vomit after eating in order to restrict / control your weight?	5	4	3	2	1	0
4. Do you exercise for more than two hours at a time in order to restrict / control your weight?	5	4	3	2	1	0
5. Do you do more than one type of exercise per day in order to restrict / control your weight?	5	4	3	2	1	0
6. Do you avoid foods high in sugar in order to restrict / control your weight?	5	4	3	2	1	0
7. If you have overeaten, do you take diuretics in order to restrict / control your weight?	5	4	3	2	1	0
8. Do you decline social invitations if they are going to conflict with your exercise schedule?	5	4	3	2	1	0
9. Do you try to limit the amount of calories / kilojoules you consume in a day in order to restrict / control your weight?	5	4	3	2	1	0
10. Do you exercise frequently, vigorously, or for long periods of time in order to restrict / control your weight?	5	4	3	2	1	0
11. Do you avoid junk food in order to restrict / control your weight?	5	4	3	2	1	0
12. If you have overeaten, do you take laxatives in order to make up for it?	5	4	3	2	1	0
13. Do you play multiple sports in order to restrict / control your weight?	5	4	3	2	1	0

	Always	Very Often	Often	Sometimes	Rarely	Never
14. Do you avoid fast food in order to restrict / control your weight?	5	4	3	2	1	0
15. Do you engage in exercise five or more times per week in order to restrict / control your weight?	5	4	3	2	1	0
16. Do you restrict the amount of carbohydrates in your diet in order to restrict / control your weight?	5	4	3	2	1	0
17. If you have overeaten, do you take diet pills in order to make up for it?	5	4	3	2	1	0
18. Do you miss occupational or educational activities if they interfere with your exercise regime?	5	4	3	2	1	0
19. Do you avoid snacking between meals in order to restrict / control your weight?	5	4	3	2	1	0
20. Do you exercise despite being ill because you are concerned that you might gain weight if you miss exercise sessions?	5	4	3	2	1	0
21. Do you maintain your exercise schedule even when it is inconvenient because you are concerned about weight gain?	5	4	3	2	1	0
22. Does your main food intake consist of diet foods so that your weight is restricted and / or controlled?	5	4	3	2	1	0
23. Do you make yourself vomit after overeating in order to restrict / control your weight?	5	4	3	2	1	0
24. Do you avoid foods high in fat in order to restrict / control your weight?	5	4	3	2	1	0
25. Do you follow a set weekly exercise routine in order to restrict / control your weight?	5	4	3	2	1	0
26. Do you count the number of calories / kilojoules / points you consume in order to restrict / control your weight?	5	4	3	2	1	0
27. Do you exercise despite being injured because you are concerned that you might gain weight if you miss exercise sessions?	5	4	3	2	1	0
28. If you feel that you have overeaten, do you then eat less than you usually would to make up for it?	5	4	3	2	1	0

	Always	Very Often	Often	Sometimes	Rarely	Never
29. Do you take diet pills in order to restrict / control your weight?	5	4	3	2	1	0
30. In order to restrict / control your weight, do you deliberately eat less than you actually want to eat?	5	4	3	2	1	0
31. Do you exercise vigorously, frequently or for long periods of time in order to burn calories?	5	4	3	2	1	0
32. Do you take smaller helpings or leave food on your plate at mealtimes in order to restrict / control your weight?	5	4	3	2	1	0
33. Do you take diuretics in order to restrict / control your weight?	5	4	3	2	1	0
34. Do you exercise to the point of exhaustion in order to restrict / control your weight?	5	4	3	2	1	0
35. If you have overeaten, do you exercise in order to make up for it?	5	4	3	2	1	0
36. Do you skip one or more meals per day in order to restrict / control your weight?	5	4	3	2	1	0
37. Do you maintain your exercise schedule even when you are away on holidays because you are concerned about weight gain?	5	4	3	2	1	0
38. Do you take laxatives in order to restrict / control your weight?	5	4	3	2	1	0
39. If you miss an exercise session for some reason, do you attempt to make that session up at some point because you are worried about weight gain?	5	4	3	2	1	0