THE FUNCTIONAL EFFECTS

OF

DIETARY RESTRAINT

Thesis submitted to the University of Strathclyde for the degree of Doctor of Philosophy, October 1993.

Renée Bleau
Department of Psychology
University of Strathclyde
Glasgow G1

I would like to take this opportunity to acknowledge the help and support of my supervisor, Professor John Davies and also to thank Dr Bill Cheyne, University of Strathclyde and Dr Euan McArthur, University of Paisley for their statistical advice, and Ms Karen Dunleavy, University of Paisley, for her assistance with software and technical issues.

I gratefully acknowledge financial support from the ESRC in the form of my doctoral scholarship.

For my mother

ABSTRACT

Restraint theory was originally developed to explain differences in eating behaviour between normal-weight and obese individuals. It represented a development from explanations based on obesity *per se*, and instead proposed the activity of dieting as the causal predictor of eating behaviour. Research has demonstrated that highly restrained individuals are more likely than unrestrained individuals to overeat under certain disinhibiting circumstances. The present thesis aims to investigate some of the functional effects of dietary restraint. Chapter 2 evaluates two different rationales for short-term starvation and the interpretation of the results in terms of the relative importance of the internal versus external cues suggests that external cues are very important in determining (over)eating behaviour. Chapter 3 assesses the functional role of restraint in the adolescent population and provides evidence of a restraint x disinhibitor (anxiety) interaction. Restraint is therefore functional in predicting eating behaviour even in the young adolescent population. Chapter 4 evaluates the role of imagining eating food as a potential disinhibitor and results provide an insight into the determination of highly restrained individuals when faced with a situation where it is possible to maintain high levels of restraint, and I have termed this phenomenon "super-inhibition". Chapter 5 psychometrically assesses the various techniques of measuring restraint and results provide clear evidence for the use of the Restraint Scale for identifying chronic dieters. The results of this thesis are analysed in terms of current Restraint Theory, and implications for further research are discussed.

Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1 - INTRODUCTION

It was proposed originally in the 1960s that differences between obese persons and normal-weight individuals lay in variations in the eating patterns of the two groups. Schachter (1971; 1968) advanced his internal-external theory of obesity and for many years this was the received explanation for these differences. Schachter's suggestion was to divide determinants of eating into two broad sets of controlling stimuli: internal, that is to say, physiological components such as gastric contractions and circulatory and hypothalamic influences; and external, that is to say, aspects of the environment which are processed cognitively and perceptually. At that time research focused on exploring the influences of each of these types of stimuli and how they operated, independently and interactively, in the initiation and termination of eating behaviour. Schachter contended that the obese were overly responsive to external cues for eating and suffered a lack of responsiveness to internal cues for satiety. His later modification was that, external cues in order that they were effective determinants of behaviour for the obese, had to be both salient and compelling i.e. a stimulus with high intensity.

However, although a substantial amount of research was

carried out in the 70s testing Schachter's theory, the results of the studies performed remained equivocal. While some studies found predicted obese-normal differences (Schachter & Rodin, 1974) with respect to responses to internal and external cues, others did not (Wooley, 1972). These inconsistencies were difficult to reconcile for several reasons.

Firstly, some complications arose concerning definitions of and differentiations between internal and external cues. Obviously, this was a crucial element as far as predictions pertaining to behaviour were involved. Palatability was a determinant of eating which was particularly problematic. Initially this factor was conceived of as an external cue, and the finding that palatability functionally predicted eating behaviour of the obese better than that of normal-weight subjects was taken to be supportive of Schachter's theory. However, it was later pointed out by Spitzer and Rodin, (1981) that perceptions of palatability were influenced not only by properties of the food *per se*, but also the internal state of the subject (current degree of satiety or hunger), thus the categorisation of palatability does not seem clear cut. Agreement over the internal-external classification of cues is very important in the interpretation of results and for the support or discrediting of theories of obese-normal

differences in eating behaviour.

Another difficulty has concerned the intensity aspect of the external cue stimulus. A method of testing Schachter's theory was to manipulate in some way the intensity of the external cue. A rational way to vary the intensity of the stimulus would be to vary some measurable aspect of the stimulus for example the concentration of sucrose in the taste solution. Unfortunately, however rather than use an independent criterion to measure differences in intensity of the independent variable, instead measures were inferred often from subjects' reactions to external cues, thus relying on internal interpretations of the stimulus (Rodin, 1981).

Thus, such difficulties have resulted in the conclusion that there was a lack of evident differences between the obese and normal-weight individuals' eating patterns and the internal-external dichotomy was over-simplistic as an account to explain processes which underlie eating behaviour (Rodin, 1981; Spitzer, et al., 1981).

Another theory of obesity developed by a protégé of Schachter's was proposed by Nisbett (1972). Nisbett submitted that everyone has an individual "set-point" for weight level which was homeostatically defended and

that obese people have higher set-points than normals. Nisbett proposed that, because of cultural and societal pressures in the West, people would endeavour to get below their set-points and conform to the slim ideal. One of the many consequences of dieting to below one's set-point would be an increased level of "externality", that is to say, a greater likelihood of responding to external cues in the environment. Nisbett, further proposed, succeeding Hirsch and Knittle (1970) that obese individuals had an abundance of fat cells which determined their set-point, and the number of fat cells was determined by genetic inheritance and also conceivably by overeating during childhood and adolescence.

According to Nisbett's theory, the behaviour of the obese individual is predictable in the extent to which weight suppression has been achieved. However, discovering who is weight suppressed and who is not would appear to be an impossible feat. While it was assumed in the initial testing of Nisbett's predictions, that overweight people are below set point and normal weight people are at set-point, this assumption is clearly untenable. Clearly some normal weight people could be normal weight as result of dieting rather than as a function of being at set-point. Similarly, some obese individuals might be more heavy, were they not

dieting, and so on. Thus, while it seemed a plausible explanation for behavioural differences in eating behaviour, the concept of set-point *per se* was a difficult one to test.

A key feature of Nisbett's theorising, that of weight suppression, however was to lead to the genesis of a new line of research. The role of dieting or reducing weight was given new status and much attention, and level of restraint was proposed as a major determinant of eating behaviour.

1.1 Restraint Theory

Another of Schachter's students, Peter Herman with co-author Deborah Mack published the seminal study on restraint in the mid-70s (Herman & Mack, 1975). They used an experimental paradigm to investigate dieter-nondieter differences in incidental eating behaviour. The classic study involved the use of preloads and a disguised taste-test to measure eating. The aim of the study was to test the hypothesis that normal weight females, differing in levels of restraint would differ in their reaction to the "experimental removal of restraint" (1975, p.649). Those who were restrained, and they argued sub-set-point, should eat more when salient palatable food cues were externally

prominent if the chronic restraints were eliminated. Those who were not restrained and they argued at or near set-point should eat according to internal regulation.

In the experimental procedure, the subjects were required to consume 0,1, or 2 milkshakes as a preliminary tasting and then to sample icecream (the real behaviour of interest). The preload manipulation of the milkshakes was based on the rationale that subjects who were in the 2 milkshake condition would be in the situation of having exceeded their daily calorific consumption and thus highly restrained individuals might be expected to have had their restraint disrupted; such restrained subjects in the 0 milkshake condition however would remain in a "diet-intact" state. Thus restrainers in the 2-milkshake condition were expected to consume more icecream in the disguised taste test than restrainers in the 0-milkshake condition. Non-restrainers were expected to do the reverse. Levels of restraint were assessed by a simple questionnaire and subjects were categorised as high or low restrainers based on a median-split of the scores. Results demonstrated a preload X restraint interaction, with high restrainers eating less in the no milkshake condition and more in the 2-milkshake condition, and low restrainers eat less in the 2-milkshake condition and eating most in the

0-milkshake condition. In this study, approximately 25% of the subjects were obese, and it was found that restraint rather than overweight was functional in predicting eating behaviour.

Since this original article the construct of restraint has been embellished and hypotheses concerning eating behaviour have been developed by Herman and Polivy and their colleagues. Hibscher and Herman, 1977, proposed that "obese characteristics" such as externality were linked directly to conscious restraint rather than obesity, *per se* (as suggested by Schachter) or deprivation (as advanced by Nisbett).

The main hypothesis concerning restraint is that when the restraint which characterises dieters is broken then overeating will ensue. This disinhibition hypothesis has been tested for almost two decades now, investigating different types of disinhibitor: certain cognitions, preloads, alcohol and strong emotional states such as anxiety or depression. More recently an imagination procedure has been used which involves simply imagining eating food and some evidence exists that this procedure produces disinhibition in highly restrained individuals (Hill, Rogers & Blundell, 1989; Rogers & Hill, 1989).

1.2 The Boundary Model

Herman and Polivy, (1984), in their work theorising on restraint research consolidated their hypotheses into a "boundary" model which would explain the regulation of eating for different types of individual. The basic model is presented in figure 1.1:

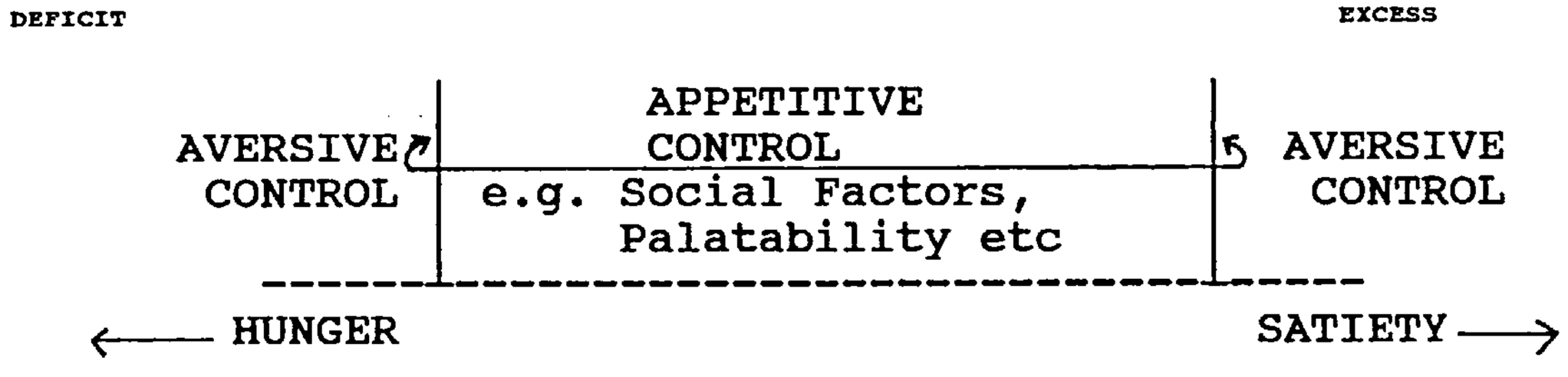

Figure 1.1 The Basic Boundary Model

The defining feature of their model is that eating is regulated within BOUNDARIES rather than at a point. Essentially, they propose that biological pressures work to keep regulation within a certain range. Aversive controls operate, at one end to maintain consumption above a minimum level, and at the other end to maintain consumption below a maximum level. In the central zone, posited a zone of biological indifference, psychological factors will have the greatest impact on the control of eating behaviour. Different types of individual are characterised by differential positioning of their boundaries and some types of individual have an extra

boundary which they work within, a "diet" boundary. For the dieter, once the diet boundary is transgressed, she may eat to satiety. It is to be noted that for the dieter, her hunger and satiety boundaries are spaced further apart than those of the normal eater. Thus the boundary model has been proposed to account for the eating patterns of binge eaters and anorexics as well as those of normals, dieters and disinhibited dieters. For comparison of different types of eaters, see figure 1.2. which delineates a comparison of the various types.

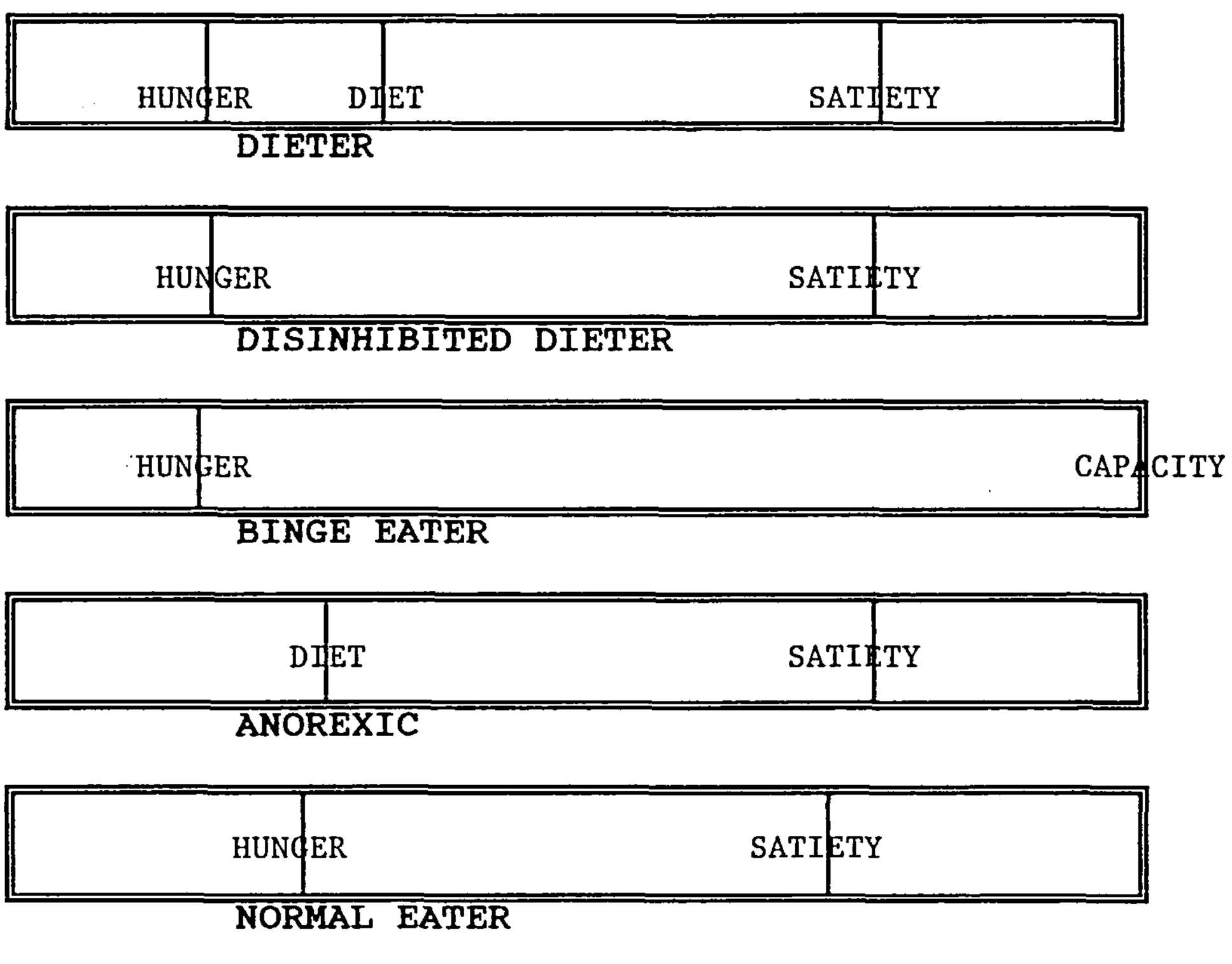

Figure 1.2 Comparison of various types of eaters

While dieters stop eating when they reach the satiety

boundary, binge eaters are able to go beyond satiety to the point of physical capacity. For the anorexic, on the other hand it is not the satiety boundary which is irrelevant but the hunger boundary. Anorexics are able to tolerate non-consumption well below the normal hunger boundary which operates for most other people, and anorexics rarely consume beyond their diet boundary.

1.3 The role of internal versus external cues

An assumption of the boundary model pertinent to dieters is that given their zone of biological indifference is wider, then dieters will show a decreased sensitivity to internal cues and an increased sensitivity to external cues. This line of reasoning is consistent with differences in eating behaviour originally suggested by Schachter (for obese individuals), and then by Nisbett (for weight suppressors). The importance of internal cues was investigated in a series of studies by Wooley and Wooley and their colleagues (Wooley, Wooley & Woods, 1975; Wooley, 1972; Wooley, Wooley & Dunham, 1972) and they developed a strategy which enabled them to assess the independent contribution of internal factors by manipulating beliefs concerning caloric loads. They demonstrated that few people, regardless of weight were

able to display a sensitivity to internal signals of caloric density in the short term. However, Wardle, (1987) using a repeated measures analysis of variance was able to demonstrate a significant responsiveness to internal cues in normal weight women. In addition, Hill (1987) has demonstrated that while in the short-term individuals show no differences in motivational ratings to eat after having had either a high- (435 kcal) or low-calorie (260 kcal) meal, after one hour significantly higher hunger ratings were correlated with the low calorie condition and after 3 hours nearly all measures showed significant differences between the meals. This provides clear evidence for an ability to discern internal physiological cues of hunger and satiety. However, perhaps the most important issue is not sensitivity to internal cues *per se*, but whether or not the registering such signals will be predictive of behaviour.

Ogden and Wardle, (1990) using a methodology developed by Wardle, (1987) independently manipulated internal (actual caloric content of drink) and external (believed caloric content of drink) cues and tracked hunger and satiety over time. Their results demonstrated that all subjects, i.e. both low and high restrainers were sensitive to variation in internal cues as indicated by reports of hunger and fullness. However, as predicted

by restraint theory restrained eaters showed greater sensitivity to the manipulation of external cues in that they reported less hunger if they believed that the drink was high in calories and more hunger if they believed that the drink was low in calories. The results of this study also failed to demonstrate the usual restraint X preload effect, however perhaps this is not too surprising given that the preload in this study was a presumably fairly unappetising orange drink and did not have the qualities usually associated with the preload normally required to produce disinhibition (high palatability).

Herman and his colleagues (Heatherton, Polivy & Herman, 1989) have tested their prediction of reduced internal responsiveness in dieters using a placebo manipulation. Restrainers and unrestrained subjects were given a "vitamin" prior to an *ad-lib* taste test; subjects were either given no information about the pill or told that in previous circumstances the pill had made individuals either feel full or hungry. Results from two separate studies reported in the publication indicated that as predicted, restrainers behaved in accordance with the external cues, eating more when given the hungry message ("Probably the only thing people ever mention is that the vitamin gives them an empty sensation in their stomach, as if they hadn't eaten for a while") than when

given the full message ("Probably the only thing people ever mention is that the vitamin gives them a full sensation in their stomach, as if they just eaten").

It has been suggested that (Ogden, 1990) restrainers are sensitive not only to external cues but also, contrary to restraint theory's predictions, to internal cues and that depending on the particular situation one set of cues might be more salient than others.

One of the aims of this thesis is to test the relative importance in predicting eating behaviour of internal cues and external cues. The prediction of restraint theory would be that even in the presence of extremely potent internal cues, for those individuals who are concerned to limit caloric intake, it would be the external cues which would remain paramount. This hypothesis is tested in a study reported in Chapter Two.

1.4 The Disinhibition Hypothesis

1.41 Restraint and Negative Affect

Restraint theory predicts that for restrained eaters the diet boundary can be broken by negative affect, and so when the diet boundary is no longer effective, then overeating may ensue. Herman and Polivy, (1984) suggest that the effect of stress on dieters is that a

more important consideration has become the priority factor, that is to say, how to deal with the emotional upheaval and this takes precedence in the short-term over dieting considerations. In their original study investigating negative affect, Herman and Polivy (1975) used an experimental paradigm which manipulated levels of anxiety following Schachter et al's procedure (Schachter, et al., 1968). Subjects were introduced to the study as being one which would investigate how one sort of sensation affects another. Subjects in the experimental condition were told to expect "a fairly painful shock", (p.668, 1975) whereas in the control condition, subjects were told that "only the mildest possible tactile stimulation is required" (p.668, 1975). The anxiety manipulation was successful and results showed as predicted a significant anxiety X restraint interaction, with low restrainers eating less icecream in the taste test in the high anxiety condition and more in the low anxiety condition and restrained eaters eating less in the low anxiety condition and more in the high anxiety condition.

These results paralleled findings by others who investigated anxiety effects of the obese (McKenna, 1972; Schachter, et al., 1968); when anxious, dieters ate more (like obese subjects) and nondieters ate less (like normal weight-subjects).

Later, Herman, et al, (1987) demonstrated that dieters ate more when anxious, though only when in an initial hungry state. This study demonstrated that only when hungry did the predicted restraint X anxiety interaction occur. The authors explained the results in terms of preloaded subjects being indifferent and thus not affected by anxiety or restraint per se. Using an anxiety manipulation which involved either coming up with some ideas which would be useful in a marketing campaign (low anxiety) or thinking up an advertising jingle which subjects would then have to perform for video (high anxiety), predictions made by restraint theory were upheld.

Wardle and Beales, (1988) carried out an experimental study of the effects of induced anxiety on 3 groups: dieters, exercisers and non-dieting controls as part of a larger study investigating the causal link between restraint and disruption in the control of food-intake. Anxiety was induced in a novel way in this study, by exposing subjects to part of a frightening film, the Shining, Stanley Kubrick, 1980, which they had to watch on their own in a semi-darkened room. The dependent variable was the amount of food (sweets and nuts) they ate from bowls positioned on tables in the room. Food intake in this study was incidental therefore rather than the main focus of interest (as in the taste-test

procedures). Results from this study demonstrated that the dieting group ate significantly more than the other two groups, indeed dieters ate 3 times as much as subjects in the exercise group or non-dieting control group. Unfortunately, the study did not include a dieting non-anxiety group thus it can not be concluded unequivocally that the overeating occurred as a result of the functional release of anxiety or as a result of dieting on its own.

Other studies have looked at depressed or dysphoric mood. Baucom and Aiken, (1981) and Ruderman, (1985) used a failure manipulation technique to induce dysphoric mood. Subjects were invited to take part in a study which included involvement in two experiments, one dealing with problem solving and the other with taste sensitivity. The problem solving task provided a forum for failure/success manipulation and the taste test provided a measure of the dependent variable, amount eaten during a tasting session. The problem solving task procedure involved the experimental group receiving erroneous feedback concerning their performance resulting in "failure" in the task (dysphoric mood), and the control group receiving veridical feedback allowing them "success" in the task (nondysphoric mood). Both studies demonstrated similar results, "depressed" restrainers ate significantly more than those in the

non-depressed condition. Frost et al, (1982) using a mood induction procedure found similarly that depressed restrainers ate twice as much as non-depressed restrainers and depressed low-restrainers ate less than did nondepressed low-restrainers.

The restraint literature indicates therefore that disinhibition occurs as a result of a breaking of normal restraint practices on the part of the chronic dieter and this cognitive change results in a "what the hell effect" (Marlatt & Gordon, 1980) and more food is consumed than would normally be the case.

1.42 Restraint in Adolescence

All of the studies to date which have been carried out to investigate the functional effects of anxiety in highly restrained individuals have focused on the adult population. However for a long time now dieting has been known to be an active pursuit of the adolescent population, with girls more engaged than boys. Wardle and Beales, (1986) carried out a survey of attitudes to food, levels of restraint and body image in children from 12 to 18 years old. Results demonstrated that girls as young as 12 indicated that they suffered from feeling fat and said they would like to weigh less. Clear evidence of disturbed body image was found for the girls, and the authors concluded that a significant

measure of distress over eating and weight was characteristic of these "normal" girls.

Wardle and Marsland, (1990) report on a huge sample of 846 children. Among other things this study indicated that there were high levels of dieting among the girls from the first year (mean age = 11.8 yrs) right through to the seventh year (mean age = 18.0 yrs). Trends indicated that dieting was more common in the older girls. Overall, approximately 40% of the girls were trying to lose weight.

This active dieting and concern about body image would appear to be far from benign. Patton, (1988) in his one-year longitudinal study of 176 fifteen year old girls found that dieting was common in the sample and that for some this represented a precursor to more extreme methods of weight control and concerns about weight which developed over the course of the 12 months. This study gives some support for the view that dieting may be regarded as an aetiological factor in the development of disordered eating. Later Patton, et al, (1990) reported that girls who dieted were eight times more likely than non-dieters to develop an eating disorder.

Only one study to date has reported on the functional

nature of restraint in adolescence. Hill, et al, (1989) using the classic taste test paradigm with biscuits as the dependent variable investigated restraint and treatment effects in a group of 12 and 14 year old girls. No age effects were found, but main effects for restraint and treatment were found. There were no significant interaction effects but perhaps this was due to the experimental procedure, which was to have the subjects imagine they had eaten food. This method for provoking disinhibition was used as it had been demonstrated previously that mere exposure to the sight and smell of palatable food had precipitated the breakdown of dietary restraint (Rogers, et al., 1989).

One of the aims of this thesis is to investigate dieting behaviour in the adolescent population further. In particular, no research has been done on dysphoric mood as a potential disinhibitor of restraint in the adolescent age group. More data are needed concerning the functional nature of restraint in the younger population and indeed if there are changes over time. Hill, et al,(1989) investigated 12 and 14 year old girls. A wider gap in ages might have shown age effects. Chapter 3 reports on a experimental study investigating the effects of induced anxiety in girls aged 13 and 16.

1.43 Imagination as a disinhibitor

In addition, the imagination procedure as a method of disinhibition merits further investigation. It is a recent addition to the group of disinhibitors that are functional in the breakdown of restraint and ensuing counter-regulation. However, very little work to date has been done to replicate the operation of this procedure. Chapter 4 reports on an experimental study exploring the imagination procedure in male and female subjects.

1.5 The Measurement of Restraint

Finally, an area which has become increasingly controversial in the restraint research is the measurement of restraint. As a result of a number of criticisms of the original scale developed by Herman and his colleagues concerning factor structure and its inability to identify high restrainers in the obese population, two other measures have been developed. These are the Dutch Eating Behaviour Questionnaire (Van Strien, Frijters, Bergers & Defares, 1986) and the Three Factor Eating Questionnaire (Stunkard & Messick, 1985). Each purports to measure "pure" restraint.

The original Restraint Scale includes items pertinent to dieting, weight fluctuation and disinhibition. Many of

the criticisms levelled against the scale concern its factor structure. A number of studies have demonstrated a two factor structure - Concern for Dieting and Weight Fluctuation. Some have proposed that therefore the questionnaire is invalid as it does not measure a unitary construct and it is impossible to know which is the primary factor in predicting behaviour. In some studies the Concern for Dieting factor has been demonstrated at the more important factor and in others the Weight Fluctuation factor has been indicated as the critical factor. However it is to be remembered that the purpose of the scale is to identify chronic dieters. Chapter 5 investigates the new scales and the Restraint Scale in a factor analytic study and reports on the criticisms of the original scale.

1.6 Aims of the thesis

The aim of the work described in this thesis (four discrete studies) is to test various predictions made by restraint theory. Using experimental techniques and interview procedures, data are gathered concerning the effects of restraining or being unrestrained. The thesis aims to provide information concerning factors which have been hitherto uninvestigated.

Bibliography - Chapter One

Baucom, D. H., & Aiken, P. A. (1981). Effect of depressed mood on eating among obese and nonobese dieting and nondieting persons. Journal of Personality and Social Psychology, 41, 577-585.

Frost, R. O., Goolkasian, G. A., Ely, R. J., & Blanchard, F. A. (1982). Depression, restraint and eating behaviour. Behavior Research and Therapy, 20, 113-121.

Heatherton, T. F., Polivy, J., & Herman, C. P. (1989). Restraint and internal responsiveness: effects of placebo manipulations of hunger state on eating. Journal of Abnormal Psychology, 98, 89-92.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 43, 647-660.

Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A. J. Stunkard, & E. Elliot (Ed.), Eating and its disorders (pp. 141-156). New York: Raven Press.

Herman, C. P., Polivy, J., Lank, C., & Heatherton, T. F. (1987). Anxiety, hunger and eating behaviour. Journal of Abnormal Psychology, 96, 264-269.

Hill, A. J., Leathwood, P. D., & Blundell, J. E. (1987). Some evidence for short-term caloric compensation in normal weight human subjects: the effects of high-and-low energy meals on hunger, food preference and food intake. Human Nutrition: Applied Nutrition, 41A, 244-257.

Hill, A. J., Rogers, P. J., & Blundell, J. E. (1989). Dietary restraint in young adolescent girls: a functional analysis. British Journal of Clinical Psychology, 28, 165-176.

Hirsch, J., & Knittle, J. (1970). Cellularity of obese and nonobese human adipose tissue. Federation Proceedings, 29, 1516-1521.

Marlatt, G. A., & Gordon, J. R. (1980). Determinants of relapse: implications for the maintenance of behaviour change. In P. O. Davidson, & G. M. Davidson (Ed.), Behavioural Medicine: Changing Lifestyles (pp. 410-452). New York: Brunner/Mazel.

McKenna, R. J. (1972). Some effects of anxiety level and food cues on the eating behavior of obese and normal subjects: a comparison of the Schachterian and Psychosomatic concepts. Journal of Personality and Social Psychology, 22, 331-319.

Nisbett, R. E. (1972). Hunger, Obesity and the ventromedial hypothalamus. Psychological Review, 79, 433-453.

Ogden, J. (1990). Cognitive restraint and the control of eating. PhD, London University.

Ogden, J., & Wardle, J. (1990). Cognitive restraint and sensitivity to cues for hunger and satiety . Physiology and Behavior, 47, 477-481.

Patton, G. C. (1988). The spectrum of eating disorder in adolescence. Journal of Psychosomatic Research, 32, 579-584.

Patton, G. C., Johnson-sabine, E., Wood, K., Manna, A. H., & Wakeling, A. (1990). Abnormal eating attitudes in London schoolgirls - a prospective epidemiological study: outcome at twelve month follow-up. Psychological Medicine, 20, 383-394.

Rodin, J. (1981). Current status of the internal-external hypothesis for obesity: what went wrong. American Psycholgist, 36, 361-372.

Rogers, P. J., & Hill, A. J. (1989). Breakdown of dietary restraint following mere exposure to food stimuli: interrelationships between restraint, hunger, salivation and food intake. Addictive Behaviours, 14, 387-397.

Ruderman, A. J. (1985). Dysphoric mood and overeating: a test of restraint theory's disinhibition hypothesis. Journal of Abnormal Psychology, 94, 78-85.

Schachter, S. (1971). Some extraordinary facts about obese humans and rats. American Psychologist, 26, 129-144.

Schachter, S., Goldman, R., & Gordon, A. (1968). The effects of fear, food deprivation and obesity on eating. Journal of Personality and Social Psychology, 10, 91-97.

Schachter, S., & Rodin, J. (1974). Obese humans and rats. Potomac, M.D.: Erlbaum.

Spitzer, L., & Rodin, J. (1981). Human eating behavior: a critical review of studies in normal weight and

overweight individuals. Appetite, 2, 293-329.

Stunkard, A. J., & Messick, S. (1985). The three factor eating questionnaire to emasure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research, 29, 71-84.

Van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch eating behaviour questionnaire for assessment of restrained, emotional and external eating behaviour. International Journal of Eating Disorders, 5, 295-315.

Wardle, J. (1987). Hunger and satiety: a multidimensional assessment of response to caloric loads. Physiology and Behaviour, 40, 577-582.

Wardle, J., & Beales, S. (1986). Restraint, body image and food attitudes in children from 12 to 18 years. Appetite, 7, 209-217.

Wardle, J., & Beales, S. (1988). Control and loss of control over eating: an experimental investigation. Journal of Abnormal Psychology, 97, 35-40.

Wardle, J., & Marsland, L. (1990). Adolescent concerns about weight and eating; a social-developmental perspective. Journal of Psychosomatic Research, 34,

377-391.

Wooley, O. W., Wooley, S. C., & Woods, W. A. (1975). Effect of calories on appetite for palatable food in obese and non-obese humans. Journal of Comparative Physiological Psychology, 89, 619-625.

Wooley, S. C. (1972). Physiologic versus cognitive factors in short-term food regulation in the obese and non-obese. Journal of Psychosomatic Medicine, 34, 62-68.

Wooley, S. C., Wooley, O. W., & Dunham, R. B. (1972). Can calories be perceived and do they affect hunger in obese and non-obese humans. Journal of Comparative Physiological Psychology, 80, 250-258.

CHAPTER 2 - THE ROLE OF DIFFERING RATIONALES IN THE EXPERIENCE OF SHORT-TERM STARVATION

(A version of this study is to be presented at the British Psychological Society, Scottish Branch: Annual Conference in November, 1993, in Crieff, Scotland).

2.1 INTRODUCTION

Perusal of the literature would suggest that there is a high level of agreement concerning the notion that experiences of hunger (and satiety) play a fundamental role in the control of eating. However, sometimes results seem counter-intuitive. Rogers and Hill (1989) concluded in their study of interrelationships between restraint, hunger, salivation and food intake, that changes in hunger do not seem to directly mediate an increase in food intake.

Ambiguity over the derivation of the experience of hunger exists, also: to what extent is hunger felt as the result of the presence of somatic sensation? Blundell (1979) has indicated that feelings of hunger may relate to sensations within the body, the passage of time since last eaten, the presence of salient cues linked with eating or an explanation for current eating behaviour. It seems that evaluating the subjective experience of hunger is not a simple issue.

It has been suggested that for some people (dieters) cognitive considerations take precedence over everything, including "true hunger" in the control of eating (Herman & Polivy, 1988a).

Preoccupation with food is commonly reported by those attempting to diet e.g.(Herman & Polivy, 1988b; Wardle, 1988; Wegner, Shortt, Blake & Page, 1990). The results from a classic study carried out in the 1950s by Ancel Keys and colleagues (Keys, Brozek, Henschel, Mickelson & Taylor, 1950) showed that severe caloric restriction over a six month period with high weight loss lead to a number of severe psychological sequelae. Notably, subjects became extremely preoccupied with thoughts about food and this among other symptoms manifested fairly early in the study, indicating that they were more a function of psychological restraint rather than physiological deprivation.

A more recent study designed to detect psychological changes during a phase of dietary restriction (Warren & Cooper, 1988) demonstrated significant increases during the diet period of i/ preoccupations with thoughts about food or eating, ii/ feelings of strong urges to eat and iii/ feeling out of control while eating.

Other studies have looked at the role of <u>anticipated</u>

deprivation e.g.(Lowe, 1982; Ruderman, Belzer & Haperin, 1985) with equivocal results, Lowe, 1982 showing that anticipated deprivation lead to an increase in caloric intake and Ruderman, et al, 1985, demonstrating no such main effect.

None of the methodologies used to date however, have attempted to manipulate cognitions with respect to <u>reasons</u> for not eating during periods of restriction. That is to say, to focus on the psychological component of not eating in order to find some insight into the underlying processes of dieting. What is it about dietary restraint which causes preoccupation about food - is it as a result of physiological processes which increase such thoughts, or does the restriction result in a psychological mind-set which yields increased cognitions about food.

Dieting is a deliberate attempt to restrict calo_ic intake and so cognitions are focused on the task of not eating at least for a proportion of waking hours. Thus, by and large, there is nothing incidental about abstinence, while on a diet.

The present study was designed to render normal eaters (female) physiologically equivalent in terms of short-term starvation, but cognitively different with

respect to the rationale for their not eating, with one group focusing on starving and the other not (i.e. perceiving it as incidental) and to assess the experiential differences of these groups.

It was predicted that the group focusing on starvation would report higher levels of hunger at the end of a 24 hour fast and experience more preoccupation with food than the control group, as assessed in a semi-structured interview and a short questionnaire.

2.2 METHOD

2.21 Overview

Female subjects were randomly assigned to the experimental (psychological restraint) condition or the control (incidental restraint) condition. Both groups were required to go without food for 24 hours and therefore were equal in terms of physiological restraint. A semi-structured interview and a Likert scale questionnaire provided data on the level of difficulty of the abstinence task, the level of hunger reported and various food-related cognitions.

2.22 Subjects

Subjects were recruited from a first-year undergraduate

psychology course. At the time of recruitment, subjects were required to complete a screening questionnaire (see Appendix 1) the purpose of which was threefold. Firstly, it was to screen for contra-indications relating to food abstinence (diabetes, pregnancy and current medication); secondly, to screen for any eating pathology or dieting behaviour (current or past history of bulimia nervosa or anorexia nervosa; currently on a diet) and finally, to provide face-validity for the control condition of the study (the screening form included questions such as : "Have you ever had your IQ formally tested by a psychologist?" and "Do you suffer from any kind of sleep disorder?")

Only subjects who satisfied all criteria of the screening form were selected to take part in the study. Initially, 40 subjects signed up for the study. However, 5 were de-selected as they were currently on a diet; 2 were de-selected as they indicated a history of bulimia or anorexia nervosa and 1 was de-selected as she was diabetic. The remaining 32 subjects were randomly assigned to the experimental or control condition, but, 3 of the control subjects did not return for interview at the end of the 24-hour fast. Thus, analysis was conducted on a sample of 29 female subjects (mean age= 18.9 ± 2.4).

2.23 Design

The experiment was of a between subjects single-factor design, the independent variable being a manipulation of psychological restraint of food. In the experimental condition the 24-hour fast was presented to subjects as short-term starvation; whereas, in the control condition it was presented as incidental to a longitudinal study on the effects of food and sleep deprivation on IQ. The dependent variables comprised interview data (detailed in Results section) and scores on a Likert scale questionnaire (see Appendix 2).

2.24 Procedure

At the time of screening the 40 original subjects signed up for an experimental time-slot. On arrival at the allocated times the 8 unsuitable subjects were thanked for participating but it was explained to them that they would be unable to complete the experiment for the reasons described above. The remaining 32 subjects were allocated to experimental and control conditions on an odd-even basis. Subjects were run singly.

2.24.1 Experimental

Subjects in the experimental condition were told that

they would be participating in a study concerned with the effects of short-term starvation on cognition. It was explained to them that they would experience no undue discomfort or undertake any risks in taking part in the study. Subjects were told that forthwith they had to abstain from all foods over the next 24 hours, and they should return the following day at the same time in order that their cognitive state be assessed and to be interviewed on their experience of going without food. The whole emphasis of the directions given to the experimental subjects related to the condition of psychological restraint with respect to food (see Appendix 15). In addition, subjects had to sign and date a Declaration of informed consent form which reinforced the sentiment of the instructions (see Appendix 3).

2.24.2 Control

Subjects in the control condition were told that they would be participating in a psychological experiment concerned with the effects of sleep and food deprivation on IQ. They were informed that this was the first phase of the study and they had to go without food for 24 hours. In the second phase of the study they would be required to go without sleep for 24 hours. Similarly they were told that they would experience no undue

discomfort or undertake any risks in taking part in the study. Unlike the experimental group, it was intimated to these subjects that the 24 hour abstinence period was incidental and the focus was not on going without food, rather on the effects of various physiological deprivation states on IQ. The directions (see Appendix 16) and the Declaration of informed consent (see Appendix 4) served to uphold this emphasis.

2.24.3 Both Groups

On return after the end of the 24-hour period subjects were all treated alike. It is to be noted that 3 of the control subjects did not return. Attempts to contact these subjects to discover the reasons for drop out resulted in responses from 2 of the subjects, with the third untraceable. The 2 subjects who dropped out, both said that on reflection they did not want to be involved in such a commitment, indicating that going without sleep for 24 hours in the later stage of the study would be overly detrimental to their study schedules. While it was unfortunate to have subjects drop out in this manner, this fact did provide some evidence that the instructions in the control condition were convincing and some support for the manipulation being a successful one, that is to say, that the control group perceived the abstinence from food as incidental. However, these

2 subjects had not in fact fasted for the 24 hour period and a conservative analysis would indicate a high level difficulty concerning the fasting task in that they did not even attempt it. A certain caution has to be introduced therefore in the interpretation of results given this circumstance.

Subjects who did return (16 experimental and 13 control) all reported having abstained completely from all food substances. They were required to complete "an IQ test", which was an amended version Cattell Intelligence Tests, Scale 3 (see Aappendix 5). This requirement was to provide face validity for the control condition, in giving a measure of "IQ" after a period of food deprivation, and also for the experimental condition, in providing a measure of cognitive performance after a period of short-term starvation. The experimenter left the subject alone for 10 minutes in order to complete "the experimental task". This strategy was also introduced to focus any feelings subjects might have at the end of the 24 hour fast. The test itself only took approximately 5 minutes to complete, thus time was left at the end in isolation perhaps allowing for reflection on the experience of the fast, and it is to be hoped priming subjects for the interview to follow.

On returning at the end of the 10-minute period, the experimenter proceeded to interview subjects following a semi-structured interview format and subjects were also given a questionnaire (see Appendix 2) to complete to provide further data on their experience and to offer a different type of modality to report their experience and this yielded more structured responses. Finally, subjects' height and weight were recorded and subjects were fully debriefed on the experimental proceedings. Height and weight data were recorded at this time in order to calculate BMI (body mass index) to ensure that experimental and control conditions did not differ significantly on this variable.

2.3 RESULTS

Subjects were randomly allocated to the experimental or control group. Subject characteristics are shown in Table 2.1.

Table 2.1

	Experimental (n=16)	Control (n=13)
Age (yrs)	19.0 ± 2.3	18.7 ± 2.6
Weight (kg)	60.1 ± 8.9	58.5 ± 6.9
Height (m)	1.65 ± .06	1.65 ± .07

2.31 Interview Data

After an unstructured beginning (so, what have the past 24 hours been like?), the interview followed a semi-structured format with the following questions being put to all subjects:

1. Did you complete the fast, and have you ever fasted before, if so, why?
2. How difficult did you find the fasting?
3. How hungry are you right now?
4. Will you eat immediately after leaving the laboratory?
5. Would you go without food again for 24 hours?

The interviews were transcribed by the experimenter (author of thesis) but coded by a postgraduate psychology student, experienced in the coding of interview data, and who was unaware which subjects were assigned to the experimental and control conditions. This was an attempt to prevent any unconscious bias which may have been introduced by the experimenter as a result of her being aware of whether or not a subject was a control or experimental subject.

It was considered unwise to have subjects complete a restraint questionnaire to ascertain that an equal balance of restrainers and non-restrainers were in each group because it was felt that completion of such a questionnaire in advance of allocation to experimental

or control groups would jeopardise the validity of the experiment, by attaching importance to normal restraint practices. However, it has been demonstrated that restraint and body mass index (BMI) are often positively correlated e.g.(Wardle & Marsland, 1990), so an assessment of differences in BMI between groups was made. A simple t-test indicated that there were no significant differences between the two groups on this variable, $t(27) = .62$, n.s. Furthermore, the screening device provided evidence that at least at the time of the study, none of the subjects was dieting, nor had suffered from any eating disorders in the past.

In response to the first question, it was ascertained that all subjects had adhered to the abstinence request. Subjects were also asked if they had ever abstained for 24 hours from food before. This was further checking on bias in the sample, in selecting subjects who had a vested interest in fasting for weight loss purposes. A small number of subjects had fasted before - 2 of the control group and 1 from the experimental group - and each of these had been for charity purposes.

The answers to the remaining 4 questions were analyzed with chi square tests. Two-by-two contingency tables were set up with one variable being experimental/control and the other being a dichotomy on each of the 4 variables:

1/ difficulty 2/ hunger 3/ eatnow 4/ repeat.

1/ The variable of difficulty which was a dichotomy of "not too difficult" and "quite or very difficult", resulted in a chi-square of .02, n.s., with 74% of both groups finding the task of abstinence not too difficult.

2/ The variable of hunger which was a dichotomy of "not very hungry and quite hungry" and "very hungry, starving" resulted in a chi-square of 7.6, d.f.=1, $p<.005$, indicating that the experimental group (81%) were significantly more likely to report hunger than the control group (23%).

3/ The variable of "eatnow" which was a simple distinction yes/no resulted in a chi-square of 3.9, d.f.=1, $p<.05$, indicating that the experimental group (87%) were significantly more likely to eat immediately than the control (46%) group.

4/ The variable "repeat" indicating a measure of willingness of go without food for 24 hours again, was dichotomy of "no or I'm not certain" and "probably, or yes I would do it again", resulted in a chi-square of .05, d.f.=1, n.s., with both groups demonstrating a willingness to do it again, (experimental - 68% and control - 72%).

A summary of these results is presented in Table 2.2,

below:

Table 2.2 Summary results of Semi-structured interview

Variable		Experimental N	Control N	
Difficulty	"yes"	4	3	
	"no"	12	10	=.02, n.s.
Hunger	"yes"	13	3	
	"no"	3	10	=7.6,d.f.=1, p<.005
Eatnow	"yes"	14	6	
	"no"	2	7	=3.9,d.f.=1. p<.05
Repeat	"yes"	11	9	
	"no"	5	4	=.05, n.s.

NB: Yates' correction applied to all above chi-squared tests.

2.32 Likert Questionnaire Data

The Likert Questionnaire (see Appendix 2) which was devised to provide further outcome data was analyzed using a simple t-test. This proved to be not significant, $t(27)=.12$, n.s. However, to investigate responses to individual items, chi-square statistics were calculated on each of the questions, with response categories such as "not at all" and "slightly" being grouped and "often" and "constantly" being grouped to provide 2x2 contingency tables for each question.

Q1 Over the past 24 hours, how difficult have you found refraining from food?

Chi-square = .7, d.f.=1, n.s., indicating that

there was no difference between the experimental and control group with respect to the proportion of subjects who found the task difficult. Indeed, 55% of all subjects found refraining from food, not at all, or slightly difficult, and 37% found the task moderately difficult, with only one subject from each condition reporting the task to be extremely difficult.

Q2 Did you think about eating?

Chi-square = .05, d.f.=1, n.s., demonstrating there was no difference between the experimental group and control group on this question. In fact, 81% of the experimental group and 85% of the control group thought about eating; indicating that a large number of both groups thought about eating.

Q3 Did you find your level of concentration was affected?

Chi-square = 3.8, d.f.=1, $p<.05$, with 38% of the experimental group, as opposed to 7% of the control having their concentration affected.

Q4 How hungry did you feel most of the time?

Chi-square = 5.2, d.f.=1, $p<.05$, with 43% of the experimental group reporting feeling hungry most of

the time, in comparison with 7% of the control group.

Q5 How aware were you of food in the environment? Chi-square = .2, d.f.=1, n.s., demonstrating no differences between conditions. Both groups had a high number (mean = 72%) of subjects reporting being moderately or extremely aware of food in the environment.

Q6 Did you experience intrusive thoughts of food? Chi-square = 1.5, d.f.=1, n.s., demonstrating no differences between conditions. However, a higher proportion of experimental subjects (69%) than control (46%) subjects reported intrusive thoughts about food.

A summary of these results is presented in Table 2.3 below:

Table 2.3 Summary results of Questionnaire data

Variable		Exp'tal N	Control N	
Q1 Difficulty	"yes"	6	5	
	"no"	10	8	=.07,d.f.=1,n.s.
Q2 Thought about eating	"yes"	13	11	
	"no"	3	2	=.05,d.f.=1,n.s.
Q3 Concentration affected	"yes"	10	5	
	"no"	6	8	=3.8,d.f.=1,p<.05

Q4 Hunger	"yes"	9	3	
	"no"	7	10	=5.2,d.f.=1,p<.05
Q5 Awareness of food	"yes"	11	10	
	"no"	5	3	=.2,d.f.=1,n.s.
Q6 Intrusive thougts about food	"yes"	11	6	
	"no"	5	7	=1.5,d.f.=1,n.s.

NB: Yates' correction was applied to all chi-squared tests

2.4 DISCUSSION

The aim of the present study was to evaluate the effects of different rationales for abstinence in normal eaters on reported levels of hunger and preoccupations about food.

2.41 Difficulty

No specific predictions were made about level of difficulty in maintaining the fast, however it seemed an obvious question to put to subjects at the beginning of the interview. There were no differences between the groups in terms of reported difficulty of the task, and this finding was supported both by the interview and the questionnaire data. Perhaps, a more surprising finding was that both groups reported low levels of difficulty maintaining the fast. There were also no differences between the groups in terms of their readiness to repeat the task, with 70% of subjects saying they would be willing to do it again. This seems counter-intuitive, however, perhaps can be explained in the light of what is known on studies of obedience, particularly to an authority figure (Milgram, 1963). The important point to note is that it was possible to test the experimental hypotheses as all subjects in both groups complied with the instructions to abstain from food for 24 hours, though there is a implicit reliance on subjects' telling the truth concerning this point and some type of

physiological check would have increased the methodological rigour on this issue.

2.42 Hunger

While acknowledging that "dropouts" from the control group potentially may have influenced final outcomes, results from this study indicated that subjects in the focusing-on-starvation group did report higher levels of hunger. This was evident from both the interview and the Likert questionnaire data. The interview question pertaining to hunger focused specifically on how subjects felt at the end of the fast: "How hungry are you right now?" and the relevant questionnaire item related to during the period of the fast: "How hungry did you feel most of the time?" Given that both groups were equally deprived in terms a 24-hour period of abstinence, this differential interpretation of internal cues is a very interesting one. The experimental manipulation is such that one can conclude that there is a causal relationship between rationale for abstinence and the experience of hunger, with the group focusing on starvation feeling hungrier than the group incidentally abstaining. This has significance for the debate on the relative importance of internal versus external cues on eating behaviour.

The issue of relative contribution of internal, that is to say, physiological cues and external, that is to say, cognitive and emotional cues has been extensively investigated in connection with the control of eating behaviour. First, by Schachter and his colleagues conducting research on the obese(Schachter, 1968; Schachter & Rodin, 1974) and then by restraint theorists Peter Herman and Janet Polivy, and colleagues e.g. (Herman & Polivy, 1984; Hibscher & Herman, 1977). Originally, Schachter had suggested that the obese were both relatively insensitive to internal cues and relatively over-sensitive to external cues. However, Herman and Polivy have since demonstrated that level of restraint is a more important factor in predicting control of food intake.

Recent research on restrained eaters focusing on their sensitivity to internal cues has provided equivocal results. For example, (Herman, et al., 1984) predict that dieters will fail to respond as well as their unrestrained counter-parts, to internal cues and (Heatherton, Polivy & Herman, 1989) demonstrate an unresponsiveness to internal hunger state on the part of high restrainers. Whereas, (Ogden & Wardle, 1990; Wardle, 1987) both fail to find support for restraint theory's prediction that restrained eaters' will have a lowered sensitivity to internal cues.

However, the results of the present study seem to indicate that internal cues only matter insofar as individuals attend to them. Presumably, both groups in the study suffered the same internal symptoms, however these were differentially interpreted, or at least differentially reported.

Further, the results implicate external cues as being all important with the experimental group's cognitions providing an explanation for their "hungrier" experience. The literature is fairly united in its support of increased sensitivity to external cues being cited as explanatory of over-eating.

Evidence from this study provides further support that external cues are important in determining eating behaviour. The focus-on-starvation group was significantly more likely to indicate that they would eat immediately at the end of the fast, which indicates the central role of cognitions as determinants of eating behaviour.

2.42 Preoccupation with food

The data from this study did not support the hypothesis that the experimental group would report higher levels of preoccupation about food. No questions relating to preoccupations about food were put during the interview

to maintain face validity and also so as to not influence subjects in their responses. It was felt that this data might be appropriately gathered in a "supplementary questionnaire" where it might not seem odd to ask such questions. The questionnaire items 2, 5 and 6 which all pertained to preoccupation about food, all revealed non-significant differences, with both groups indicating high levels of thinking about eating, awareness of food in the environment and intrusive thoughts about food. While this did not support the hypothesis, perhaps the period of abstinence was simply too long resulting in a powerful drive which had consequences of high levels of preoccupation about food irrespective of the reasons for abstinence. What is clear however is that physiological abstinence from food DOES result in an increased awareness of food in the environment. Given that such an outcome is likely to produce eating behaviour, it would seem obvious that individuals wishing to lose weight should AVOID extended periods of abstinence, which would mean then that most types of diet would be contra-indicated.

2.44 Methodological problems

There are some methodological problems with the present study which may have influenced the results. Firstly, with respect to the sample: i/ in the recruitment of

subjects for this study, for ethical reasons I had to say that taking part in the study may involve going without food for 24 hours or going without sleep for 24 hours. There is the obvious danger of a bias in selecting individuals who would be willing to be subjected to a long period of time without food. The other issue concerning the sample pertains to: ii/ the dropouts in the control condition, as I have already intimated, this affects the interpretation of the results in that more caution is required with respect to conclusions concerning outcomes than if the whole control group had completed the study.

Secondly, there was no behavioural outcome measure in the design. If an opportunity to eat had been provided at the end of the 24-hour fast, it would have been possible to measure actual differences in intake rather than a reporting of how hungry subjects were, or how likely they were to eat something immediately. Stronger conclusions could have been drawn about the effect of the rationale of a deliberate abstinence from food.

Finally, an implicit link is made between dieting, that is to say, non-incidental periods of abstinence from food, and focusing on abstinence as in the experimental condition of this study. While it may be the case that these two conditions are functionally equivalent, it is

not an explicit relationship.

2.45 Conclusion

The aim of the present study was to assess the role of differing rationales (deliberate abstinence and incidental abstinence) in the experience of short-term starvation. The results suggest that deliberate abstainers experience higher levels of hunger and reported that they were more likely to eat immediately at the end of the their fast, than incidental abstainers. There were no differences between groups with respect to preoccupations about food, however results indicated that regardless of the reason for abstinence, individuals were likely to experience high levels of awareness of food in the environment and intrusive thoughts about food. These data have meaningful implications for those who attempt to restrict caloric intake in pursuit of weight-loss, in that the psychological impact of deliberately abstaining from food results in being more likely to feel hungry, and more likely to think about food and to want to eat it.

Bibliography - Chapter Two

Blundell, J. E. (1979). Hunger, appetite and satiety - constructs in search of identities. In M. Turner (Ed.), Nutrition and Lifestyles (pp. 21-42). London: Applied Science Publishers.

Heatherton, T. F., Polivy, J., & Herman, C. P. (1989). Restraint and internal responsiveness: effects of placebo manipulations of hunger state on eating. Journal of Abnormal Psychology, 98, 89-92.

Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A. J. Stunkard, & E. Elliot (Ed.), Eating and its disorders (pp. 141-156). New York: Raven Press.

Herman, C. P., & Polivy, J. (1988a). Psychological factors in the control of appetite. Current Concepts in Nutrition, 16, 41-51.

Herman, C. P., & Polivy, J. (1988b). Studies of eating in nomral dieters. In B. T. Walsh (Ed.), Eating behavior in eating disorders (pp. 95-111). Washington: American Psychological Association.

Hibscher, J. A., & Herman, C. P. (1977). Obesity,

dieting and the expression of obese characteristics. Journal of Comparative and Physiological Psychology, 91, 374-380.

Keys, A., Brozek, J., Henschel, A., Mickelson, O., & Taylor, H. L. (1950). The biology of human starvation. Minneapolis: University of Minnesota Press.

Lowe, M. G. (1982). The role of anticipated deprivation in overeating. Addictive Behaviors, 7, 103-112.

Milgram, S. (1963). Behavioural study of obedience. Journal of Abnormal and Social Psychology, 67, 371-378.

Ogden, J., & Wardle, J. (1990). Control of eating and attributional style. British Journal of Clinical Psychology, 29, 445-446.

Rogers, P. J., & Hill, A. J. (1989). Breakdown of dietary restraint following mere exposure to food stimuli: interrelationships between restraint, hunger, salivation and food intake. Addictive Behaviours, 14, 387-397.

Ruderman, A. J., Belzer, L. J., & Haperin, A. (1985). Restraint, anticipated consumption and overeating. Journal of Abnormal Psychology, 94, 547-555.

Schachter, S. (1968). Obesity and eating. Science, 161, 751-756.

Schachter, S., & Rodin, J. (1974). Obese humans and rats. Potomac, M.D.: Erlbaum.

Wardle, J. (1987). Hunger and satiety: a multidimensional assessment of response to caloric loads. Physiology and Behaviour, 40, 577-582.

Wardle, J. (1988). Cognitive control of eating. Journal of Psychosomatic Research, 32, 607-612.

Wardle, J., & Marsland, L. (1990). Adolescent concerns about weight and eating; a social-developmental perspective. Journal of Psychosomatic Research, 34, 377-391.

Warren, C., & Cooper, P. J. (1988). Psychological effects of dieting. British Journal of Clinical Psychology, 27, 269-270.

Wegner, D. M., Shortt, J. W., Blake, A. W., & Page, M. S. (1990). The suppression of exciting thoughts. Journal of Peronsality and Social Psychology, 59, 409-418.

CHAPTER 3 - RESTRAINT AND ANXIETY IN ADOLESCENCE

(A version of this study was presented at the British Psychological Society, Scottish Branch: Annual Conference in October, 1992, in Perth, Scotland).

3.1 INTRODUCTION

Dieting in adolescent girls is well documented (Davies & Furnham, 1986; Heunnemann, Shapiro, Hampton & Mitchell, 1968; Wadden, Foster, Stunkard & Liinowitz, 1989). Typical reports are of 70% of adolescent girls having dieted in order to lose weight e.g. (Moses, Banilivy & Lifshitz, 1989).

While some studies indicate that overall levels of restraint in younger adolescent girls (12 years old) are comparable to those older girls and adult women (Wardle & Beales, 1986) others have shown a developmental effect, with older girls becoming more concerned. For example, Nylander, 1971 in a study of high school children in Sweden, found an increase in reports of dieting from 8% at age 14 to 44% at age 18. Dieting was related to a feeling of being fat and so girls were making conscious decisions about their body size and desires to change them.

Andrew Hill and colleagues were among the first to demonstrate the functional nature of dietary restraint in adolescence (Bleau, 1990; Hill, Rogers & Blundell, 1989), where they demonstrated that highly restrained 12 and 14

year old girls, ate more in a taste test following a disinhibiting procedure than their unrestrained counterparts, as a main effect of restraint.

Effects of dieting in adults include lapses from restraint following a number of disinhibiting circumstances including anxiety (Herman & Polivy, 1975; Herman, Polivy, Lank & Heatherton, 1987; Ruderman, 1985). Though some experimental studies have failed to show this effect e.g. (Wardle & Beales, 1988).

It has long been considered that the consequences of anxiety on eating behaviour will depend on the type of individual involved. Those who are responsive to their internal physiological state, and not primarily controlled by cognitive considerations concerning food, are expected to react to anxiety or stress by eating LESS, as the some of the effects of anxiety or stress include inhibition of gastric contractions and the elevation of blood sugar - both of which should suppress hunger and appetite.

Herman, et al, 1987, consider that the effect of anxiety on individuals who are highly restrained, and more attentive to cognitive control than physiological signals, will disrupt their usual resolve and thus the restrainer will eat more when anxious as a result of disinhibition, than when composed (determination unimpaired).

The present study was designed to investigate the effects of anxiety in adolescent girls (examining two age groups -13 and 16 year olds) as a function of restraint, using the classic experimental paradigm of the taste test as a measure of eating behaviour. This paradigm was originally developed by Schachter and his colleagues (Schachter, Goldman & Gordon, 1968) in which food intake in a laboratory setting was unobtrusively measured under a variety of conditions. The current study used biscuits as the food to be rated. Different types of biscuits were used to test the forbidden/permitted dimension (see Chapter 4).

It was predicted that a restraint x anxiety interaction effect would emerge, with restrainers being disinhibited and eating more in the high-anxiety condition and more likely to overeat the forbidden than the permitted biscuits. It was predicted that the 16-year olds would be themore vulnerable age-group with respect to overeating.

3.2 METHOD

3.21 Overview

Female subjects were assessed as high or low restrainers and then randomly assigned to either the high-anxiety condition or the low-anxiety condition. An ostensible taste-rating exercise provided a measure of the amount of biscuits consumed ad lib. Anxiety was measured

immediately before eating on the Spielberger State Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1968) - see Appendix 6. Restraint was assessed by a modified version of the Stunkard and Messick three-factor eating inventory (Stunkard & Messick, 1985) as it had been used successfully as a measure of restraint in Hill, 1989 see Appendix 7.

3.22 Subjects

The subjects, all female, were recruited from a comprehensive high school with 24 subjects from the second year (mean age = 13 years) and 24 subjects from the fifth year (mean age = 16 years, 1 month). Subjects were run individually from 10.30 a.m. to 3.30 p.m. at 45 minute intervals. Parental consent was sought initially by the headteacher of the school, which resulted in 100% compliance from second year pupils' parents, but only 83% of fifth year pupils' parents agreed to allow participation. Thus four of the original 24 sixteen-year-old recruits did not take part in the study. All subjects whose parents gave consent, agreed to take part in the study. The subjects' participation in the experiment was voluntary but the probability of participation was possibly increased in that the alternative was routine schoolwork.

3.23 Design

Subjects from both age groups were designated as high or

low restrainers on the basis of a median split on the restraint scores and were assigned at random to one of the two treatment conditions - high or low anxiety. The study was therefore of a between-subjects design with main factors restraint, age and anxiety. The dependent variable was the amount eaten during a 10-minute "taste-testing" session.

3.24 Procedure

The modified restraint scale (Hill, et al., 1989) was administered to both age groups at the same time with the investigator, headteacher and a guidance teacher all present to answer any questions the subjects might have had. The 30-item questionnaire was introduced as a scale to provide information about eating habits, preliminary to taking part in a taste-test later in the following two weeks. A 45-minute period was given over to the task of filling out the questionnaire, which resulted in no missing values on the restraint variable.

A female experimenter asked subjects upon arrival for the "taste-test" to complete a questionnaire which was described as giving an indication of how they were feeling at the time. This was in fact an assessment of state-anxiety. It was stressed to the subjects to respond to the questions as to "how they were feeling right now", that is to say, faced with either the experimental or control situation (described below).

3.24.1 High Anxiety Condition

Subjects in the high anxiety condition were placed at a table laid out with the wherewithal to take a blood sample. Immediately adjacent to where they were invited to sit initially, the following instruments were arranged: a syringe and needle, a bowl of disinfectant, some cotton wool, a plaster and a plastic glove. The sensory stimuli were fairly potent both in terms of sight and smell, and served to provide an anxiety-inducing environment. To make the scene plausible, the experimenter explained that as part of the experimental procedure it was necessary to take a blood sample and a measurement of their height and weight. The instruments for measuring weight and height, however were out of sight in another room, so as to a/ retain the focus on the blood sampling (unpleasant for most people) b/ eliminate any inhibition which may occur by the sight of weighing scales in the taste-test exercise.

3.24.2 Low Anxiety Condition

Subjects in the low anxiety condition were greeted by an amiable experimenter who invited them to ask any questions they may have following information they had already received.

3.24.3 Both Groups

From this point on all subjects were treated identically. They were invited to taste and rate each of the five

different types of biscuits laid out on a separate table. The biscuits were labelled A to E and the plates were fully laden. Biscuits to be tasted were: fruit shortcake, shortcake, custard cream, chocolate hobnob and krackawheat cracker. The subject was told that she would have 10 minutes in which to taste and rate all the different types of biscuit. It was emphasised that she must be sure of all the ratings on the schedule (see Appendix 8) that was given out which required responses on a variety of the qualities of each biscuit, e.g., saltiness, sweetness, tastiness, smell and so on. Finally, the subject was asked to write down her order of preference of the biscuits, and was informed that as the biscuits had been provided free by the researcher's university, the subject could eat as many biscuits as she liked after completing the ratings. A glass of water was also provided to aid consumption if required. The questionnaire was sufficiently short that the subject could complete it with ample time for extra eating during the 10 minute period. The experimenter then left the subject "to concentrate on her task" saying that she (the experimenter) was only next door if the subject required any assistance.

After the 10 minute period the experimenter returned to take the subject to another room where the subject's weight and height were recorded. The subject was asked to refrain from discussing the experiment with any of her friends or classmates and was informed that a debriefing

would take place later in the month when she would have the opportunity to ask questions about the purpose of the study. The experimenter then weighed all the plates of biscuits to determine consumption. Measurement was accurate to the nearest tenth of a gram. Subjects were fully debriefed as group at the end of the experimental sessions.

3.3 RESULTS

3.31 Properties and Choice of the Restraint Scale

The modified version of Stunkard and Messick (1981) three-factor eating inventory was used in this study. In fact, the modified version created by Hill *et al.* (1989) was revised further. Two questions were omitted from the questionnaire - one of the questions was removed as it was not included in the updated Stunkard and Messick (1985) inventory. The other question related to the amount of pounds over desired weight and it was deleted as the experimenter felt that it was not relevant to the age groups under study. Thus the maximum restraint score which could have been attained was 30 and the lowest was 0. The 30-item questionnaire contained questions from all three factors of the Three-Factor Eating Questionnaire - 13 from the Restraint Scale (factor 1), 9 from the Disinhibition Scale (factor 2) and 8 from the

Hunger Scale (factor 3). Hill's version of the scale resulted from rating for applicability by experienced psychologists of the original (1981) scale, for use with the adolescent population. The decision to use this particular restraint scale therefore was based on the demonstrated empirical ability of the scale to identify high and low restrainers in the adolescent population (Hill *et al*, 1989).

3.32 Classification of Subjects

The distribution of scores for each age group is shown in figure 3.1. Subjects were divided into restrained and unrestrained groups on the basis of a median split of scores on the restraint scale. Restrained eaters were defined as those scoring 12 or more on the scale; subjects scoring below 12 were classified as unrestrained. The classification by median split has been the standard method of discrimination in restraint studies (Herman & Mack, 1975). The effect of this split produced highly significant differences in restraint scores between the two groups, $t(42) = 7.37$, $p<.001$. Unrestrained subjects reported a mean (±SD) restraint score of 8.65 (±1.8), whereas the restrained group subjects' mean was 14.5 (±3.1). When the group was split by age - 13- and 16-years-olds, the mean restraint scores followed a similar pattern in the low and high restraint factions.

Restraint Scores
13 & 16 year olds

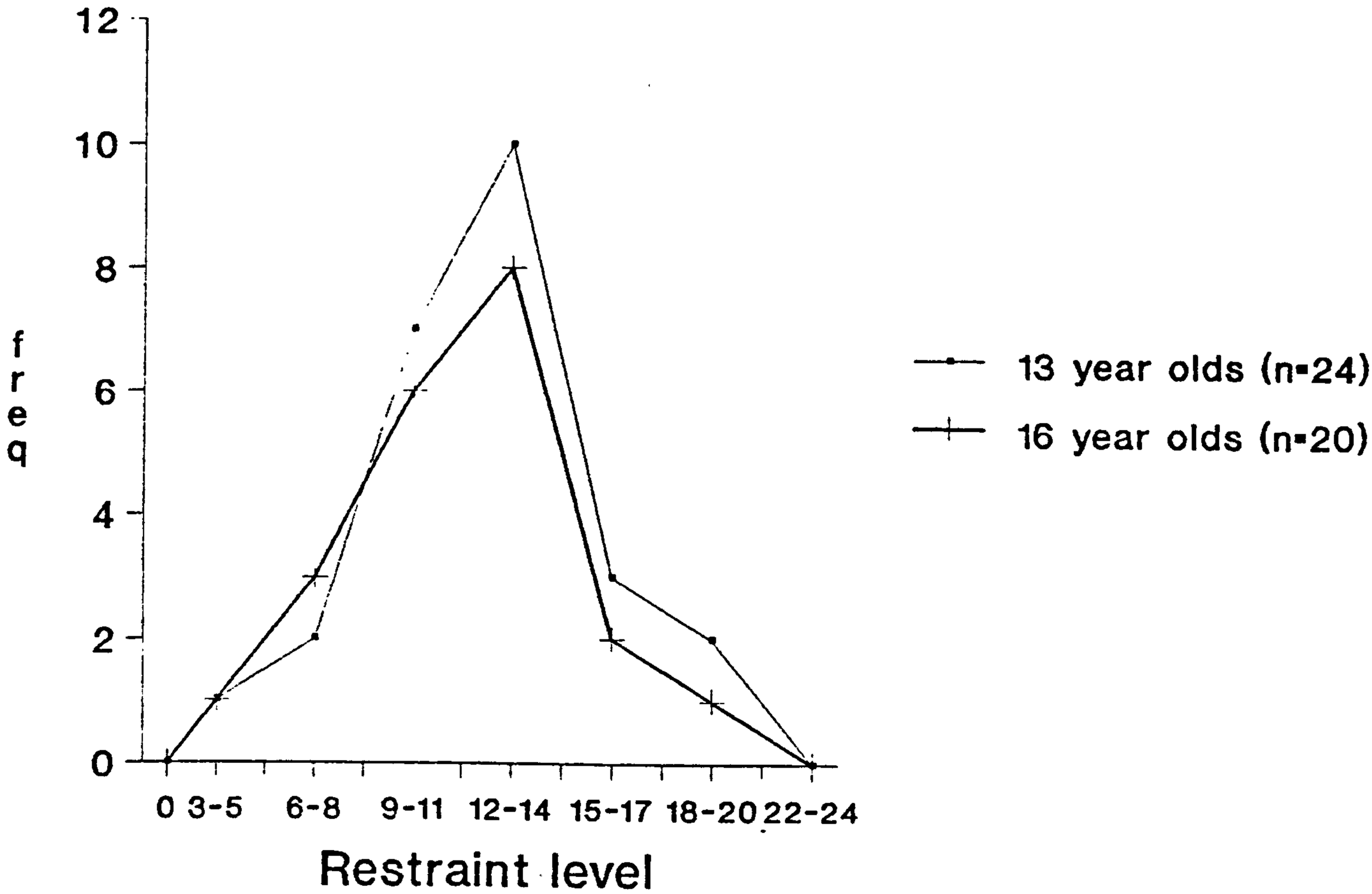

Figure 3.1

Distribution of scores on the revised restraint scale for 13 & 16 year old girls

3.33 Anxiety Manipulation Check

The effect of the anxiety manipulation on the Spielberger State Anxiety Inventory scores was significant , $t(42) = 2.29$, $p<.05$ (Spielberger, et al., 1968). Scores ranged from 23 to 60 (possible range: 20-80), with low-anxiety subjects reporting a mean anxiety score of 37.5 and the high-anxiety subjects reporting a mean of 42.7. Thus the anticipation of having a blood sample taken, coupled with the smell of antiseptic and the sight of the syringe, led subjects to report significantly more anxiety. High and low restrainers did not differ significantly in their anxiety reactions: group means were 40.1 and 39.8 respectively. The absence of restrainer/non-restrainer differences in reported anxiety suggests that the anticipation of eating in the taste-test did not contaminate the anxiety-inducement manipulation.

3.34 Relationship between Restraint and Consumption as a Function of Anxiety

The relationship between degree of restraint and grams of biscuits consumed in the taste test, irrespective of age, as a function of anxiety manipulation is demonstrated in figure 3.2 for the control condition and figure 3.3 for the experimental condition. In the control (low-anxiety) condition there was no relationship between restraint and energy intake (r=.23, n.s.). By contrast, the experimental (high-anxiety) condition procedure resulted in a significant positive correlation between restraint

Figure 3.2

Control - Low Anxiety

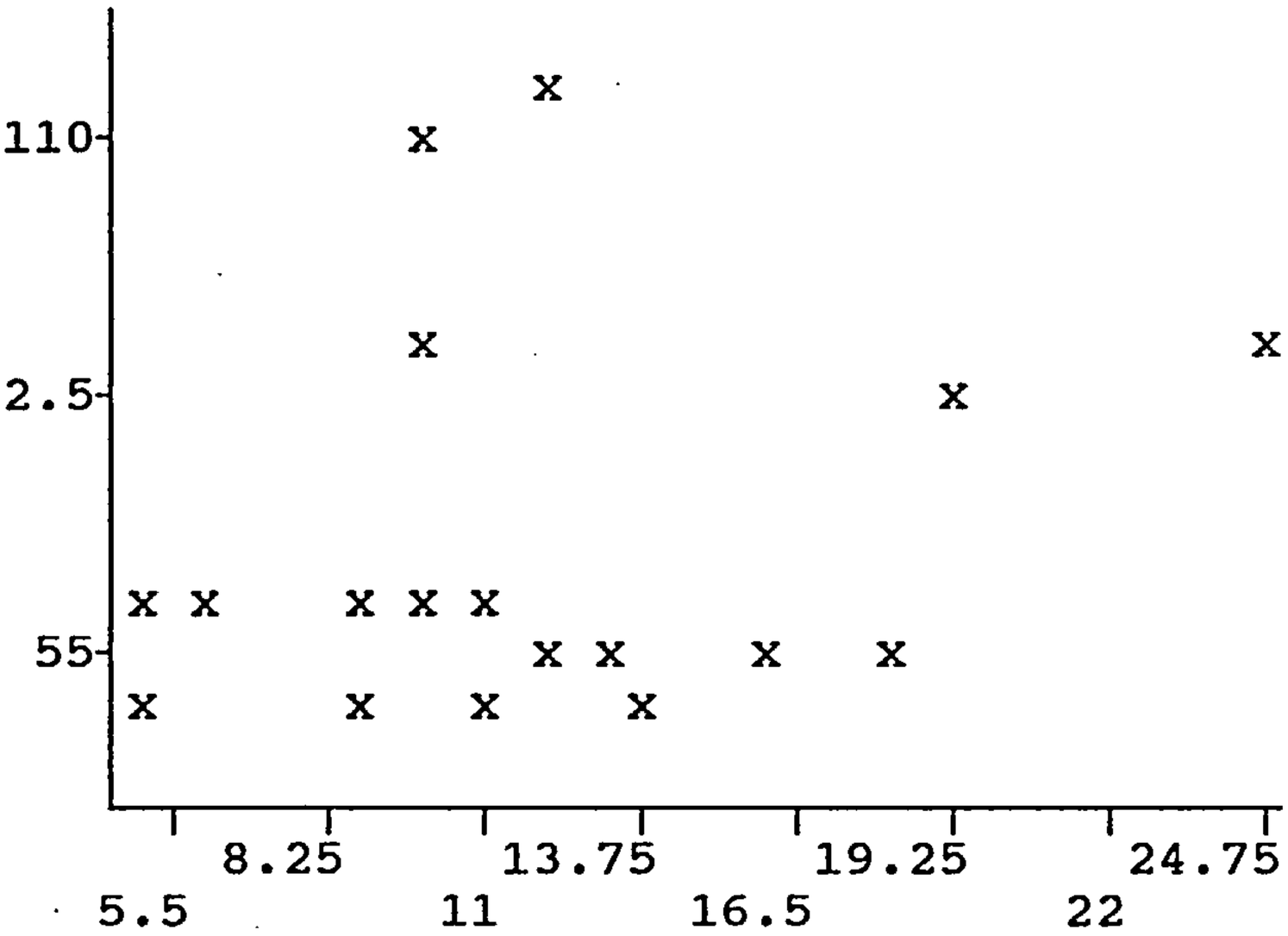

Figure 3.3

Experimental - High Anxiety

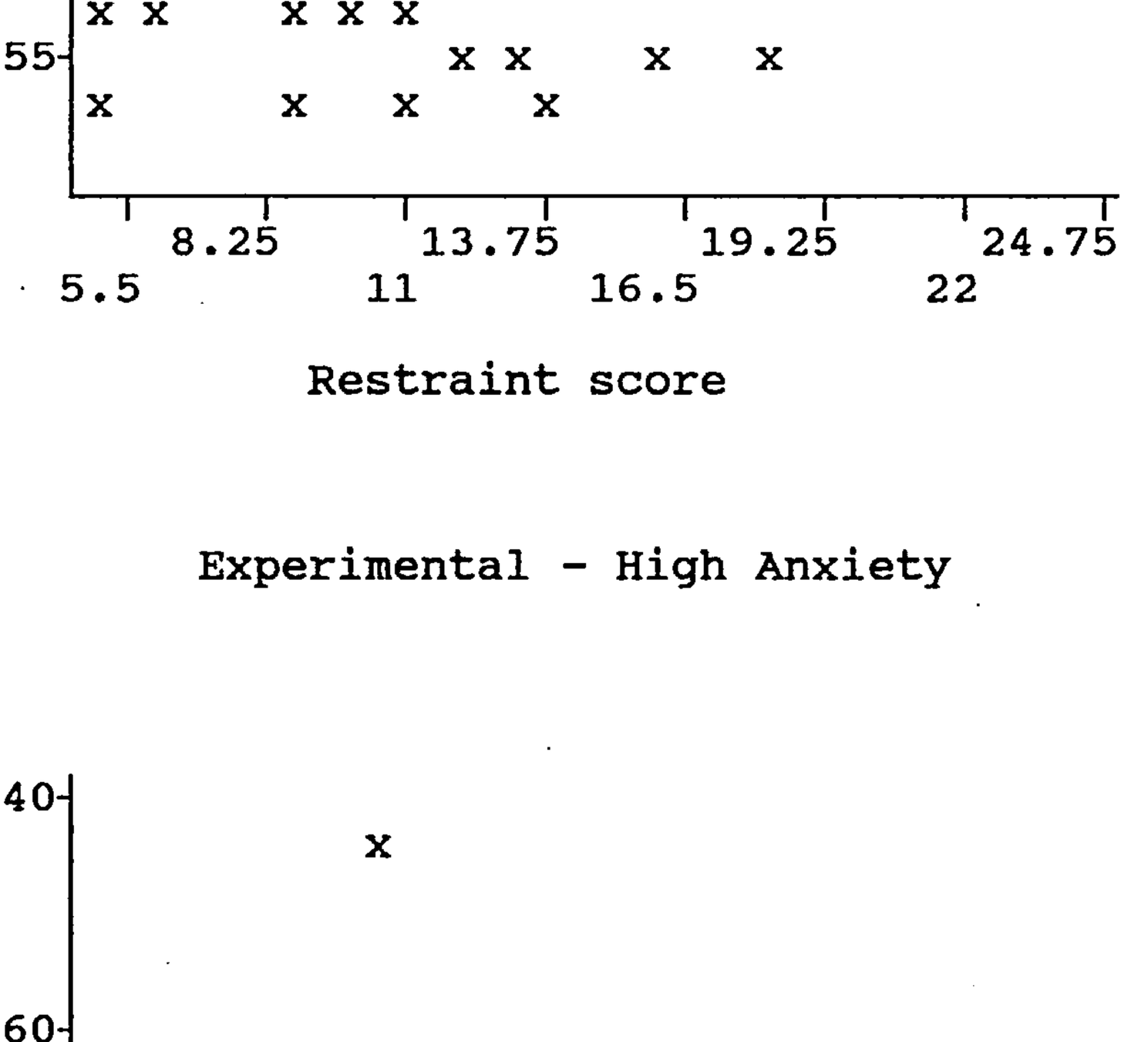

Figure 3.2 & 3.3 Scattergrams depicting the relationship between restraint and intake during the taste test in the control (r=.23, n.s.) and experimental conditions (r=.38, $p<0.05$).

and energy intake (r=.38, p<.05), indicating that the higher the degree of restraint, the larger the amount of food consumed when in an anxiety-induced state. Separating the 2 age groups produce non-significant correlations for both age groups in the control condition, r=.25, p=.2 for 13-year-olds and r=0, p=.5 for 16-year-olds. However, following the experimental procedure, the 16-year-olds produced a highly significant strong positive correlation between restraint and intake (r=.63, p<.01). The 13- year-olds' correlation of restraint and the dependent variable remained non-significant in the high-anxiety condition (r=.21, p=.3) Weight index (Edwards, 1978) and food intake were not significantly correlated in either the control condition (r=0, p=.5) or the experimental condition (r=.13, p=.3); restraint therefore rather than degree of overweight was a better predictor of eating behaviour.

3.35 Effects of Anxiety, Restraint and Age on Eating

To investigate the suggestion that restraint had a greater effect on intake in the older age group, a three-way analysis of variance was computed with main factors anxiety, age and restraint. For practical and methodological reasons it had not been possible to require that subjects were equally deprived of food before participating in the taste-test (e.g., no food for 5 hours prior to participation). Therefore a crude estimation of deprivation by coding time of day as before

or after lunch was recorded to determine how hungry a subject was at the time of the taste test. A Spearman correlation coefficient demonstrated an almost significant correlation between the dependent variable and length of time since last eaten, r =.23, p=.06, thus it was thought prudent to enter the time variable as a covariate into the analysis of variance.

A three-way (anxiety x restraint x age) analysis of variance with time of day entered as a covariate in the analysis revealed a very nearly significant three-way interaction effect F (1,35) = 3.82, p <.059, with no other main or two-way interaction effects being significant. The differential effects of anxiety on 16-year-old restrained subjects is shown in Table 3.1. Following up the three-way interaction effect, planned comparisons revealed a significant difference between high and low restrained subjects in the 16-year-old group in the high anxiety condition, F (1,35) = 4.51, p <.05 (see figure 3.4).

Table 3.1 - Mean number of grams consumed

	LOW ANXIETY		HIGH ANXIETY	
	Low restraint	High restraint	Low restraint	High restraint
13 yr olds	60.98	81.27	98.2	93.51
16 yr olds	68.35	56.73	51.35	93.47

3.36 Effects of Anxiety, Age and Restraint on Consumption of Particular Types of Biscuit

Three-way analyses of variance were carried out for each type of individual biscuit: fruit shortcake, shortcake, custard cream, chocolate hobnob and krackawheat. Non-significant results were produced in the shortcake and krackawheat analyses. However, the fruit shortcake and custard cream analyses yielded significant two-way interaction effects between restraint and anxiety, F (1,35) = 5.84, p<.05 and F (1,35) = 4.92, p<.05 respectively (see figures 3.5 and 3.6). The chocolate hobnob analysis revealed a significant three-way interaction with restraint, anxiety and age, which was followed up with a planned comparison which demonstrated a significant difference between the high and low restrained subjects in the 16-year-old group in the high anxiety condition, F (1,35)= 5.24, p<.05 (see figure 3.7).

Total Consumption
16 year olds

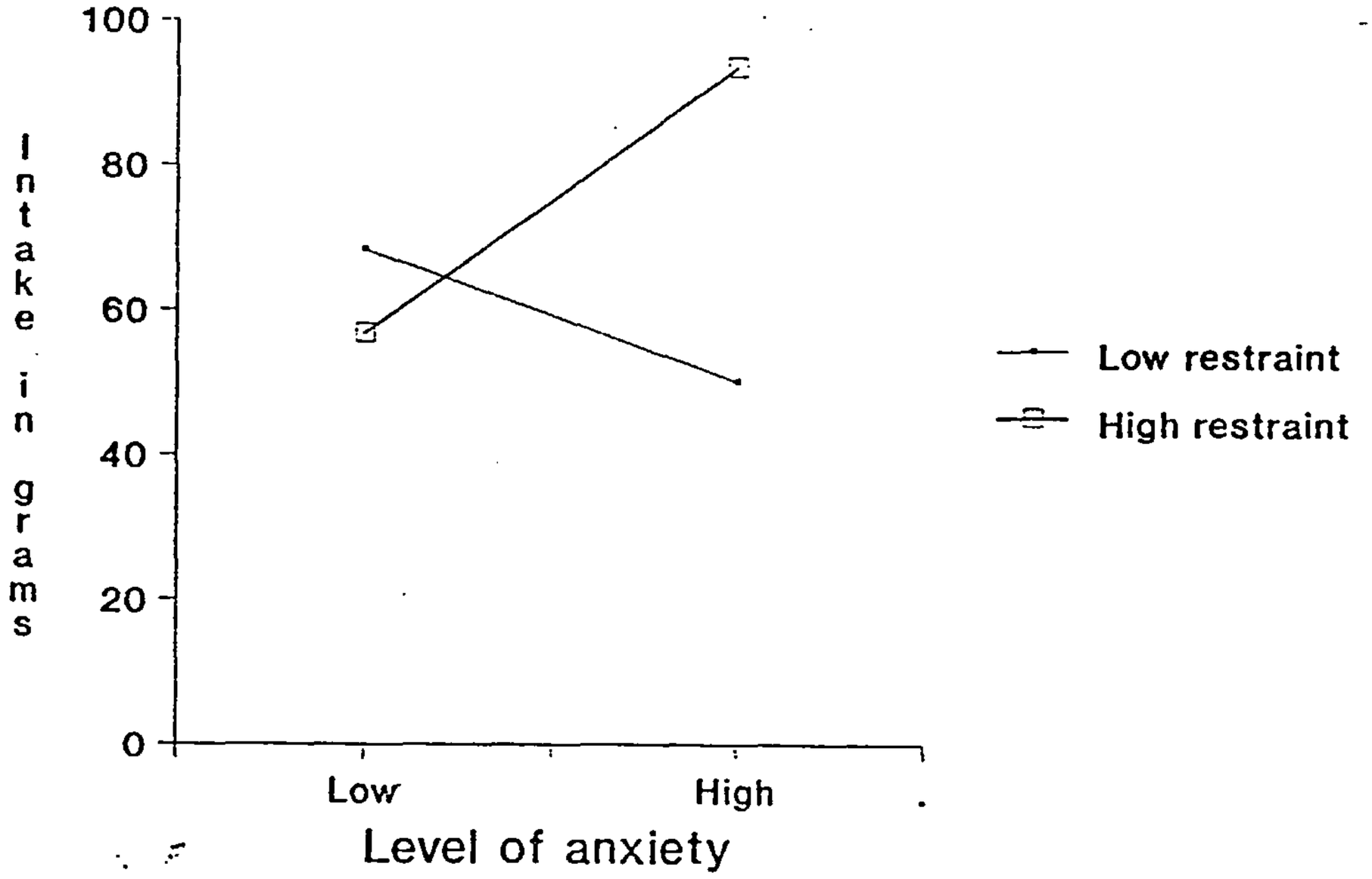

Figure 3.4
16 year olds' total biscuit consumption - high and low restrainers in the high and low anxiety conditions

Consumption - Shortcake
13 & 16 year olds

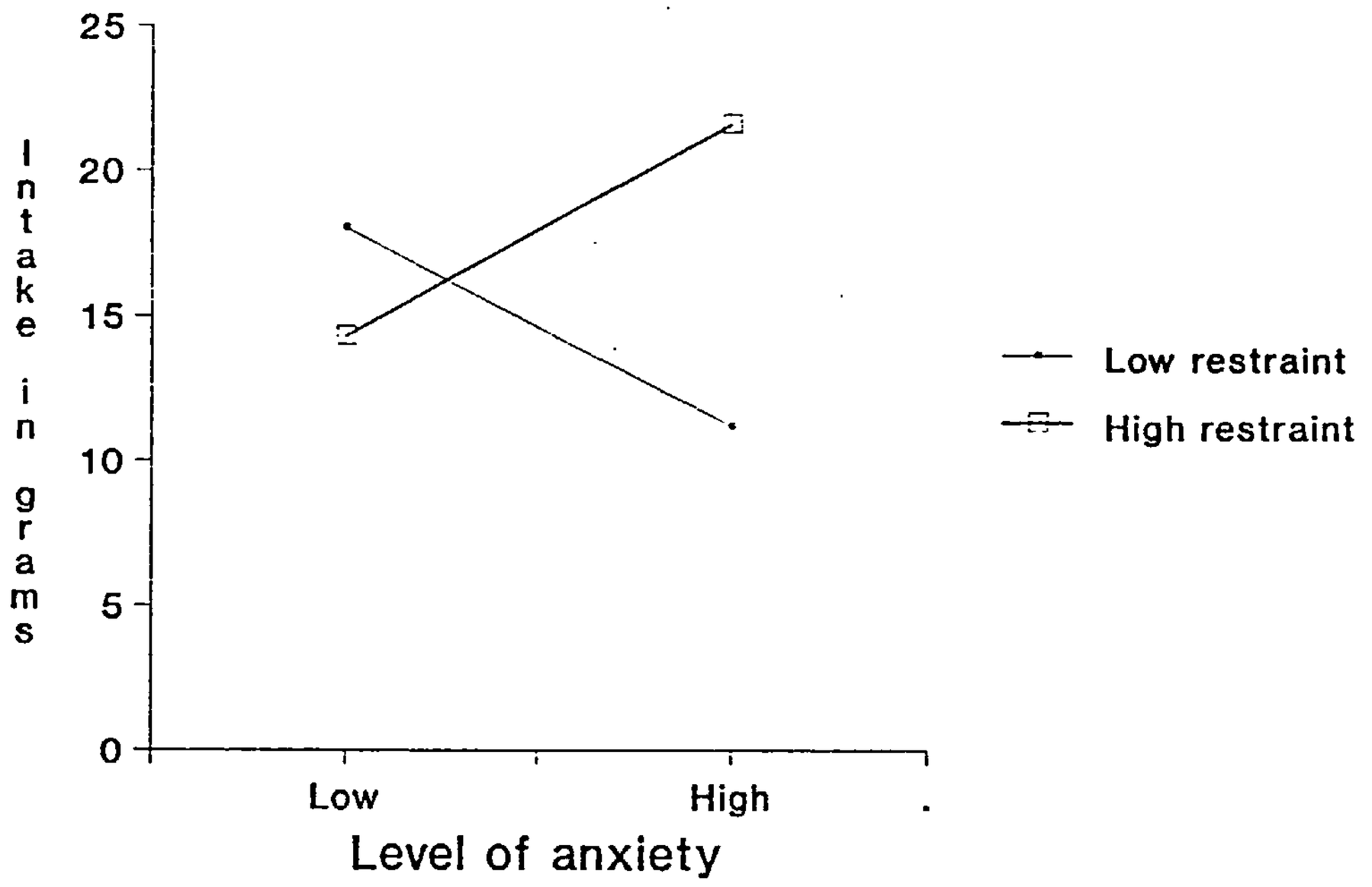

Figure 3.5

Consumption - Custard Cream
13 & 16 year olds

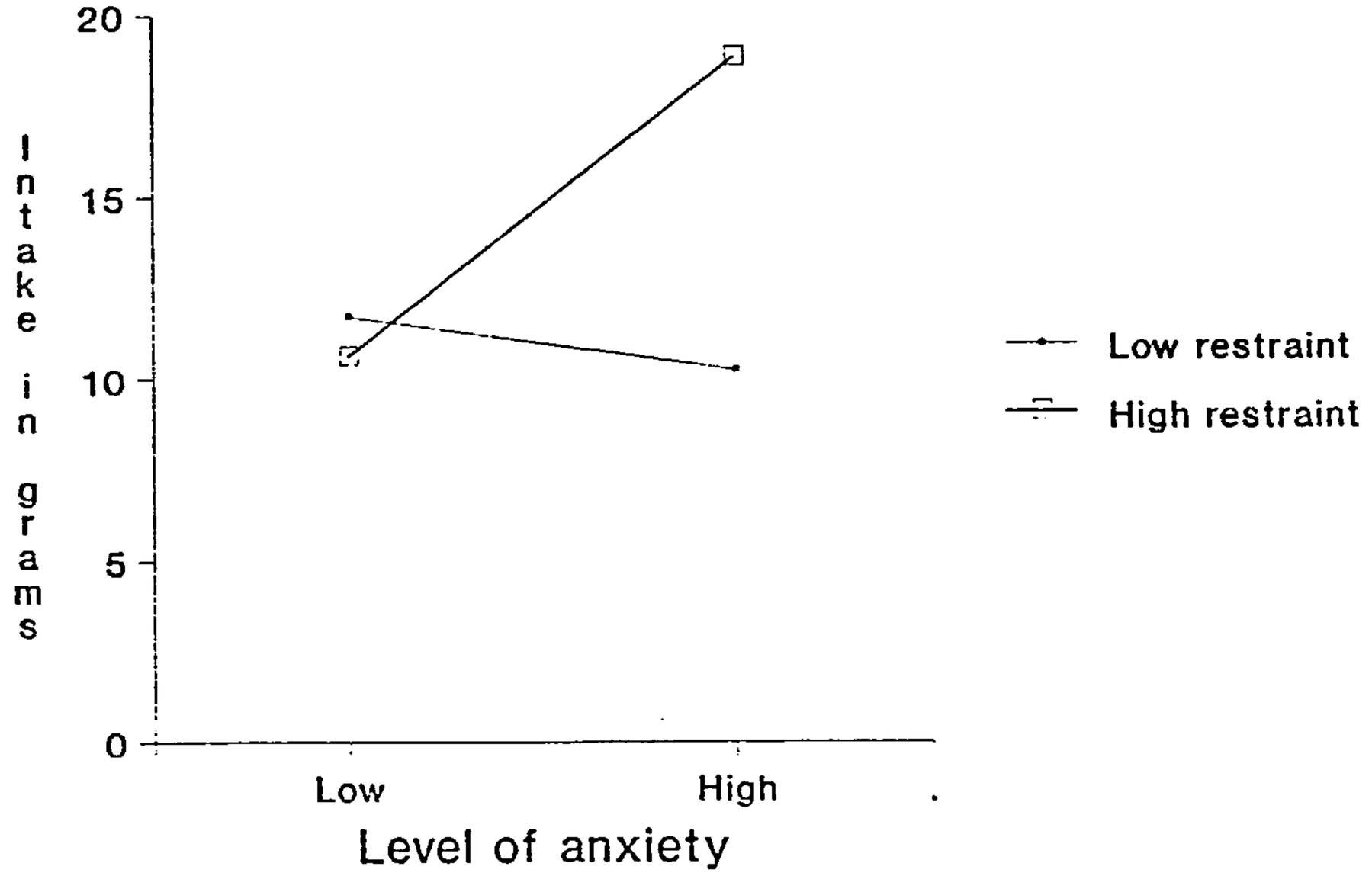

Figure 3.6

Consumption - Chocolate Hobnob
16 year olds

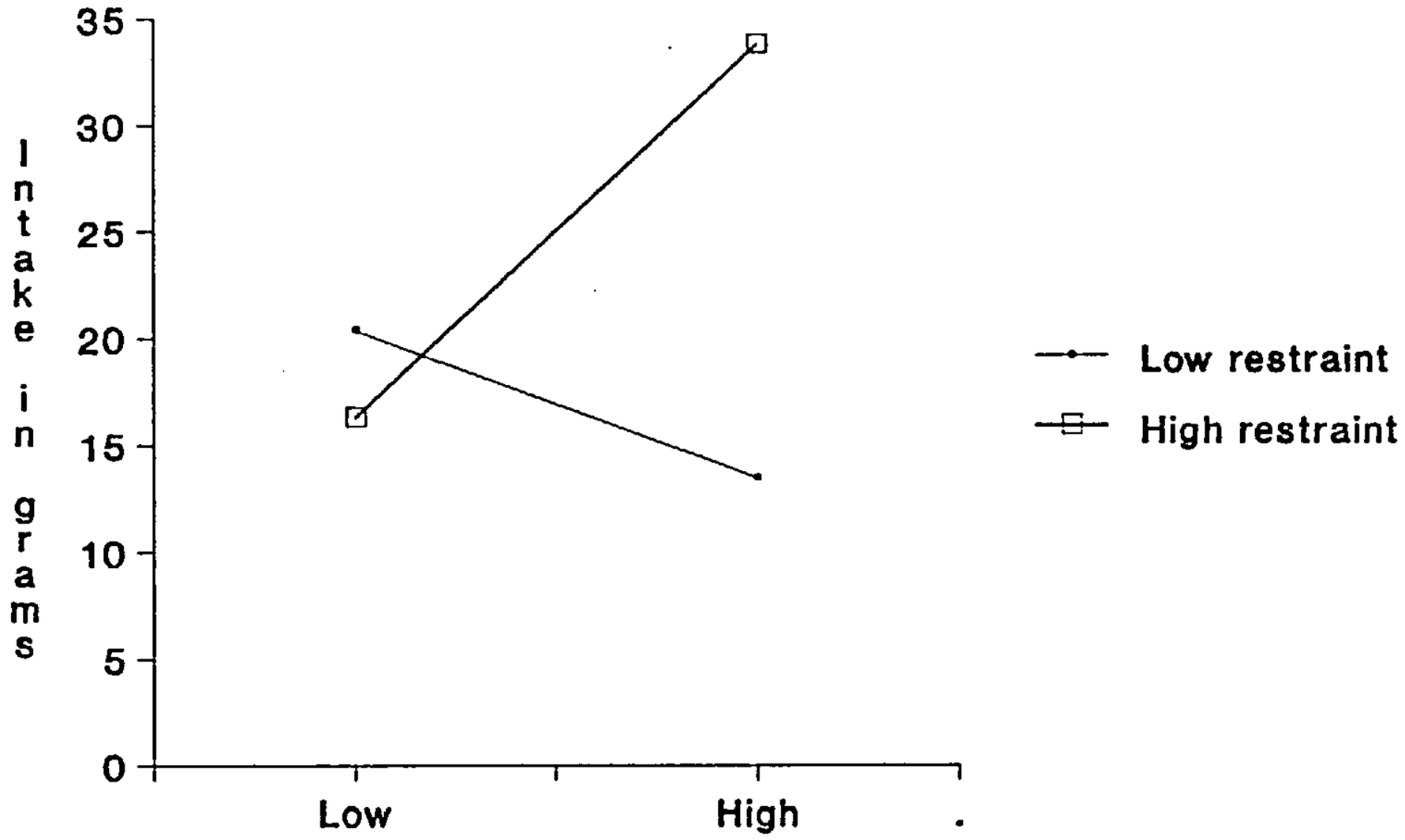

Figure 3.7

3.4 DISCUSSION

The aim of the present study was to evaluate the role of anxiety as a potential disinhibitor for restraining adolescents, to evaluate any age effects and to assess the role of forbidden/permitted foods in the disinhibition process.

3.41 The role of anxiety

Results indicated that high levels of restraint occurred within both age groups: 13 and 16 year olds, with the younger cohort scoring just as highly on the restraint scale as the older girls. Data revealed a positive correlation between restraint and consumption during the taste test in the experimental condition and no such relationship occurred in the control condition. Clearly restraint was functional in predicting eating behaviour as a result of being disinhibited under conditions of anxiety. This study is the first to demonstrate anxiety as a disinhibitor in the adolescent population, and its interactive role with restraint as functional in producing higher levels of consumption.

3.42 Age effects

An investigation of age effects, demonstrated that only highly restrained 16 year olds in the experimental high anxiety condition, were predominantly influenced, eating almost twice the amount of biscuits than their

unrestrained counterparts in the 16 year old cohort. No such effect occurred in the 13 year old group. Thus while restraint seems to be a feature at the age of 13, it does not appear to have the functional effect of producing disinhibition when faced with potential restraint terminators. A developmental effect seems to be present, with older adolescents being more influenced by their restraint practices than the younger girls.

3.43 Forbidden and Permitted Biscuits

Analyses of the types of biscuits consumed produced interesting outcomes. Krackawheat and shortcake resulted in no significant effects - and given these two biscuits were the most bland this was not surprising. Krackawheats would be perceived as dietary permitted (Knight & Boland, 1989) and the shortcake biscuits would fall into the same category, given that they were not the shortcake type of biscuit that is coated in sugar.

Consumption of fruit shortcake biscuits and the custard creams showed differences however. The results indicated that for both biscuit high restrainers in the high anxiety condition ate significantly more of these biscuits. This would concur with the forbidden food hypothesis - once disinhibited, high restrainers are likely to consume more of these foods, though while diet intact, they would avoid them. The results of this study provide further support for the importance of the

forbidden/permitted food discrimination.

Chocolate hob nobs demonstrated even more specificity, with highly restrained, highly anxious subjects in the older age group eating significantly more of these biscuits. This is an interesting effect, as it seems to suggest that chocolate is forbidden only in the 16 year old group and not (yet) in the 13 year old group.

3.44 Methodological Problems

There were some methodological problems with this study which may have affected the results. There were no baseline measures of anxiety, thus a check could not be made for differential levels of anxiety across groups prior to the induction of the anxiety manipulation.

3.45 Conclusion

The aim of the present study was to assess the effect of anxiety, age and restraint in adolescence. Results indicated that a restraint x anxiety interaction occurred only in the older (16) age group. Forbidden biscuits were more likely to be consumed by the disinhibited restrainers. These findings are of importance in providing more information about the functional nature of restraint in the adolescent population.

Bibliography - Chapter Three

Bleau, R. (1990). Dietary restraint in adolescents - a review of Hill, et al, 1989. The Psychologist, 3(10), 459-460.

Davies, E., & Furnham, A. (1986). Body satisfaction in adolescent girls. British Journal of Medical Psychology, 59, 279-287.

Edwards, K. A. (1978). An index for assessing weight change in children: weight/height ratios. Journal of Applied Behavior Analysis, 11, 421-429.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 43, 647-660.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint and eating behaviour. Journal of Abnormal Psychology, 85, 666-672.

Herman, C. P., Polivy, J., Lank, C., & Heatherton, T. F. (1987). Anxiety, hunger and eating behaviour. Journal of Abnormal Psychology, 96, 264-269.

Heunnemann, R. L., Shapiro, L. R., Hampton, M. C., & Mitchell, B. W. (1968). Food and eating practices of teenagers. Journal of the American Dietetic Association, 53, 17-24.

Hill, A. J., Rogers, P. J., & Blundell, J. E. (1989). Dietary restraint in young adolescent girls: a functional analysis. British Journal of Clinical Psychology, 28, 165-176.

Knight, L. J., & Boland, F. J. (1989). Restrained eating: an experimental disentanglement of the disinhibiting variables of perceived calories and food type. Journal of Abnormal Psychology, 98, 412-420.

Moses, N., Banilivy, M. M., & Lifshitz, F. (1989). Fear of obesity among adolescent girls. Pediatrics, 83, 393-398.

Nylander, I. (1971). The feeling of being fat and dieting in a school population. Acta socio-medica Scandinavica, 1, 17-26.

Ruderman, A. J. (1985). Dysphoric mood and overeating: a test of restraint theory's disinhibition hypothesis. Journal of Abnormal Psychology, 94, 78-85.

Schachter, S., Goldman, R., & Gordon, A. (1968). The effects of fear, food deprivation and obesity on eating. Journal of Personality and Social Psychology, 10, 91-97.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. (1968). State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychology Press.

Stunkard, A. J. (1981). "Restrained eating": What it is and a new scale to measure it. In L. A. Cioffi, W. P. T. James, & T. B. Van Itallie (Ed.), The body weight regulatory system: normal and disturbed mechanisms (pp. 243-251). New York: Raven Press.

Stunkard, A. J., & Messick, S. (1985). The three factor eating questionnaire to emasure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research, 29, 71-84.

Wadden, T. A., Foster, G. D., Stunkard, A. J., & Liinowitz, J. R. (1989). Dissatisfaction with weight and figure in obese girls: discontent but not depression. International Journal of Eating Disorders , 5, 89-97.

Wardle, J., & Beales, S. (1986). Restraint, body image and food attitudes in children from 12 to 18 years. Appetite, 7, 209-217.

Wardle, J., & Beales, S. (1988). Control and loss of control over eating: an experimental investigation. Journal of Abnormal Psychology, 97, 35-40.

CHAPTER 4 - THE EFFECTS OF IMAGINING EATING IN RESTRAINED AND UNRESTRAINED EATERS

4.1 INTRODUCTION

Restrained eating is a major factor governing eating behaviour (Herman & Mack, 1975; Herman & Polivy, 1984; Hibscher & Herman, 1977; Spencer & Fremouw, 1979). Although restrained eaters normally limit their intake, under certain circumstances, such restraint is broken (disinhibition) and as a result intake is greatly increased (counter-regulation). A number of variables have been found to disinhibit restrained eaters and produce the effect of counter-regulation: stress or anxiety, e.g. (Herman & Polivy, 1975; Herman, Polivy, Lank & Heatherton, 1987) also, see Chapter 3 for effects of anxiety in the adolescent population; depression e.g. (Frost, Goolkasian, Ely & Blanchard, 1982; Ruderman, 1985) and the most extensively explored, the preload - the seminal study being published in 1975 by Peter Herman and Deborah Mack, then of North Western University, Illinois.

A variation on the preload has been the mere exposure to the sight and smell of palatable food. Rogers and Hill (1989) hypothesised that a simple exposure to food would increase motivation to eat by, for example, the effect of the presence on food on various physiological

processes such as the release of insulin (Powley, 1977). Subjects were presented with a display of food and colour pictures of food and were asked to imagine eating the food. It was made quite clear to them that they would not eat the food. This experimental manipulation brought about the predicted disinhibition in restrained eaters.

Furthermore, even the imagination procedure alone without the presence of food has produced the disinhibitory effect in restrained eaters (Hill, Rogers & Blundell, 1989). Subjects had to imagine eating food as part of the experimental procedure and restraint was found to functional with a higher food consumption rate in the incidental taste test after exposure to the imagination condition.

However, there has been a dearth of studies using this procedure and thus no replication of these findings exist, which seem to indicate that even thinking about eating food will provide a powerful enough trigger to precipitate the cognitively mediated disinhibition process in restrained eaters. Further inquiry is necessary to assess the capacity of such a procedure to cause violation of restraint.

Much of the restraint research carried out to date has

focused on females rather than males though reported gender differences indicate that disordered eating and concern with dieting are much more prevalent in women than men (Kristeller & Rodin, 1989; Striegel-Moore, Silberstein & Rodin, 1986). Some research points to higher levels of intake in males as a main effect of sex, irrespective of level of restraint e.g. (Klesges, Klem & Bene, 1989). Further investigation of the sex variable within the restraint experimental research design is warranted.

Recent research has signalled the choice as well as the quantity of food consumed following disinhibition (Charnock, 1989) as being an important issue and indeed Tuschl, *et al*, 1990 have indicated that differences exist between restrained and unrestrained eaters, with restrained eaters avoiding fat in their diet. Another perspective pertinent to type of food, is the permitted-forbidden dimension (Knight & Boland, 1989) and Wardle and Beinart (1981) have demonstrated that even the consumption of small amounts of a forbidden food can lead to binge-eating. According to Knight and Boland's interpretation of their data, a dietary forbidden food is more instrumental in disrupting restraint for restrained eaters than a high calorie food.

The aim of the present study was to investigate the effects of restraint, sex and imagining eating food on motivation to eat and prospective consumption, a variation on the taste test, which involved no actual eating, but a measure of what foods subjects indicated they would eat.

It was predicted that dieters would be disinhibited following the experimental condition (imagination procedure) which would be manifested in raised levels of motivation to eat and an indication of a higher number of food items selected, with an increase in forbidden foods. It was predicted that females and males would respond differently, though no predictions were made about direction on the various outcome measures.

4.2 METHOD

4.21 Overview

Female and male subjects were assessed as high or low restrainers, then randomly assigned to the experimental or control condition. Prospective consumption and motivation to eat were evaluated by use of a food checklist (see Appendix 9) and 100 millimetre visual analogue rating scales, respectively (Hill, Leathwood & Blundell, 1987). Restraint was assessed by the

restraint subscale of the Dutch Eating Behaviour Questionnaire (D.E.B.Q.) (Van Strien, Frijters, Bergers & Defares, 1986) (see Appendix 11).

4.22 Subjects

Subjects were recruited from a second-year undergraduate psychology course. At the time of recruitment, subjects were required to fill out the D.E.B.Q. restraint subscale. Initially, 52 subjects registered for an experimental session, however because of problems with timetabling, 6 subjects were unable to participate. Thus 23 males (mean age = 19 years, 6 months) and 23 females (mean age = 19 years, 10 months) took part in the study.

4.23 Design

Subjects from each gender group were designated as high or low restrainers on the basis of a median split on the restraint scores of each sex, (males: low restrainers < 1.6, n=11, high restrainers > 1.7, n=12; females: low restrainers < 2.6, n=11, high restrainers > 2.7, n=12). Subjects were then assigned at random to one of two treatment conditions.The study was therefore of a between-subjects design with main factors restraint, sex and treatment. The dependent variables were measures of

prospective consumption and motivation to eat.

4.24 Procedure

The D.E.B.Q. restraint subscale was administered to the total subject group with the investigator present to answer any questions. The 10-item questionnaire was introduced as a scale to provide information about their eating habits and was described as being preliminary to a perception study concerning food. Subjects had ample time to complete the questionnaire, which resulted in no missing values on the restraint variable. Experimental time slots were allocated and subjects were required to return for further testing in the following weeks.

4.24.1 Experimental Group

Subjects were told that they had been assigned to the "group which will provide information about how you feel after having imagined eating food". They were invited to fill out a range of visual analogue scales designed to give an indication of how they were feeling "at the moment". The subjective ratings of motivation to eat were measured by 4 dimensions i/ desire to eat ii/ hunger iii/ fullness and iv/ amount on 100 millimetre visual analogue scales with phrases anchored at both ends, viz.:

i/ How strong is your desire to eat?

(Very strong - Very weak)

ii/ How hungry do you feel?

(As hungry as I have ever felt - Not at all hungry)

iii/ How full do you feel?

(Very full - Not at all full)

iv/ How much food do you think you could eat?

(A large amount - Nothing at all)

Having completed this first set of rating scales subjects were then invited to think about a food that they would like to eat at that moment. Having chosen a food, they were asked to imagine eating the food. To aid in this cognitive process they were required to describe the sensory qualities associated with the food and to relate these out loud to the experimenter.

4.24.2 Control Group

Subjects in the control condition were told that they had been assigned to the "group which will provide information concerning the relationship between hunger perception and experimental task completion". As with

the experimental condition, subjects were asked to fill out motivation to eat scales to give an indication of how they were feeling "at the time".

In contrast to the experimental condition, subjects were asked to complete the "experimental task" - a series of grammar and logic questions which took roughly 6 minutes to complete (see Appendix 11), which was approximately the same length of time spent in the experimental condition on imagining eating a palatable food.

4.24.3 Both Groups

From this point on all subjects were treated identically. They were asked to complete a further set of (the same) motivation to eat rating scales. Then they had to choose from a list of foods, any food which they would eat immediately if they were able to. A list of 10 items were on offer, of varying calorific value and of varying degree on the permitted-forbidden dimension. Subjects were asked to choose one or more foods, or none if that was their choice. Subjects also had to give details of the time they had last eaten along with a description of the food.

4.3 RESULTS

4.31 Properties and Choice of Restraint Scale

The restraint subscale of the Dutch Eating Behaviour Questionnaire was used in this study. This 10-item scale has proven validity with British subjects (Wardle, 1987) and is generally believed to be easier to complete than the original Restraint Scale (Herman, Polivy, Pliner, Threlkeld & Munic, 1978) as it does not have questions relating to weight per se. (However, see Chapter 5 for discussion of psychometric issues pertaining to the measurement of restraint). The scale is scored by summing the scores on all the individual questions and dividing the total by the number of questions answered. The minimum score obtainable is 0.8 and maximum is 5.0.

4.32 Classification of Subjects

Subjects from each gender group were divided into restrained and unrestrained groups on the basis of a median split of scores on the D.E.B.Q. restraint subscale. In the male subject group, restrained eaters were classified as scoring 1.7 or more (n = 12); male subjects scoring 1.6 or less were classified as unrestrained (n = 11). In the female subject group, restrained eaters were classified as scoring 2.7 or more

(n = 12); female subjects scoring 2.6 or less were classified as unrestrained (n=11). The decision to segregate subjects by gender and classify as restrained and unrestrained separately in each group was on based on significant sex differences on restraint, $t(44) = 4.44$, $p<.001$, with females scoring significantly higher (mean = 2.73, SD = 0.79) than males (mean = 1.76, SD = 0.67). These restraint levels are similar to those reported by Wardle (1987), with her sample indicating a female mean (± SD) of 2.75 (± .77) and male mean of 1.88 (±.77). The effect of the median split produced highly significant differences in restraint scores in both gender groups. In the male subject group, $t(21) = 6.94$, p>.001, with unrestrained subjects reporting a mean of 1.24, SD = 0.25 and restrained subjects a mean of 2.34, SD = 0.48; and in the female subject group, t(21) = 6.61, p<.001, with unrestrained subjects reporting a mean of 2.12, SD = 0.42 and restrained subjects a mean of 3.4, SD = 0.51>

4.33 Effects of Restraint, Treatment and Sex on Motivation to Eat

Four individual rating scales determined motivation to eat and these were analysed separately. Ratings taken pre-treatment were subtracted from ratings taken

post-treatment to provide a measure of CHANGE in motivation to eat, as the main focus of interest lay in an increased or decreased motivation to eat. Analysis of variance was carried out on pre-treatment ratings in order to ascertain that there were no significant differences between groups on base-line measures, as restrained eaters typically provide low self-reports of hunger (Wright, 1987). The analysis indicated no significant main or interaction effects pre-experimental treatment, thus any changes post-treatment could be attributed to effects of the experimental manipulation and interactions of this variable with gender or restraint. Four 3-way analyses of variance (ANOVA) were computed with main factors restraint, treatment and sex. The variable "time last eaten" only correlated significantly with the dependent variable "fullness" ($r = -.25$, $p<0.05$) therefore time as a covariate was entered into that ANOVA only.

4.33.1 Desire to eat

A significant main effect of treatment resulted $F(1,38) = 19.861$, $p<.001$ with desire to eat being significantly stronger in the experimental condition. In addition there was a significant interaction effect between restraint and treatment with unrestrained subjects' desire to eat being more elevated in the experimental

condition than that of restrained subjects (see figure 4.1), $F(1,38) = 5.927$, $p<.05$.

4.33.2 Hunger

A significant main effect of treatment resulted $F(1,38) = 13.908$, $p<.001$, indicating subjects became hungrier after the experimental condition, regardless of sex or restraint level.

4.33.3 Fullness

No main effects resulted from analysing the fullness dependent variable, however an almost significant interaction occurred with restraint and treatment, $F(1,38) = 9.406$, $p=.07$, with the pattern of means indicating that unrestrained subjects had an increased motivation to eat after the experimental condition whereas restrained subjects had a decreased motivation to eat after the experimental condition (see figure 4.2).

4.33.4 Amount

Significant main effects of sex, $F(1,38) = 9.500$, $p<.005$ and treatment, $F(1,38) = 9.662$, $p<.005$ resulted. These results demonstrated that females report they would like

Desire to Eat
Post - Pre Ratings

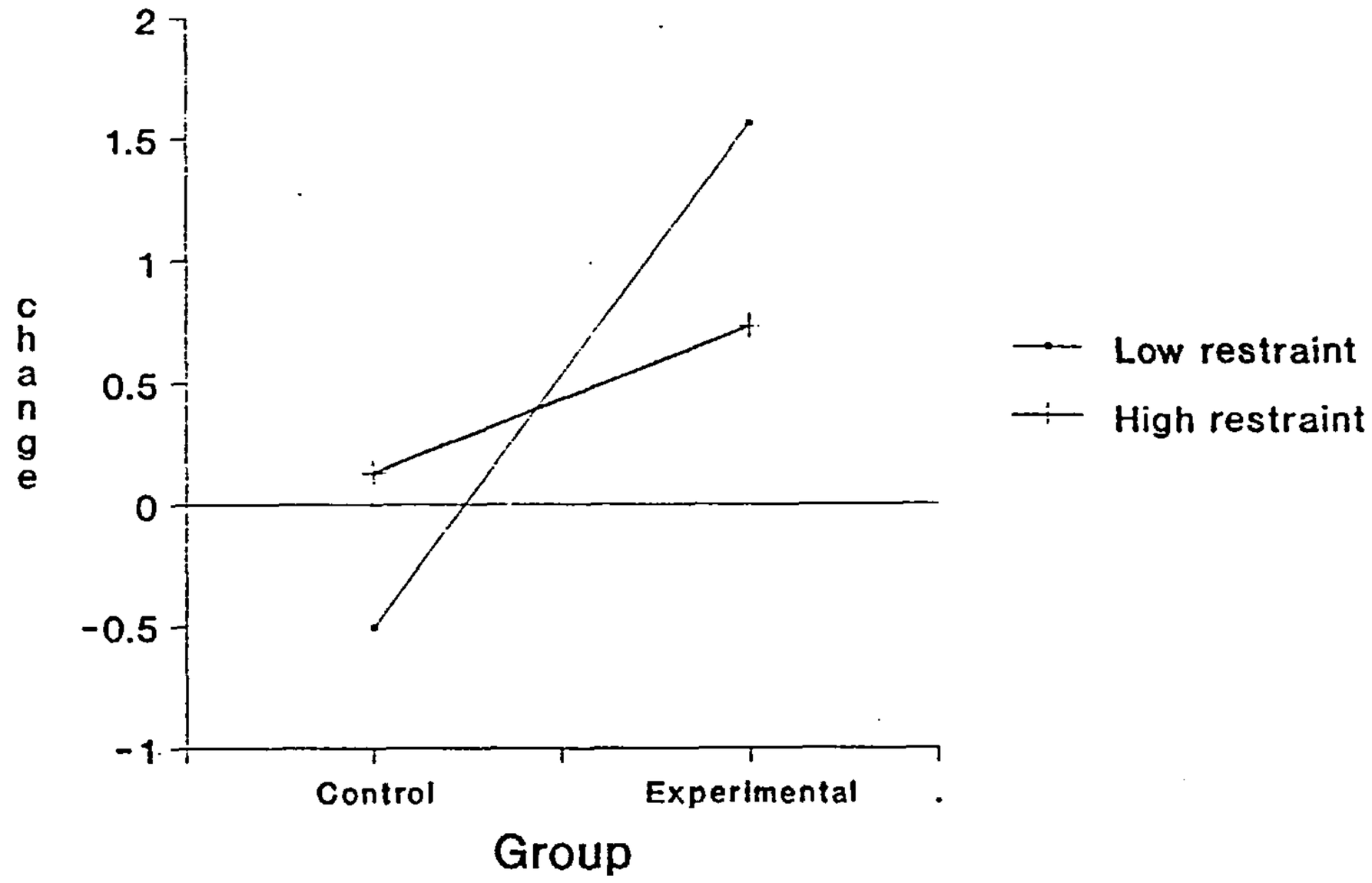

Figure 4.1

Fullness
Post - Pre Ratings

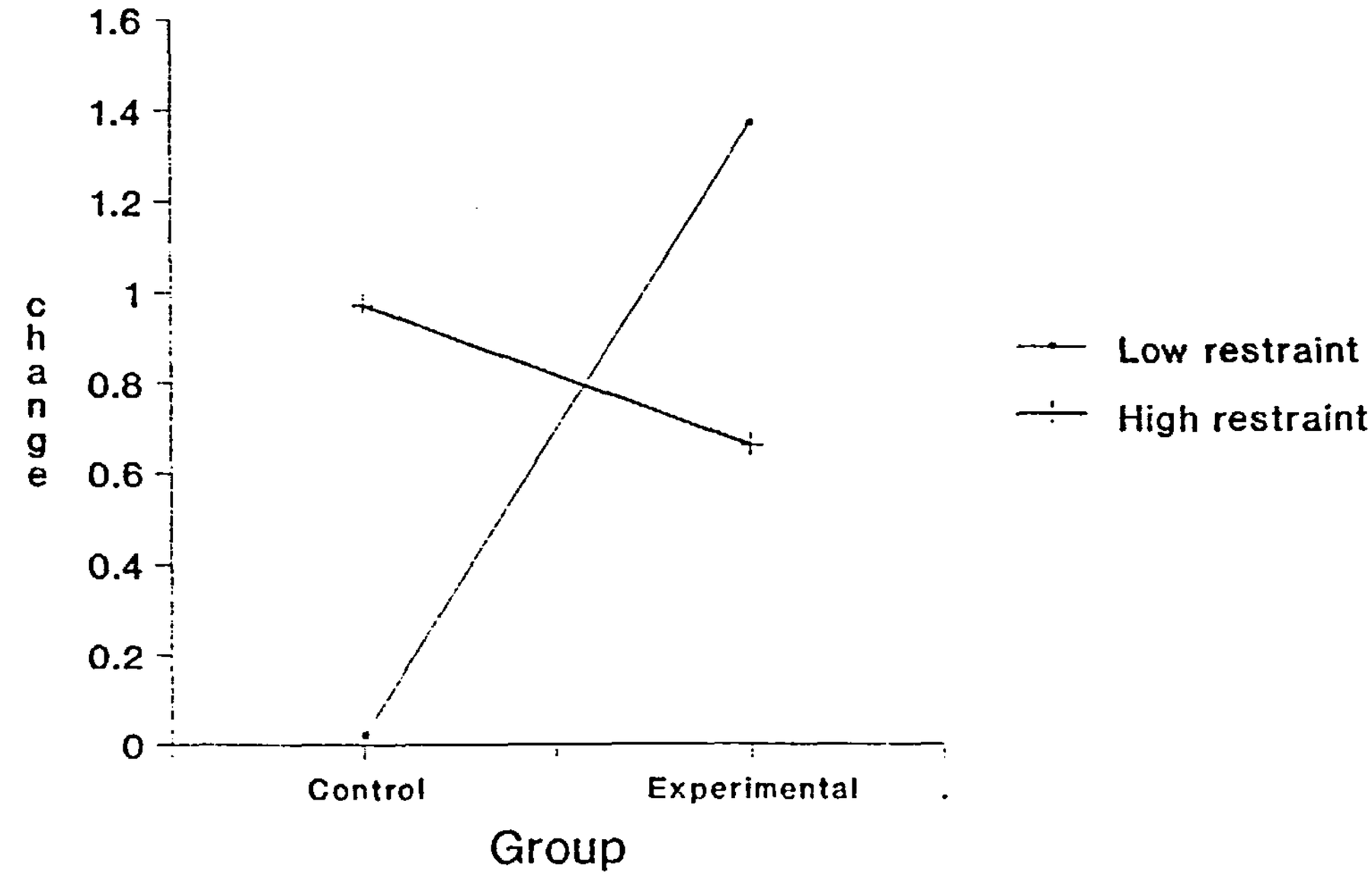

Figure 4.2

to eat more and males would like to eat less, and that subjects would eat more after the experimental condition than after the control. An almost significant interaction effect between these two variables gives further insight, F (1,38) = 3.266, p=.07; the pattern of means indicates that both males and females would eat more after the experimental condition than after the control condition, but that the increase is much larger in the females (see figure 4.3).

4.34 Effects of Restraint, Treatment and Sex on Prospective Consumption

After filling out the last set of rating scales on motivation to eat, subjects were invited to indicate which foods (none or one or as many desired) they would like to eat "at the moment". This dependent variable was analysed in three ways:

i/ Sum of number of items subjects indicated they would like to eat

ii/ Sum of ranks of items in terms of perceived calories subjects indicated they would like to eat

iii/ Sum of 3 "permitted" foods from the list and sum of 3 "forbidden" foods subjects said they would like to eat

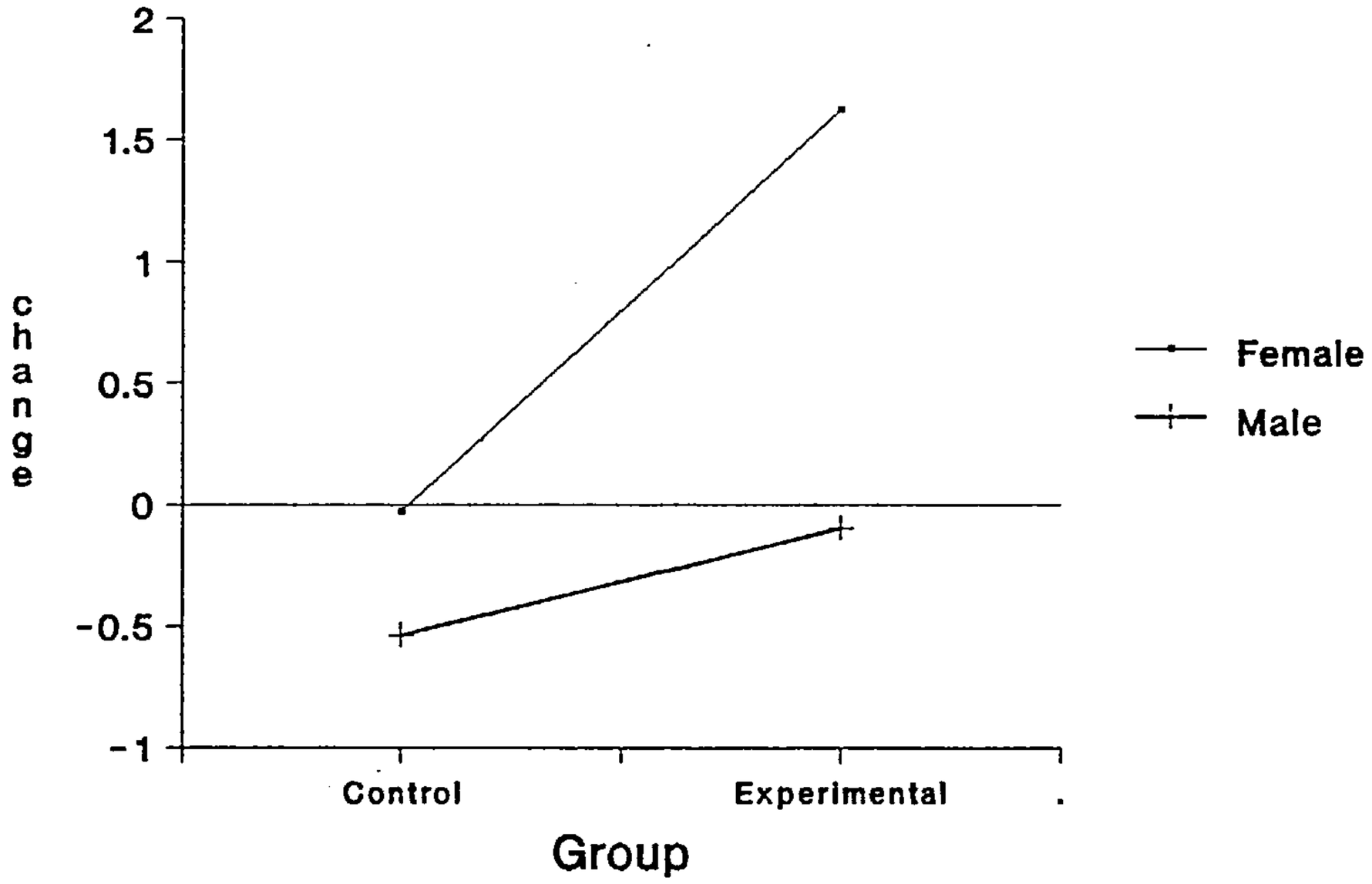
Amount
Post - Pre Ratings
2
1.5
1
0.5
0
-0.5
-1
change
Control
Experimental
Group
Female
Male

Figure 4.3

Three-way analyses of variance were carried out for each of the above computations with main factors as before - restraint, treatment and sex.

i/ Sum of items subjects said they would like to eat - this was an analysis based on how many food items subjects said they would like to eat, which resulted with a significant main effect of treatment $F(1,38) = 7.597$, $p,<.01$, the sum of the items being significantly greater after exposure to the experimental condition.

ii/Sum of ranks of perceived calories of items subjects said they would eat. As the perceived calorific values of foods was the pertinent criterion rather than actual calorific values, a coefficient of concordance was calculated on a sample n=19, on ranks designated to the foodlist items based on how many calories individuals <u>thought</u> were in each food item, $r=0.797$, $p<.01$.

A three way analysis of variance, resulted in significant main effect of treatment $F(1,38) = 5.389$, $p<.05$, the sum of ranks of perceived calories being significantly greater after the exposure to the experimental condition.

iii/ Analyses were carried out on permitted foods from

Permitted Foods

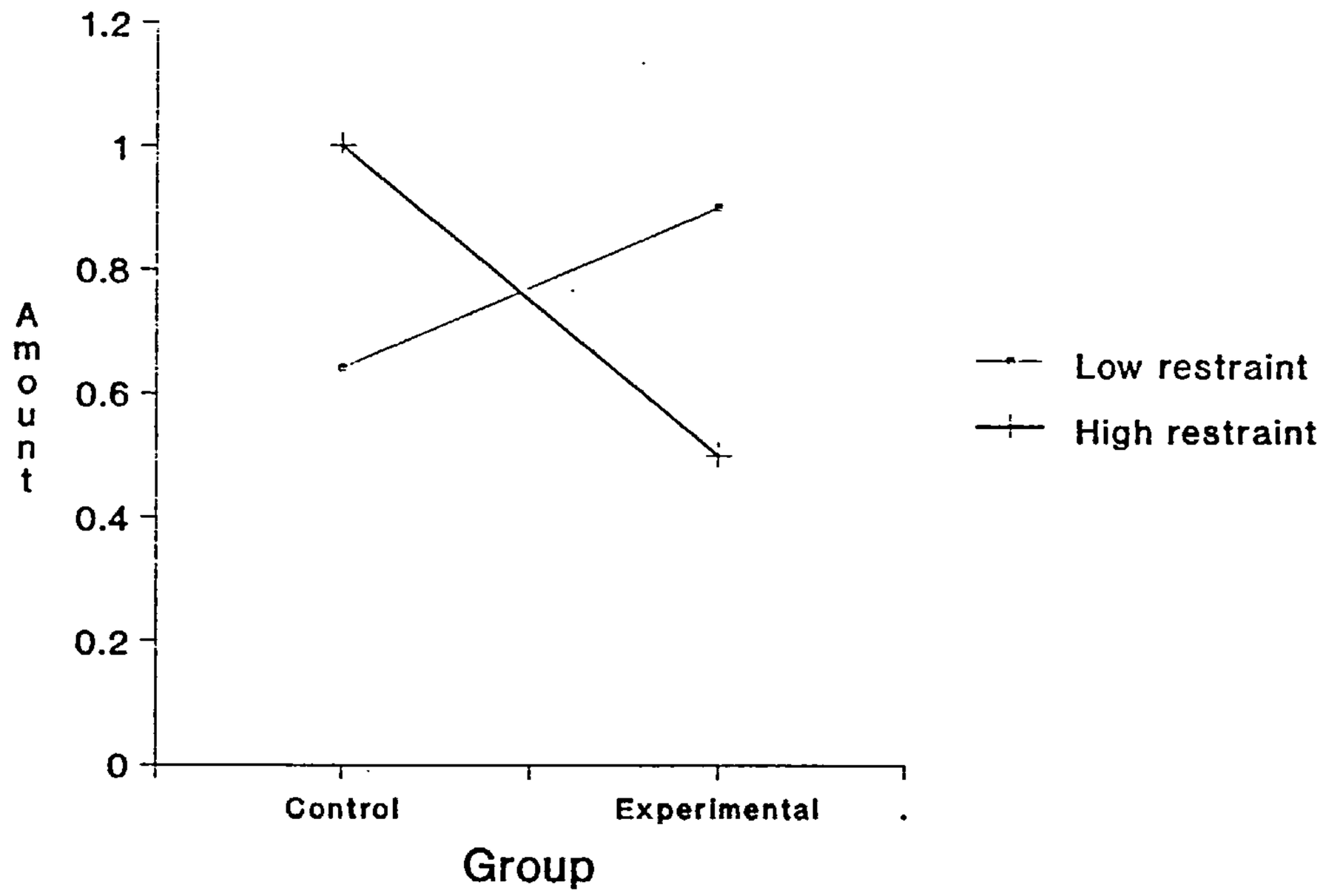

Figure 4.4

Forbidden Foods

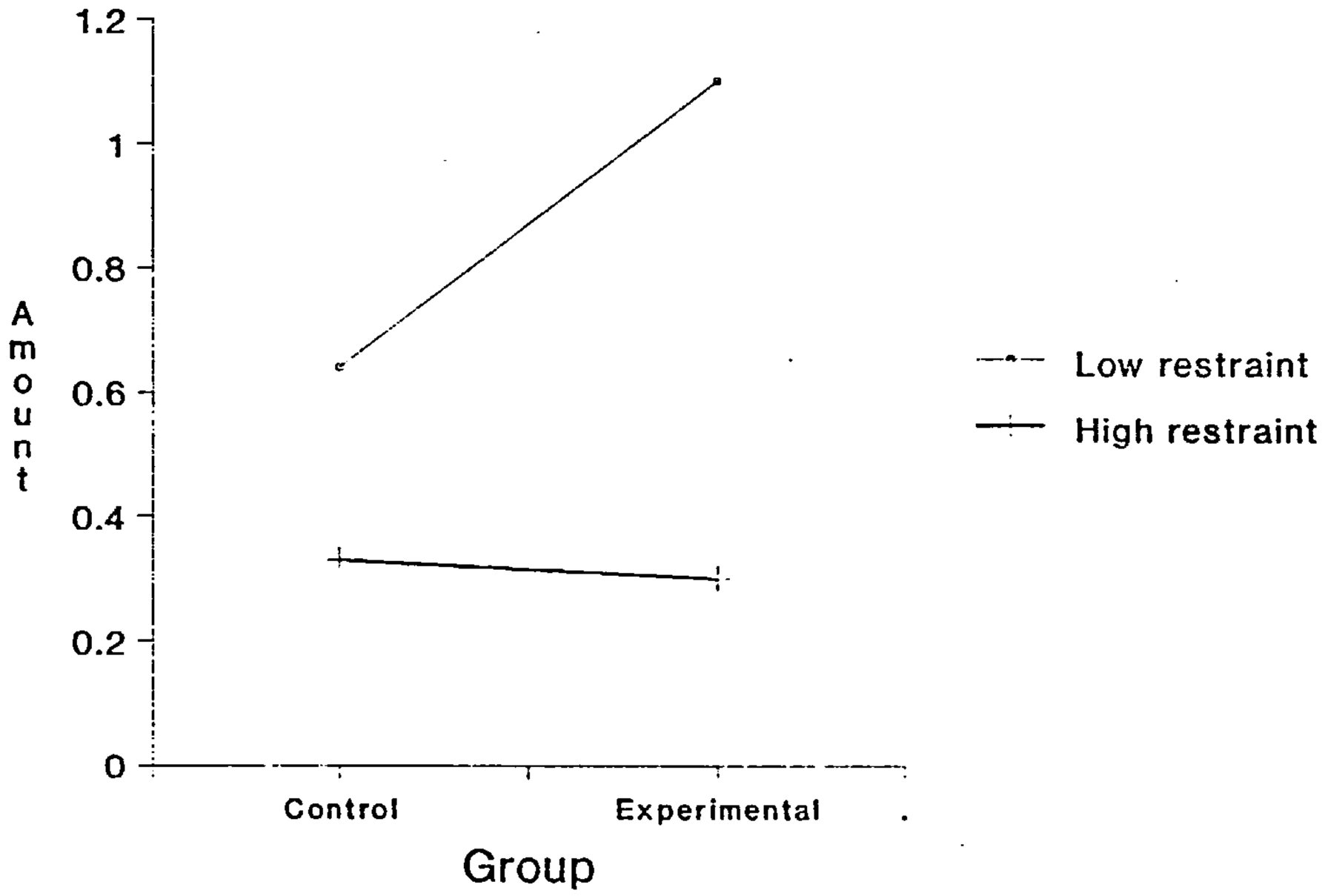

Figure 4.5

the checklist (apple, banana and salad roll) and forbidden foods (cheese toastie, crisps and mars bar).

A three-way ANOVA on permitted foods resulted in a significant main effect of sex $F(1,38) = 5.946$, $p<.05$, indicating females would eat more permitted foods than males, with no other main being significant. A near significant interaction effect ($p=.06$) between restraint and treatment occurred, with the pattern of means indicating that in the experimental condition low restrainers would eat MORE permitted foods and high restrainers would eat LESS (see figure 4.4).

The same three-way analysis carried out on forbidden foods revealed a significant main of restraint $F(1,38) = 8.64$, $p<.01$, with high restrainers indicating they would eat less forbidden foods than low restrainers, with no other main effects being significant. Again, a near significant interaction effect ($p=.07$) occurred between restraint and treatment, with the pattern of means indicating that high restrainers would not increase their intake on forbidden foods following exposure to the experimental condition, but that low restrainers would make such an increase (see figure 4.5).

4.4 DISCUSSION

The aim of the present study was to evaluate the effects of restraint and gender in an experimental situation of potential disinhibition - that of imagining eating food, which has been shown to disinhibit high restrainers (Hill, et al., 1989).

Results of the present study are counter to the prediction that restrained eaters would be disinhibited as a result of the experimental treatment. Indeed the some of the results would seem to support a maintenance of inhibition on the part of high restrainers as if they were "superinhibited", and demonstrating strengthened levels of inhibition.

4.41 Motivation to eat

This outcome measure was assessed from four rating scales: Desire to eat, Hunger, Fullness and Amount.

Desire to eat

While there was a main effect of experimental condition, contrary to the prediction of high restrainers being "disinhibited", the significant interaction resulted from a big increase in desire to eat on the part of low restrainers in the experimental condition. The post-minus-pre ratings for high restrainers indicated a slight effect of experimental condition, whereas the effect was much greater in the low restrainers (see

figure 3.1). This effect could be explained by low restrainers responding acting "rationally" to a procedure which requires imagining eating food - that is to demonstrate an increased desire to eat. However, the high restrainers demonstrated only a marginal effect in the direction of an increased desire to eat. Thus, far from the experimental condition producing a disinhibiting effect on high restrainers, these subjects were able to maintain their usual resolve of high restraint.

Hunger

The hunger ratings indicated a main effect of experimental condition with no other main or interaction effects being significant. This provides evidence that the effect of the imagination procedure was to increase hunger levels in subjects irrespective of gender or restraint level.

Fullness

No main effects resulted, but a near significant interaction effect ($p=.07$) indicated an effect of restraint and treatment condition. Again, the interaction indicated that for the low restrainers, they felt less full after the exposure to the imagination procedure but the high restrainers, remarkably felt more full. The effect of the imagining eating food but not

being exposed to food or having to eat food as part of the experimental procedure, seemed to allow restrainers to maintain their convictions and manifest their restrained cognitions.

Amount

Main effects of both gender and treatment occurred with this measure, indicating that females were more likely to indicate they could eat a large amount, and those in the experimental condition indicating they could eat a large amount. A near significant interaction (p=.07) between gender and treatment revealed an interesting effect that although males and females were both more likely to want to eat a large amount after exposure to the imagination procedure, the increase for females was much greater. It is difficult to know whether that which females indicate as a large amount is equal to what males would consider to be a large amount. However, in terms of baseline ratings, it is clear that females are more prone to respond to this procedure than males. There was no effect of restraint, but given that females are more restrained than males (see under classification of subjects) it could be that restraint is confounded with this gender variable.

4.42 Prospective Consumption

This outcome variable was measured in three ways using a

checklist of foods (see Appendix 9). The first 2 methods involved simply looking at a/ the number of items subjects picked from the list. (If you were given a choice, which of the following would you eat NOW; subjects were told that they could pick one or more items, or none if they did not want to eat any of them); b/ the sum of the ranks of perceived calories for foodlist items subjects selected.

These first 2 analyses revealed simple main effects of treatment condition only, with subjects in the experimental condition indicating they would eat a higher number of items and a higher total sum of ranks of perceived calories. This provides further support for the effect of the imagination procedure being one of increasing hunger levels and prospective consumption levels. No effect of restraint was evident, contrary to prediction.

The third method of measuring the outcome variable of Prospective Consumption, which enabled an analysis of a different perspective was a grouping of food items into Dietary Permitted and Dietary Forbidden foods. The checklist consisted of 10 items. Three of the items were meals (fish and chips, Big Mac with fries, and steak, chips and veg) and in terms of permitted and forbidden foods these items did not conform to the

notion of discrete items of food to be allowed or avoided. Another item was a milkshake, and although this is perceived as a forbidden food in the U.S. and Canada, it suffers a certain ambiguity in the U.K. with respect to its utility for example, as a suitable preload, see (Wardle & Beales, 1987). It was felt that as this item had an uncertain status it should be excluded from consideration of the forbidden/permitted food analysis. Thus, three items from the checklist made up the forbidden foods and three made up the permitted foods, viz. forbidden - mars bar, bag of crisps, cheese toastie; permitted - apple, banana and salad roll.

Permitted Foods

Analysis of the permitted foods revealed a main effect of sex, with females more likely to select permitted foods than males. In addition, a near significant interaction effect ($p=.06$) between restraint and treatment condition, indicated that low restrainers in the experimental condition would eat <u>more</u> permitted foods, and high restrainers would eat <u>less</u> permitted foods. This may be a result of superinhibition on the part of restrained eaters, for although they were part of the overall cohort in the experimental condition indicating higher levels of hunger, they chose less items, irrespective of the fact that such items are

permitted. On the other hand, low restrainers felt more motivated to eat and indicated that they would select more items than high restrainers.

Forbidden Foods

Analysis of forbidden foods revealed a main effect of restraint, with high restrainers indicating they would select significantly less forbidden foods. Further, a near significant interaction effect between restraint and treatment, demonstrated that the experimental condition had virtually no effect on restrainers with respect to selecting forbidden foods, with low levels being the norm for both conditions, but low restrainers are much more likely to select forbidden foods in the experimental condition than in the control.

This analysis reveals clear differences between restrainers and non-restrainers, with restrainers being significantly less likely to select forbidden foods irrespective of treatment condition or sex. The interpretation in line with all the results of this study supports a superinhibition hypothesis, and restrainers are demonstrating a maintenance of restraint as they are able to do so, not being tempted with actual or anticipated food, whereas low restrainers are responding in a way, which indicates that they are not constrained by the concept of forbidden food and in

addition, respond in an intuitive way to the process of imagining eating food - i.e. it increases their motivation to eat.

Far from supporting the disinhibition hypothesis the results of this study, when taken together, indicate that restrainers were "superinhibited" in the experimental treatment condition. While these results are contrary to predictions made, such predictions were made in the light of the capacity of imagining eating, mimicking the effect of the preload, to produce disinhibition. The imagination procedure in this study simply did not have such an effect. It had a very interesting consequence of reinforcing the resolve of the restrainer, such that s/he either maintained his/her baseline levels or had a decreased "motivation to eat" and the interpretation of these results further supports the Boundary Model which implicates very strongly the role of cognitions in the control of eating irrespective of internal hunger states.

4.43 Methodological Problems

There are some methodological problems with the present study which may have influenced the results. In the imagination procedure, subjects were asked to think of a food which they would quite like to eat at the time.

That is to say, there was no uniformity with respect to which foods they would think of, and conceivably this may have had an effect on outcome. If all subjects had been given pictures of the same palatable food to look at, this would have introduced a level of control across conditions.

There is the possibility also that the control condition procedures might have induced anxiety, rather than provide a neutral condition for the control subjects. Clearly, this would provide extreme problems for interpretation of results; however, while acknowledging this as a possiblity, it is the opinion of the experimenter that anxiety was not experienced by the control condition subjects, and that they seemed fairly relaxed as they completed the grammar and logic questions provided. The subjects in this study were undergraduate students and it is unlikely that they would have felt intimidated by such a task.

Finally, there is the problem of sex differences in the the baseline measures of restraint, that is to say, highly restrained males do not score nearly as highly on the scale as do highly restrained females. There is the difficulty of ascertaining whether in fact the highly restrained males are REALLY highly restrained, or whether or not an artificial distinction between low and

high male restrainers is being made on the basis of a median split. Further research is required to discover if there are "real" male high restrainers and if so, whether these individuals behave similarly to female high restrainers or not.

4.44 Conclusion

The aim of the present study was to assess restraint, gender and imagining eating on motivation to eat and prospective consumption. Contrary to expected results, the treatment condition produced a "superinhibiting" effect on high restrainers rather than a disinhibiting effect. These findings are of importance in the light of restraint theory as there has been a paucity of material produced to demonstrate the normative effect of restraint, i.e. to defend high levels of restraint when possible.

Bibliography - Chapter Four

Charnock, D. J. K. (1989). A comment on the role of dietary restraint in the development of bulimia nervosa. British Journal of Clinical Psychology, 28, 329-340.

Frost, R. O., Goolkasian, G. A., Ely, R. J., & Blanchard, F. A. (1982). Depression, restraint and eating behaviour. Behavior Research and Therapy, 20, 113-121.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 43, 647-660.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint and eating behaviour. Journal of Abnormal Psychology, 85, 666-672.

Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A. J. Stunkard, & E. Elliot (Ed.), Eating and its disorders (pp. 141-156). New York: Raven Press.

Herman, C. P., Polivy, J., Lank, C., & Heatherton, T. F. (1987). Anxiety, hunger and eating behaviour. Journal of Abnormal Psychology, 96, 264-269.

Herman, C. P., Polivy, J., Pliner, P., Threlkeld, J., & Munic, D. (1978). Distractibility in dieters and non-dieters: an alternative view of "externality". Journal of Personality and Social Psychology, 36, 536-548.

Hibscher, J. A., & Herman, C. P. (1977). Obesity, dieting and the expression of obese characteristics. Journal of Comparative and Physiological Psychology, 91, 374-380.

Hill, A. J., Leathwood, P. D., & Blundell, J. E. (1987). Some evidence for short-term caloric compensation in normal weight human subjects: the effects of high-and-low energy meals on hunger, food preference and food intake. Human Nutrition: Applied Nutrition, 41A, 244-257.

Hill, A. J., Rogers, P. J., & Blundell, J. E. (1989). Dietary restraint in young adolescent girls: a functional analysis. British Journal of Clinical Psychology, 28, 165-176.

Klesges, R. C., Klem, M. L., & Bene, C. R. (1989). Effects of dietary restraint, obesity and gender on holiday eating behavior and weight gain. Journal of Abnormal Psychology, 98, 499-503.

Knight, L. J., & Boland, F. J. (1989). Restrained eating: an experimental disentanglement of the disinhibiting variables of perceived calories and food type. Journal of Abnormal Psychology, 98, 412-420.

Kristeller, J. L., & Rodin, J. (1989). Identifying eating patterns in male and female undergraduates using cluster analysis. Addictive Behaviors, 14, 631-642.

Powley, T. L. (1977). The ventromedial hypothalamic syndrome, satiety and cephalic phase hypothesis. Psychological Review, 84, 89-126.

Rogers, P. J., & Hill, A. J. (1989). Breakdown of dietary restraint following mere exposure to food stimuli: interrelationships between restraint, hunger, salivation and food intake. Addictive Behaviours, 14, 387-397.

Ruderman, A. J. (1985). Dysphoric mood and overeating: a test of restraint theory's disinhibition hypothesis. Journal of Abnormal Psychology, 94, 78-85.

Spencer, J. A., & Fremouw, W. J. (1979). Binge-eating as a function of restraint and weight classifcation. Journal of Abnormal Psychology, 88, 262-267.

Striegel-Moore, R. H., Silberstein, L. R., & Rodin, J. (1986). Toward an understanding of risk factors for bulimia. American Psychologist, 41, 246-263.

Tuschl, R. J., Laessle, R. G., Platte, P., & Pirke, K. M. (1990). Differences in food-choice frequencies between restrained and unrestrained eaters. Appetite, 14, 9-14.

Van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch eating behaviour questionnaire for assessment of restrained, emotional and external eating behaviour. International Journal of Eating Disorders, 5, 295-315.

Wardle, J. (1987). Eating style: a validation study of the Dutch Eating Behaviour questionnaire in normal subjects and women with eating disorders. Journal of Psychosomatic Research, 31, 161-169.

Wardle, J., & Beales, S. (1987). Restraint and food intake: an experimental study of eating patterns in the laboratory and in normal life. Behaviour Research and Therapy, 25, 179-185.

Wardle, J., & Beinart, H. (1981). Binge eating: a theoretical review. British Journal of Clinical Psychology, 20, 97-109.

Wright, P. (1987). The psychology of eating and eating disorders. In A. Beloff, & A. Coleman (Ed.), Psychology Survey No. 6 (pp. 140-166). Leicester: The British Psychological Society.

CHAPTER 5 - THE MEASUREMENT OF RESTRAINT: AN INVESTIGATION OF THE CURRENT PSYCHOMETRIC TOOLS

5.1 INTRODUCTION

Research on eating behaviour has unfolded from the examination of differences as a function of body weight to an investigation of differences as a function of weight suppression (Nisbett, 1972). Further research revealed the importance of cognitive restraint (dieting) in the control of eating (Herman & Mack, 1975; Herman & Polivy, 1975) and the Restraint Scale (Herman, et al., 1975; Polivy, Herman & Warsh, 1978) was proposed as a simple self-report device to identify chronic dieters.

However, since the early 1980s the scale has been subjected to much criticism: 1/ for having a bi-factor structure, Concern for Dieting and Weight Fluctuation, (Blanchard & Frost, 1983; Drewnowski, Riskey & Desor, 1982a; Ruderman, 1983) 2/ for failing as an appropriate measure of restraint amongst the obese population, (Johnson, Lake & Mahan, 1983; Ruderman & Christison, 1983; Ruderman & Wilson, 1979) 3/ for confounding disinhibition with restraint, and not measuring "pure" restraint (Wardle, 1986). Responses to these criticisms from Herman and his colleagues are found in Heatherton et al's article (Heatherton, Herman, Polivy, King & McGee, 1988).

On the first criticism, the bi-factor structure, p.23:

> "The principle that a single scale ought to measure a

single construct does not mean, however, that a scale ought not to contain two or more correlated factors. Rather, it simply requires that the component factors be statistically and conceptually related; that is, they should measure *different aspects* of the *same construct*. ... It is clear from the relatively strong correlation between CD and WF that the two are sufficiently related to satisfy the demand that a single scale ought to measure a single construct, yet dissimilar enough so that they do not supply redundant information.'

Heatherton et al's response to the criticism that the Restraint Scale is not measuring a single construct is convincing and supports their case, which has been presented previously (Herman & Polivy, 1982). Further, the second factor of the Restraint Scale is often misrepresented by others as being a measure of overweight (Drewnowski, Riskey & Desor, 1982b), which is inaccurate, it is a measure of weight <u>fluctuation</u>. It has been demonstrated that weight fluctuation is characteristic of chronic dieters (Herman, et al., 1982).

On the second criticism, the obese population problem, there are three main lines of reproach: first, the scale does not accurately measure restraint in obese respondents; second, the factor structure of the scale is different among the obese; and third, restrained obese do not parallel behaviours of restrained normal-weight persons.

With respect to the first line of reproach, p.21.

> "On balance, the evidence does not clearly support the claim that obese subjects' higher restraint scores are simply a matter of greater weight fluctuation...Such dieting, along with the sporadic excessive eating to which dieting conduces (Herman & Polivy, 1980; Polivy & Herman, 1985), will contribute directly to weight fluctuations in a way that is directly reflective of restraint, and not an artifact of physiology or the law of initial values (Herman & Polivy, 1982)."

With respect to the second line of reproach, p.21:

> "When the subject population consists mainly of obese individuals, factors analyses tend to extract more than two basic factor (CD and WF) of the Restraint Scale (Ruderman, 1986). However, if one considers that perhaps as many as 90% of obese individuals in some samples are restrained (Herman & Polivy, 1980), then a factor analysis on obese subjects may well amount to a factor analysis on only a restricted (high) range of restraint scores. The decreased variability of responses among highly restrained subjects might produce lower interitem correlations than one might expect and consequently produce extraneous factors (Gorsuch, 1983)."

With respect to the third line of reproach, p. 22:

> "It might be the case that the diet boundary for obese

dieters is more stringent than that for normal-weight dieters; after all, the obese have more to be concerned about and require a stricter diet if they are to achieve their goal...This does not mean that the Restraint Scale is unable to detect obese dieters; nor does it mean that the phenomenon of counterregulation does not apply to obese dieters. It simply means that counterregulation will appear in obese dieters following different, more appropriate preload comparisons."

Thus, Heatherton et al, 1988 furnish sufficient evidence to discount criticisms of the scale with regard to the obese population and they provide reassurance for the research community concerning the validity of the scale for use with obese subjects.

On the third criticism, confounding of restraint with disinhibition, p.20:

"It seems that restraint is thus a misnomer, because the construct we measure involves disinhibition as well. The restrained eater who is exclusively restrained (i.e. the individual who scores high on Van Strien et al's, 1985, and Stunkard and Messick's 1985, restraint subscales) is not representative of restrained eaters in general, whereas the restrained eater who occasionally splurges is...Thus to argue that the Restraint Scale *confounds* true restraint with disinhibition betrays a mistaken view of the scale's purpose, which is to identify dieters.

> Most dieters (to their regret) display both restraint and disinhibition, and the disinhibition they display is not an arbitrary attribute, but a direct consequence of their restraint."

A fundamental error made by many researchers is that the purpose of the Restraint Scale is to measure "pure" restraint. It was never presented as a scale to measure "pure" restraint, but as a scale to identify dieters. Once again, the original Restraint theorists defend their position with respect to the purpose of their scale and no doubt can remain concerning this misapprehension.

However, as a consequence of the criticisms put forward by many of the original Restraint Scale, two alternative measures of restraint have been developed which purport to be purer measures of restraint: the Dutch Eating Behaviour Scale (Van Strien, Frijters, Bergers & Defares, 1986) and the Three Factor Eating Questionnaire (Stunkard & Messick, 1985). The restraint subscale of the DEBQ has 10 items which pertain to restricting food intake in order to reduce weight or to maintain weight loss. The DEBQ has proven internal consistency and test-retest reliability (Van Strien, et al., 1986) and in addition the validity of the DEBQ-R has been demonstrated (Van Strien, Fritzers, Van Staveran, Defares & Dwenberg, 1986; Wardle, 1987).

The TFEQ restraint subscale has 21 items which similarly to the DEBQ-R subscale pertain to cognitive restraint of food.

The TFEQ has proven internal consistency and test-retest reliability (Stunkard, et al., 1985) however, little evidence has been published on the validity of the scale.

With respect to laboratory studies which have used these alternative scales, the typical counterregulation pattern of eating has failed to emerge when subjects were classified as restrained or unrestrained, using the TFEQ-R (Lowe & Kleifield, 1988) and the DEBQ-R (Wardle & Beales, 1988).

Furthermore, in a comparison of the validity of the three scales measuring restraint, factor analytic results revealed that neither the DEBQ-R nor the TFEQ-R constituted a common factor together with the original Restraint Scale (Laessle, Tuschl, Kotthaus & Pirke, 1989). With respect to the TFEQ, some dubiety exists concerning which is the more relevant scale with respect to predictive validity, as the disinhibition subscale has been implicated as having primacy over the restraint subscale (Stunkard, et al., 1985).

The aim of the current study was to conduct a psychometric investigation of the three scales (the RS, the DEBQ-R and the TFEQ-R) used in the assessment of dietary restraint and a fourth scale, the disinhibition subscale of the TFEQ.
The present study consisted of a psychometric analysis of the relevant questionnaires and aimed to assess the hypotheses
a/ that the Restraint Scale measures a different construct to that measured by the DEBQ-R, the TFEQ-R and the TFEQ-D,

and

b/ that the Restraint Scale identifies dieters.

A further aim of the study was to investigate the construct validation of the scales by performing an analysis of variance of factor scores with independent variables of sex and level of restraint. A scale which would identify dieters ought produce significant main effects of sex (females reporting a higher mean than males), restraint (high restrainers reporting a higher mean than low restrainers) and a sex x restraint interaction effect (highly restrained females reporting the highest mean of the four groups).

5.2 METHOD

5.21 Subjects

The subjects were 253 undergraduate marketing students. The group characteristics are shown in table 5.1.

Table 5.1 Group Characteristics

	Male (n=108)	Female (n=145)	Total (n=253)
Age (yrs)	19.08±2.71	18.35±0.64	18.64± 1.89
Weight (kgs)	70.53±8.09	57.38±8.01	62.79±10.37
Height (ms)	1.79±0.06	1.65±0.07	1.71± 0.10

5.22 Measures

The questionnaires administered were the Dutch Eating Behaviour Questionnaire restraint subscale, (Van Strien, et al., 1986) (see Appendix 10); the Restraint Scale, (Polivy, et al., 1978) (see Appendix 12); the restraint subscale (see Appendix 13) and the disinhibition subscale (see Appendix 14) of the Three-Factor Eating Questionnaire, (Stunkard, et al., 1985). The students were requested to complete the questionnaires during a timetabled lecture hour, and noone refused to participate. Subjects were presented with the battery as a single questionnaire and instructed to complete it in one sitting without discussion with others. They were told that no right or wrong answers existed and that they should respond according to their own individual experience. In an attempt to counterbalance order effects of attention, boredom and fatigue, the questionnaires distributed were constructed with an equal number of each measure being presented first, in a rotating fashion.

In addition, two more questions were added:

1/ Are you currently on a diet?

2/ Have you ever dieted in the past?

5.3 RESULTS

5.31 The Four Scales

The scores of the 57 items in the questionnaire were analyzed using an orthogonal rotated principal components analysis. In the initial analysis all factors with an eigenvalue greater

than 1 were extracted which resulted in a 13 factor solution. However, the elbow of the Eigen plot suggested that it was acceptable to force the selection of a four factor solution, which accounted for 30.6%, 7.4%, 3.7% and 3.4% of the variance respectively. All selected factors had an Eigen value greater than 1, and a factor loading of 0.3 was used as the cut off point (marked *). The factor loadings are shown in Table 4.2. Factor 1 represented all of the questions on the DEBQ-R and TFEQ-R scale, some questions from the Restraint Scale and only one question from the TFEQ-D scale (Q5.: Since my weight goes up and down, I have gone on reducing diets more than once). The Restraint Scale questions which loaded most highly on Factor 1 were 5 of the 6 Concern for Dieting questions; the other CD question, question 6: Do you eat sensibly in front of others and splurge alone? while it did have a factor loading of .30874 on Factor 1, had a higher loading of .40073 on Factor 3 (which included 10 of the TFEQ-D (disinhibition) questions with factor loadings >.3). The WF items of the RS (RS questions 2,3,4 and 10), all loaded most highly on Factor 4, which only had one other question out of the 57 loading >.3, TFEQ-D question 10: My weight has hardly changed at all in the last ten years. It is important to note that 2 of the WF items also loaded on Factor 1 - question 2: What is the maximum amount of weight you have ever lost within 1 month? with a loading of .38230 and question 10: How many pounds over your desired weight were you at your maximum weight? with a loading of .46170. Therefore, clearly these items are implicated in the overall dieting factor.

It is clear from the analysis that the Restraint Scale is not synonymous with any of the other three scales.

Table 5.2 Varimax Rotated 4 Factor solution of the DEBQ-R, the Restraint Scale, the TFEQ-D and the TFEQ-R for 253 subjects

* = factor loading >.3 (~) = factor loading >.3, but item loads more highly on another factor

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
	30.6%	7.4%	3.7%	3.4%
DEBQQ1	.77561*	.30658(~)	-.04594	.18743
DEBQQ2	.80211*	.15269	.11026	.01307
DEBQQ3	.83033*	.18882	.02430	.16991
DEBQQ4	.70284*	-.15936	.13130	.03782
DEBQQ5	.78641*	.08351	.10903	.13059
DEBQQ6	.71602*	.25540	-.07796	.05717
DEBQQ7	.83408*	.20195	.07953	.11851
DEBQQ8	.82491*	.24894	.03647	.18789
DEBQQ9	.79699*	.26788	.01247	.21915
DEBQQ10	.73297*	.11179	.17246	.16746
HMQ1	.80807*	.23802	.12058	.27022
HMQ2	.38280(~)	-.00008	-.01932	.39049*
HMQ3	.09781	.15470	.16469	.74407*
HMQ4	.07237	.16672	.16388	.69312*
HMQ5	.61777*	.04702	.08215	-.06200
HMQ6	.30874(~)	.28057	.40063*	-.04640
HMQ7	.57115*	.14841	.31643(~)	.16512
HMQ8	.72485*	.37903	.10160	.19431
HMQ9	.60208*	-.03345	.06073	.08979

HMQ10	.46170(~)	.29312	-.00804	.56914*
SMDQ1	-.15158	-.05172	.51923*	-.08666
SMDQ2	.04713	.18026	.31469*	-.01109
SMDQ3	.01269	.14470	.42686*	.16646
SMDQ4	-.03256	.62286*	.11470	.06457
SMDQ5	.67407*	.13212	.14605	.20371
SMDQ6	.04882	.46796*	.36363(~)	.15747
SMDQ7	-.03329	.23695	.58066*	.18149
SMDQ8	.03902	-.16382	.44636*	.28832
SMDQ9	.16222	.72580*	.16407	-.05726
SMDQ10	-.04292	.05442	.02487	.52103*
SMDQ11	.08759	.65754*	.31222	.01307
SMDQ12	.00853	-.16034	.04693	.28330
SMDQ13	.19822	.37935*	.32634(~)	.26273
SMDQ14	.18229	.21068	.58016*	-.11531
SMDQ15	.03018	.21331	.59978*	.20120
SMDQ16	.14363	.39905*	.30417(~)	.27469
SMRQ1	.54978*	-.00973	-.23601	-.09544
SMRQ2	.55339*	.15446	.07250	.00140
SMRQ3	.46291*	-.02059	-.09523	.00725
SMRQ4	.51579*	-.20347	.14513	.17392
SMRQ5	.57629*	.20275	-.09740	-.06170
SMRQ6	.57365*	-.20290	-.10113	.07207
SMRQ7	.53191*	.09522	-.21956	-.11351
SMRQ8	.59783*	.07277	.13585	-.06344
SMRQ9	.70654*	.12206	-.20626	.14493
SMRQ10	.63030*	-.13705	.19920	-.08536
SMRQ11	.63648*	-.00218	-.16467	.01231

SMRQ12	.52416*	.01918	.17140	.06010
SMRQ13	.66918*	-.07863	.21742	.14125
SMRQ14	.50830*	-.04511	.17856	-.04636
SMRQ15	.63591*	.14575	-.00781	.06623
SMRQ16	.51462*	-.00252	-.14539	.22275
SMRQ17	.59254*	.23259	-.07731	.03982
SMRQ18	.64573*	-.04066	.06209	.06730
SMRQ19	.45312*	-.07549	.16044	-.01598
SMRQ20	.66059*	-.02137	.14145	-.14982
SMRQ21	.78790*	.09223	-.01719	.04642

5.32 Analyses with the additional questions

In order to investigate the scales with respect to their ability to identify dieters, separate analyses were conducted for each scale including the additional questions in each analysis: 1/ Are you currently dieting?

2/ Have you ever dieted in the past?

5.32.1 DEBQ - Restrained Eating Subscale

The Dutch Eating Behaviour Questionnaire restrained eating subscale was analyzed including the additional questions. The factor loadings from this analysis are shown in Table 5.3.

The analysis produced a two factor solution which accounted for 63.4% and 10.3% of the variance respectively. The selected factors had an Eigen value of greater than 1 and a factor loading of .3 was used as the cut off point. The

results demonstrated that the question: 1/ Are you currently dieting? was unrelated to Factor 1 which loaded all of the 10 DEBQ-R questions, and the question: 2/ Have you ever dieted?, while it had a factor loading of .30874 on Factor 1, loaded much more highly on Factor 2 with a loading of .89033. The two additional questions loaded on Factor 2 and the only other question to load on factor 2 (>.3) was question 8: How often do you try not to eat between meals because you are watching your weight?

When the DEBQ-R is subjected to factor analysis on its own the result is a factorially pure solution. Given that the scale is intended to provided a measure to identify high restrainers (dieters) and low restrainers (non-dieters) these results indicate that the DEBQ-R would not be the scale of choice to identify dieters.

Table 5.3 Varimax Rotated Factor solution of the DEBQ-R and the 2 additional questions

	FACTOR 1	FACTOR 2
	63.4%	10.3%
DEBQQ1	.81824	.26508
DEBQQ2	.78705	.28064
DEBQQ3	.84805	.24641
DEBQQ4	.69335	.08897
DEBQQ5	.81424	.16308
DEBQQ6	.76256	.13880

DEBQQ7	.85078	.25855
DEBQQ8	.85753	.31812
DEBQQ9	.84814	.28686
DEBQQ10	.75754	.25860
DIET	.17592	.93134
PASTDIET	.30874	.89033

5.32.2 The Restraint Scale

The Restraint Scale was analyzed including the additional questions. The factor loadings from this analysis are shown in Table 5.4.

The analysis produced a two-factor solution with the first factor accounting for 40.5% of the variance and the second factor accounting for 13.0%. The two factor solution indicated quite clearly that the original bi-factor structure was not changed (CD - questions 1,5,6,7,8, and 9; WF - questions 2,3,4 and 10) and that the questions 1/ Are you currently dieting? and 2/ Have you ever dieted in the past? loaded on Factor 1, the Concern for Dieting subscale, with loadings .61690 and .68594.

The results suggest that the Restraint Scale is relevant to the subjects present and past dieting status, and this provides support for the utility of the scale in identifying dieters.

Table 5.4 Varimax Rotated Factor solution of the Restraint Scale and the 2 additional questions

	FACTOR 1	FACTOR 2
	40.5%	13.0%
HMQ1	.77503	.32539
HMQ2	.32567	.44016
HMQ3	.05415	.86382
HMQ4	.02882	.83035
HMQ5	.71849	-.09671
HMQ6	.46270	.11028
HMQ7	.66852	.22880
HMQ8	.77091	.28319
HMQ9	.66378	.01868
HMQ10	.48740	.64138
DIET	.61690	.18820
PASTDIET	.68594	.26988

5.32.3 TFEQ-R Subscale

The TFEQ-R Subscale was analyzed including the additional questions. The analysis produced a five-factor solution however the plot of the Eigen values suggested that it was acceptable to force a 3 factor solution with the 4th factor coming below the elbow. The factor loadings from this analysis are shown in Table 5.5. The factors accounted for 36%, 6.7% and 5.9% of the variance respectively. The results show that

the additional questions loaded most highly on Factor 3 with loadings of .88843 and .88944. The only other questions to load on this Factor (>.3) were: questions 2, 7, and 15 with loadings .32398, .31332 and .32943 respectively, but in each case the item loaded more highly on other factors.

It would appear that given the two questions of interest: Are you currently dieting? and Have you ever dieted in the past? did not load on either of the first or second factors of the TFEQ-R scale, and that the third factor on which they did load was comprised predominantly of these two questions alone, then serious doubt is cast concerning the utility of this scale as one which can identify dieters.

Table 5.5 Varimax Rotated 3 Factor solution of the TEFQ-R with additional questions

	FACTOR 1	FACTOR 2	FACTOR 3
	36%	6.7%	5.9%
SMRQ1	.48301	.26036	.26164
SMRQ2	.19804	.55805	.32398
SMRQ3	.68254	-.01340	-.01389
SMRQ4	.29599	.47211	.02565
SMRQ5	.32905	.42621	.35491
SMRQ6	.67888	.19446	.00751
SMRQ7	.28923	.36815	.31332
SMRQ8	.24022	.63047	.18290

SMRQ9	.70534	.25710	.27967
SMRQ10	.29391	.64183	.06823
SMRQ11	.59123	.16655	.29066
SMRQ12	.42642	.38125	-.00109
SMRQ13	.43300	.55947	.17427
SMRQ14	.35640	.44014	-.07025
SMRQ15	.53903	.29043	.32943
SMRQ16	.45283	.23540	.20104
SMRQ17	.59575	.28479	.08921
SMRQ18	.47415	.39100	.24041
SMRQ19	-.03876	.70480	.06418
SMRQ20	.17539	.72394	.18837
SMRQ21	.58177	.47382	.29421
DIET	.09384	.09055	.88843
PASTDIET	.16308	.12709	.88944

5.32.4 TFEQ-D Subscale

The TFEQ-D Subscale was analyzed including the additional questions. The analysis produced a six-factor solution however the plot of the Eigen values suggested that it was acceptable to force a 4 factor solution with the 5th factor coming below the elbow. The factor loadings from this analysis are shown in Table 5.6. The factors accounted for 22.8%, 11.1% 8.2% and 6.4% of the variance respectively. The results show that the additional factors loaded most highly on the second factor with loadings of .89122 and .91154. The only other question to load on this Factor (>.3) was question 5: Since my weight

goes up and down, I have gone on reducing diets more than once, with a loading of .65979.

While it is interesting to note that the questions concerning current and past dieting status loaded on Factor 2, thus indicating that this subscale may be more pertinent than TFEQ-R, the scale has little to justify it as a scale which could be used as one which could be used for identifying dieters, as only one of the questions on this scale in the overall analysis of the 57 questions loaded on the main dieting factor.

Table 5.6 Varimax Rotated 4 Factor solution of the TFEQ-D and additional questions

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
	22.8%	11.1%	8.2%	6.4%
SMDQ1	-.08633	-.06287	.70242	-.24339
SMDQ2	.09652	.13903	.49759	-.22885
SMDQ3	.15647	-.03661	.46938	.41812
SMDQ4	.71788	-.00351	.00308	-.06958
SMDQ5	.21045	.65979	.06803	.19971
SMDQ6	.45832	.16207	.35235	.15766
SMDQ7	.30880	.07469	.53187	.30976
SMDQ8	-.03388	-.03094	.42540	.32409
SMDQ9	.79692	.11191	.06383	-.11281
SMDQ10	.03687	.00568	.01489	.59947
SMDQ11	.75643	.01988	.20272	-.07749

SMDQ12	-.10119	.13470	-.04652	.57462
SMDQ13	.46292	.22507	.18980	.34173
SMDQ14	.27506	.08838	.43561	.04529
SMDQ15	.33876	-.01264	.55027	.22185
SMDQ16	.49123	.26232	.14201	.26000
DIET	-.01391	.89122	.04493	-.06046
PASTDIET	.14259	.91154	-.01311	.04768

5.33 Construct Validation

In order to investigate the construct validation of a scale which would purport to identify dieters it would be appropriate to conduct an analysis of variance of the factor scores to investigate the effects of sex and level of restraint.

As the TFEQ-D and the TFEQ-R scales produced multi-factorial results, and because of their inability to identify dieters these scales were omitted from any further investigation. The Restraint Scale and the DEBQ-R were factor analyzed as individual scales and produced the following results (Tables 5.7 and 5.8):

Table 5.7 Varimax Rotated Factor solution of the Restraint Scale

	FACTOR 1	FACTOR 2
	41.4%	15.4%
HMQ1	.77866	.34770
HMQ2	.31478	.45239
HMQ3	.03236	.86448
HMQ4	.01550	.83003
HMQ5	.72258	-.07151
HMQ6	.47722	.12080
HMQ7	.71489	.24176
HMQ8	.80319	.30367
HMQ9	.69971	.03350
HMQ10	.46813	.65639

A two-factor solution, with Factor 1 containing questions 1,5,6,7,8 and 9 and Factor 2 containing questions 2,3,4 and 10.

Table 5.8 Varimax Factor solution of the DEBQ-R

	FACTOR 1
	70.3%
DEBQQ1	.86037
DEBQQ2	.83492
DEBQQ3	.88343
DEBQQ4	.68621
DEBQQ5	.82505
DEBQQ6	.76822
DEBQQ7	.88970

DEBQQ8	.91449
DEBQQ9	.89654
DEBQQ10	.80178

A factorially pure solution resulted from this analysis.

Factor scores were obtained by multiplying the standardized score of the items on a factor by their factor loadings and summing the products. In order to investigated the effects of sex and level of restraint, dieters and non-dieters were compared. A subject was identified as a "dieter" if s/he had answered yes to are you currently on a diet or have you dieted in the past.

5.33.1 Restraint Scale Factor 1 - Concern for dieting

A two-way (sex x dieting) analysis of variance on the Concern for dieting subscale factor scores revealed significant main effects of dieting and sex, $F(1,189) = 84.46$, $p<.001$ and $F(1,189) = 32.21$, $p<.001$, indicating dieters and females had higher means than non-dieters and males. The analysis revealed also a significant interaction effect, $F(1,189) = 5.83$, $p<.05$, indicating that female, dieters as a group had a higher mean than any other.

5.33.2 Restraint Scale Factor 2 - Weight Fluctuation

A two-way (sex x dieting) analysis of variance on the Weight

Fluctuation subscale factor scores revealed a significant main effect of restraint, $F(1,189) = 22.83$, $p<.001$, with no other effects being significant. That is to say, there was no main effect of sex and no interaction effect of sex with dieting. The main effect of dieting indicated that dieters scored more highly on the Weight Fluctuation subscale than non-dieters.

5.33.3 DEBQ-R Subscale

A two-way (sex x dieting) analysis of variance on the DEBQ-R factor scores revealed main effects of sex and dieting, $F(1,185) = 21.47$, $p < .001$, and $F(1,185) = 129.38$, $p<.001$, and no significant interaction effect. The results demonstrated that females scored more highly than males and dieters scored more highly than non-dieters.

5.4 DISCUSSION

The aim of the present study was to conduct a psychometric investigation of the current scales used or implicated in the measurement of restraint.

5.41 Synonymity of the Scales

In spite of the high level of correlation between the scales which were significant at $p < .01$ (lowest $r = .2308$, highest $r = .8919$), the original factor analysis of the four scales revealed quite clearly that they were not synonymous. All of the 10 questions on the DEBQ-R and all of the 21 questions of

the TEFQ-R loaded on Factor 1 of the analysis and thus these questionnaires measure something in common. Factor 1 is clearly related to restraint and monitoring caloric intake. The Restraint Scale however was split over a number of factors, which was not surprising given the extent to which a bi-factor structure of the scale has been demonstrated. However, the Restraint Scale questions were split over 3 of the factors; 5 of the six Concern for Dieting questions loaded on Factor 1. The Weight Fluctuation subscale had loadings which indicated that 2 of the 4 WF questions, while loading primarily on a Weight Fluctuation factor, also loaded >.3 on the main Factor 1, clearly a measure of dieting. It has long been assumed that these questions were not related to Dieting per se, but instead to Overweight. This provides some evidence that weight fluctuation is a characteristic of chronic dieting. The third factor connected with the Restraint Scale was one which had a substantial number of the TFEQ-D questions loading on it. This confirms the fact that some level of disinhibition is being measured within the Restraint Scale. The pertinent item is question 6 which had a loading of .30874 also on the main Factor 1, which is indicative of an important association with this factor also.

Clearly, the Restraint Scale is measuring something different from the other two restraint scales and also from the disinhibition scale.

5.42 Identification of Dieters

The four scales when subjected to individual factor analyses along with the additional questions: Are you currently dieting? and Have you ever dieted in the past? demonstrated that only the Restraint Scale was relevant to the subjects' present and past dieting status, and thus it can be concluded on the basis of this analysis that the Restraint Scale is the scale of choice if the identification of dieters is sought.

The DEBQ-R analysis revealed that a second factor was created when the additional questions were entered into the investigation. Thus, they did not load on the DEBQ-R's single factor of restraint. This supports findings by Ogden (Ogden, 1990) who demonstrated in her psychometric analysis of the DEBQ-R scale that the question "Are you actively dieting to control your weight at the present time?" similarly did not load on Factor 1.

Analyses of the two TFEQ subscales of restraint and disinhibition revealed multi-factor solutions. The TFEQ-R scale produced a three-factor solution with 43% of the questions loading on more than one factor. The TFEQ-D scale produced a four-factor solution with 38% of the questions loading on more than one factor. Therefore, it is unclear what each of these factors within the scales might be measuring and given the difficulty with interpretation of these solutions it is unclear as to the worth of these scales

as psychometric measures for the identification of dieters.

5.43 Construct Validation

Analyses of variance on the factor scores for the Restraint Scale and the DEBQ provide evidence concerning the validation of the measures. The Restraint Scale's factor analysis revealed two factors, and the analysis of variance carried out on the first factor, Concern for Dieting revealed that as predicted significant main effects of sex and dieting were found along with a significant interaction effect. This gives support for the validation of this factor as one which yields a measure of a Concern for Dieting. The second factor, Weight Fluctuation, produced different results. As expected, a significant main effect of dieting was found. Counter to predictions however, no main effect of sex was found nor any interaction effect. Perhaps this can be explained with respect to absolute values concerning weight fluctuation, and results indicated that these values are no likely to be higher for females than they are for males. Given there was no sex effect, it was not surprising that no interaction effect occurred.

The DEBQ scale, while resulting in main effects for sex and dieting, no significant interaction effect occurred, which does not support this scale in terms of construct validation. A scale which would be used to identify dieters in our society should yield an interaction effect for sex and restraint, because the effect of sex on dieting is not merely addititive.

The prediction would be for an interactive effect between sex and dieting, with female highly restrained individuals scoring as the highest group.

5.4 Methodological problems

While this study indicates that the Restraint Scale would be the scale of choice to be used in identifying dieters and non-dieters, based on factor analytic study and construct validation procedures, there is a caveat to be made.

Problems with completion of the Restraint Scale were evident. While an attempt was made to circumvent the problem which concerns the British population, in that we measure weight in stones and pounds rather than in pounds (a table was included on the questionnaire which indicated the number of pounds there were in a stone), this did not preclude 12.8% of the sample returning incomplete Restraint Scale questionnaires. In comparison, only .03% of the sample presented incomplete DEBQ-Rs, and .04% returned incomplete TFEQ-Ds and a surprising 14.6% failed to complete to the TFEQ-R, though this higher number of non-completions may have been due to the greater number of questions (twice as many as the Restraint Scale or the DEBQ-R).

While this problem with completion of the Restraint Scale, which is related to the Weight Fluctuation questions (the Concern for Dieting questions only resulted in .02% non-completion), presents some concern, given the scale's

capacity to identify dieters and further the demonstration of the construct validity of the scale, it must still be recommended as the preferred scale.

5.45 Conclusion

The present study aimed to assess the current tools used to measure dietary restraint. The results indicate that while there is some difficulty with completion rates of the Restraint Scale, with respect to the overall factor analysis the Restraint Scale measured not only "pure" restraint, but also an element of both disinhibition and weight fluctuation, which are characteristic of dieters. With regard to construct validation, the results revealed that the Restraint Scale and not the DEBQ-R met the criterion set. Further research concerning dieters therefore should aim to utilise the Restraint Scale as the psychometric measure in classifying high- and low-restrainers.

Bibliography - Chapter Five

Blanchard, F. A., & Frost, R. O. (1983). Two factors of restraint: concern for dieting and weight fluctuation. Behaviour Research and Therapy, 21, 259-267.

Drewnowski, A., Riskey, D., & Desor, J. A. (1982a). Feeling fat yet unconcerned: self-reported overweight and the restraint scale. Appetite, 3, 273-279.

Drewnowski, A., Riskey, D., & Desor, J. A. (1982b). Measures of restraint: separating dieting from overweight. Appetite, 3, 282.

Heatherton, T. F., Herman, C. P., Polivy, J., King, G. A., & McGee, S. T. (1988). The (mis)measurement of restraint: an analysis of the conceptual and psychometric issues. Journal of Abnormal Psychology, 97, 19-28.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 43, 647-660.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint and eating behaviour. Journal of Abnormal Psychology, 85, 666-672.

Herman, C. P., & Polivy, J. (1982). Weight change and dietary concern in the overweight: are they really independent? Appetite, 3, 280-281.

Johnson, W. G., Lake, L., & Mahan, M. J. (1983). Restrained eating: measuring an elusive construct. Addictive Behaviours, 8, 413-418.

Laessle, R. G., Tuschl, R. J., Kotthaus, B. C., & Pirke, K. M. (1989). A comparison of the validity of three scales for the assessment of dietary restraint. Journal of Abnormal Psychology, 98, 504-507.

Lowe, M. R., & Kleifield, E. K. (1988). Cognitive restraint, weight suppression and the regulation of eating. Appetite, 10, 159-168.

Nisbett, R. E. (1972). Hunger, Obesity and the ventromedial hypothalamus. Psychological Review, 79, 433-453.

Ogden, J. (1990). Cognitive restraint and the control of eating. PhD, London University.

Polivy, J., Herman, C. P., & Warsh, S. (1978). Internal and external components of emotionality in restrained and unrestrained eaters. Journal of Abnormal Psychology, 87, 497-504.

Ruderman, A. J. (1983). The restraint scale: a psychometric investigation. Behaviour Research and Therapy , 21, 253-258.

Ruderman, A. J., & Christison, H. (1983). Restraint theory and its applicability to overweight individuals. Journal of Abnormal Psychology, 92, 210-215.

Ruderman, A. J., & Wilson, G. T. (1979). Weight, restraint, cognitions and counter-regulation. Behaviour Research and Therapy, 17, 581-590.

Stunkard, A. J., & Messick, S. (1985). The three factor eating questionnaire to emasure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research, 29, 71-84.

Van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch eating behaviour questionnaire for assessment of restrained, emotional and extèrnal eating behaviour. International Journal of Eating Disorders, 5, 295-315.

Van Strien, T., Fritzers, J. E., Van Staveran, W. A., Defares, P. B., & Dwenberg, P. (1986). The predictive validity of the Dutch Restrained Eating Scale. International Journal of Eating Disorders, 5, 747-755.

Wardle, J. (1986). The assessment of restrained eating. Behaviour Research and Therapy, 24, 213-215.

Wardle, J. (1987). Eating style: a validation study of the Dutch Eating Behaviour questionnaire in normal subjects and women with eating disorders. Journal of Psychosomatic Research, 31, 161-169.

Wardle, J., & Beales, S. (1988). Control and loss of control over eating: an experimental investigation. Journal of Abnormal Psychology, 97, 35-40.

CHAPTER 6 - DISCUSSION

This thesis aimed to test some hypotheses generated by Restraint Theory. Individuals differ with respect to their control of eating; either they are largely controlled by physiological mechanisms or they follow a more cognitive agenda. Those who restrain, who seek to maintain a lower body weight, or seek to attain a lower body weight are those who necessarily follow a cognitive agenda and largely ignore other factors in the control of eating. Those who are not restrained, eat more or less in response to internal hunger cues.

Restraint theory was originally developed in response to criticisms made of previous work which had focused on differences in eating behaviour based on weight. That is to say, the obese purportedly had eating pattern regulators which were different from those of normal weight individuals. An insight of the original restraint theorists was that perhaps weight per se, was not the influencing variable but instead attempting to lose weight.

6.1 Internality/Externality

A prediction made by the new restraint theory, which was in effect a legacy from the previous theorists, concerned the extent to which restrainers and non-restrainers were sensitive to internal and external cues. More

specifically, this hypothesis pertained to the relative influences of internal factors and external factors on eating behaviour. Restraint theory would predict that people who are highly restrained would be relatively insensitive to internal cues and more sensitive to external cues (Heatherton, Polivy & Herman, 1989; Herman & Polivy, 1984).

The results from Chapter 2 provide some evidence for increased sensitivity to external cues. The study which investigated a period of 24 hour abstinence looked at the manipulation of external cues only. That is to say, the internal cues were constant and extreme for both groups with all subjects abstaining from food for 24 hours. The focus on starvation group was intended to mimic dieters, to the extent that they were deliberately focusing on the deprivation, that is to say, dieters also proceed in a deliberate attempt to restrict food intake. The incidentally abstaining group were given a rationale for not eating and so this cognitive state was intended to mimic non-dieters. While acknowledging there were methodological problems with this study, results demonstrated that the experimental group experienced higher levels of hunger and were more likely to want to eat immediately at the end of the fast than the control group. The external cues' manipulation indicated that these cues were paramount in the experience of hunger and its functional purpose in the onset of eating. The study

would have benefitted from having an actual eating phase opportunity to measure if there were significant differences in the amounts eaten between the two groups. It is important to note that these ratings of hunger were self-report and so it was the interpretation of the subjects deprivation which was significant, not the actual level of deprivation. This is a meaningful point as perhaps it is the case with dieters, that it is not so much the extent of their deprivation which is important when disinhibition occurs but their interpretation of that deprivation. The extent of overeating is conceivably a function of how much they <u>perceive</u> themselves to be deprived. The more severe the diet, the more excessive the overeating ensuing disinhibition will be.

6.2 <u>Disinhibition</u>

The concept of disinhibition was introduced in the original restraint publication (Herman & Mack, 1975) and it was described as the process which occurs as a result of the dieter's restraint (diet boundary) having been broken. It was argued that once disinhibition occurred, then counter-regulation would ensue, which was Herman's term for the failure to regulate on the part of restraining individuals.

This thesis aimed to evaluate the role of two disinhibitors: one, which has been well-established as a

disinhibitor, anxiety, but which had not been appraised in the adolescent population and the other, which has been little investigated: the process of imagining eating food.

6.2.1 Anxiety

Chapter 3 reports on the investigation of anxiety as a disinhibitor in the adolescent population. Results from this study demonstrated a three-way interaction effect: restraint X anxiety X age. Subjects in the highly restrained, high-anxiety experimental condition who were in the older (16) age group ate more biscuits in a taste test than any other group. Certainly, a restraint X anxiety interaction had been predicted, but no predictions had been made concerning age. The only other study which has looked at the functional nature of restraint experimentally found no age effects (Hill, Rogers & Blundell, 1989). However, in this study I had deliberately chosen a wider age gap to look for any possible developmental effects, with older girls becoming more concerned with weight and this concern possibly being translated into behavioral differences in eating (or not eating). This age effect did occur, though the effect is one identified in a cross-sectional study, and evidence for an age effect would be stronger if found in a longitudinal study. A further interesting finding of this study pertained to the analyses of the different

types of individual biscuits consumed. In the taste test, 5 different types of biscuits were to be consumed, with 2 types falling into the permitted category of foods (krackawheat crackers and plain shortcake), and the 3 others falling into the forbidden category (fruit sugared shortcake biscuits, custard creams and chocolate hobnobs). Analysis of the permitted biscuits showed no significant main or interaction effects. Analysis of the forbidden biscuits however, revealed a different picture. Two of the forbidden biscuits (fruit sugared shortcake biscuits and custard creams) produced a significant two-way interaction of restraint and anxiety, so this was a general effect for both age groups. Thus, high restrainers will overeat specific types of food, those which are normally avoided. The chocolate hobnobs analysis indicated a three-way interaction effect, of restraint, anxiety and age, with the older girls eating more. Perhaps the worrying conclusion to be drawn is that chocolate while perceived as a harmless treat food in early adolescence takes on a particular meaning in later adolescence (for those who restrain) and certainly becomes a food to be avoided in adulthood or consumed in great quantity depending if one is in a restrained or disinhibited state, according to reports in the clinical literature.

6.2.2 Imagining eating food

The process of imagining eating food is one which has

barely been investigated and this thesis aimed to replicated findings which had demonstrated that this procedure had been successful in its role as disinhibitor (Hill, et al., 1989). The findings from this study however were counter to predictions and lead to a tentative interpretation of the results which are couched in terms of what I labelled the "superinhibition" of restrained eaters. Chapter 4 reports on the procedures of this study. The study did not use the conventional taste test to measure the dependent variable of consumption, instead it evaluated the effects of the independent variables by using rating scales to measure motivation to eat, and a food check-list to measure the kinds of food subjects would like to eat. This method enabled measuring different types of food which subjects might eat, which while it has the disadvantage of being an artificial method, it did have the advantage of providing an indication of differences in the types of food (forbidden or permitted), subjects said they would eat. Results indicated with respect to motivation to eat ratings, that by and large the interaction effects were demonstrating that low-restrainers in the experimental conditions were more hungry. That is to say, the function of the experimental condition was to make individuals more hungry (there was a significant main effect of treatment condition), but the significant interaction indicated that contrary to prediction, high-restrainers showed no increase in their motivation

to eat. Given the effect of the procedure on "normal" low-restrainers, this effect seemed to be fairly remarkable, and I interpret the behaviour of restrainers as being evidence of their "super-inhibition". The literature is replete with evidence of the disinhibition of high-restrainers, but of course there is the implicit assumption that as a norm dieters are inhibited. In the face of a procedure which had all experimental condition subjects salivating, the fact that the highly restrained cohort gave no indication of an increased desire to eat is extraordinary, and can only be explained in terms of their super-inbition in this circumstance. Clearly, however replication would be required before this phenomenon could be integrated within the literature on Restraint Theory.

With respect to the types of food people said they would eat, differences also occurred. In an analysis of the forbidden foods, a significant main effect of restraint occurred, with high restrainers selecting significantly less forbidden foods than low restrainers. A near-significant interaction effect with treatment and restraint indicated that in the experimental condition the high restrainers persisted in their low selection of forbidden foods. This evidence indicated that far from being disinhibited these highly restrained subjects were demonstrating testimony of super-inhibition. It is not clear however, what would have occurred should these

foods had been available in reality, but when faced with no immediate threat of food, high restrainers were able to maintain their levels of restraint to a great extent.

6.3 The measurement of restraint

A final aim of this thesis was to evaluate the relative merits of the current questionnaires which exist to provide a measure of restraint. The miscomprehension of some researchers I feel endures as a result of terminology, that is to say, that it is assumed that the function of the scale is that it should measure restraint. This is a fundamental error. The purpose of such a scale is to identify dieters. Problems and confusions have arisen as a result of a misunderstanding of the main purpose of the restraint scale, which was not to measure restraint. Perhaps, the original fault lies with Herman and his colleagues, in using a misnomer like the word restraint to designate their scale. However, they have tried very hard to inform and persuade others of the utility of their scale (Heatherton, Herman, Polivy, King & McGee, 1988; Herman & Polivy, 1982). The real problem however, is that currently three scales exist and any researcher who is new to the area of restraint might imagine that the scales are synonymous and might use them interchangeably or might use one of the newer scales as they have been recommended heartily. The other two scales are the DEBQ-R (Van Strien, Frijters, Bergers & Defares, 1986) and the TFEQ-R

(Stunkard & Messick, 1985); (See chapters 3 & 4, where I used a modified version of the TFEQ and the DEBQ-R subscale). It was not until far into my research that I realised that these scales seemed to be different and perhaps they were not measuring the same construct, that I had the idea to conduct a factor analysis on the questionnaires. The results are reported in Chapter 5 and provide convincing evidence that the Restraint Scale is the scale to be employed, if the purpose of the scale required is to identify dieters. To test the predictions of restraint theory, it ought therefore to be the scale of choice. A further aim of this study was to look for evidence of construct validity. An analysis of variance on the factor scores of a scale to identify dieters should reveal main effects of restraint and sex and also a significant restraint X sex interaction effect. This significant interaction effect was found only with the Restraint Scale's Concern for Dieting subscale and not for the DEBQ-R subscale. Thus this provides further very important empirical evidence for the recommendation of the Restraint Scale as the one for researchers in this area to use.

6.4 Further research

Following on from my studies a number of strands could be pursued. Firstly, my study on abstinence highlighted the importance of interpretation of deprivation or abstinence. More research is required on the association

between the severity or intensity of the dieting experience and the extent of overeating which ensues as a result of disinhibition. It is difficult to suggest how this could be done experimentally and perhaps a more naturalistic investigation would be the method to use. Alternatively, perhaps a more sophisticated measure of intensity of restraint could be developed, instead of one which designates individuals as high or low restrainers on the basis of a median-split of restraint scores. Hypotheses concerning amounts of food consumed in the laboratory could be made on the basis of the level of restraint.

My second study investigating the functional nature of restraint in the adolescent population, must surely herald the beginning of more research on dieting adolescents. While it has long been recognised that dieting occurs in adolescence and that dieting in adolescence has serious foreboding with respect to increased likelihood in the development of a full-blown eating disorder in later life (Patton, Johnson-sabine, Wood, Manna & Wakeling, 1990), little experimental research has been done with adolescent girls to investigate whether there are parallels in behaviour to be found at an earlier developmental stage to those which are manifested in adulthood.

My third study which evaluated the process of the

imagining eating highlighted the "superinhibition" of restrainers. More research is needed now on the types of situation where high levels of restraint are capable of being maintained. What are the salient features of these situations? Are there specific dynamics which empower the restrainer rather than disinhibit her? It is conceivable that studies which have failed to demonstrate disinhibition in the highly restrained have incorporated some of these features inadvertently. While the process of disinhibition is still worthy of further investigation, it might progress the whole area, to develop a new perspective and set about analysing a new host of features pertinent to "superinhibition". Further insight into such processes may provide more pieces to be consolidated into a model of regulation of eating behaviour.

Finally, my last study on the measurement of restraint has indicated that the scale to adopt in restraint research is the Restraint Scale. Although, this scale presents difficulties of non-completion which pertain to a U.K. population, as British subjects, or some of them, find difficulty in completing the weight fluctuation subscale, it must still be recommended as the scale to implement. However, perhaps a recommendation which would solve this particular problem is one which would allocate a mark of zero or one for non-completion of a question in this subscale. A lack of awareness concerning weight

fluctuation, perhaps is indicative of no concern or even no weight fluctuation for any particular individual. Thus rather than exclude a subject from analysis as a result of missing values, it would be best to substitute the non-response with a low value, which would add little to the overall restraint score, and thus these individuals would probably fall into the low-restrained category.

A further development in the measurement of restraint would be the construction of a scale for use with the adolescent population. As I have suggested earlier, research with dieting adolescents must surely be extended, and perhaps more work has not already taken place with the younger age-group as no suitable measure currently exists to assess restraint in adolescents. It is to be hoped that I myself, will have something to contribute in this area, as I have recently obtained a small grant from my university, to collect data with a view to developing such a measure and the pilot study is currently underway.

6.5 Conclusion

People, especially women, actively decide to diet (usually on a Monday) as a means of losing or controlling their weight. Furthermore, dieting is often recommended by health professionals as a method of losing weight for

the obese. Indeed, even when individuals are of normal weight, general practioners do not object to people "watching their weight". The results of this thesis suggest that cognitive restraint of food intake while "successful" in some circumstances (Chapter 4) can lead to increased levels of hunger (Chapter 2), and increased consumption following disinhibition even in the adolescent population (Chapter 3).

Real concern must lead us to evaluate pressures on women and especially young women and girls with respect to weight and body size before dieting becomes the norm for females in our country.

Bibliograpy - Chapter Six

Heatherton, T. F., Herman, C. P., Polivy, J., King, G. A., & McGee, S. T. (1988). The (mis)measurement of restraint: an analysis of the conceptual and psychometric issues. Journal of Abnormal Psychology, 97, 19-28.

Heatherton, T. F., Polivy, J., & Herman, C. P. (1989). Restraint and internal responsiveness: effects of placebo manipulations of hunger state on eating. Journal of Abnormal Psychology, 98, 89-92.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. Journal of Personality, 43, 647-660.

Herman, C. P., & Polivy, J. (1982). Weight change and dietary concern in the overweight: are they really independent? Appetite, 3, 280-281.

Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A. J. Stunkard, & E. Elliot (Ed.), Eating and its disorders (pp. 141-156). New York: Raven Press.

Hill, A. J., Rogers, P. J., & Blundell, J. E. (1989). Dietary restraint in young adolescent girls: a functional analysis. British Journal of Clinical

Psychology, 28, 165-176.

Patton, G. C., Johnson-sabine, E., Wood, K., Manna, A. H., & Wakeling, A. (1990). Abnormal eating attitudes in London schoolgirls - a prospective epidemiological study: outcome at twelve month follow-up. Psychological Medicine, 20, 383-394.

Stunkard, A. J., & Messick, S. (1985). The three factor eating questionnaire to emasure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research, 29, 71-84.

Van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch eating behaviour questionnaire for assessment of restrained, emotional and external eating behaviour. International Journal of Eating Disorders, 5, 295-315.

CONFIDENTIAL

Name: Age:

Nationality: Weight:

Height: Sex:

Are you diabetic, or have you ever suffered from diabetes?
Yes/No

Are you currently taking any kind of medication?
Yes/No

Are you pregnant?
Yes/No

Have you ever been, or are you currently anorexic or bulimic?
Yes/No

Are you on a diet?
Yes/No

Have you ever had your IQ formally tested by a psychologist?
Yes/No

Do you suffer from any kind of sleep disorder?
Yes/No

APPENDIX TWO

Please read the following questions carefully and underline the most appropriate category.

1. Over the past 24 hours, how difficult have you found refraining from food?

Not at all Slightly Moderately Extremely

2. Did you think about eating?

Never Rarely Sometimes Often Constantly

3. Did you find your level of concentration was affected?

Not at all Slightly Moderately Very Much

4. How hungry did you feel most of the time?

Not very Moderately Fairly Extremely

5. How aware were you of food in the environment? (ie people eating around you/food in shops/food displayed on TV commercials etc)

Not at all Slightly Moderately Extremely

6. Did you experience intrusive thoughts of food? (ie you may have been thinking or involved in doing something quite unrelated to food, when thoughts of food would come into your consciousness)

Never Rarely Sometimes Often Constantly

Declaration of informed consent

I give my informed consent to participate in this study of the effects of short-term starvation on cognition.

(1) I have been informed that my participation in this experiment will involve going without food for a period of 24 hours.

(2) I have been informed that the general purpose of this experiment is to study the effects of fasting on cognition.

(3) I have been informed that there are no known expected discomforts or risks involved in my participation in this experiment. This judgment is based upon a relatively large body of research with people undertaking tasks of a similar nature.

(4) I have been informed that the investigator will gladly answer any questions regarding the procedures of this study when the experimental session is completed.

(5) I have been informed that I am free to withdraw from the experiment at any time without penalty of any kind.

Concerns about any aspect of this study may be referred to:

Dr John Davies, Reader in Psychology, Department of Psychology, University of Strathclyde, 155 George Street, Glasgow G1.

_____ _____

(Experimenter) (Experimental Participant)

_____

(Date)

Declaration of informed consent

I give my informed consent to participate in this study of how people's IQ performance is affected under varying conditions.

(1) I have been informed that my participation in this experiment will involve going without food for an initial period of 24 hours and another period of going without sleep for 24 hours.

(2) I have been informed that the general purpose of this experiment is to study the possible fluctuations in IQ under varying conditions.

(3) I have been informed that there are no known expected discomforts or risks involved in my participation in this experiment. This judgment is based upon a relatively large body of research with people undertaking tasks of a similar nature.

(4) I have been informed that the investigator will gladly answer any questions regarding the procedures of this study when the experimental session is completed.

(5) I have been informed that I am free to withdraw from the experiment at any time without penalty of any kind.

Concerns about any aspect of this study may be referred to:

Dr John Davies, Reader in Psychology, Department of Psychology, University of Strathclyde, 155 George Street, Glasgow G1.

_____ _____

(Experimenter) (Experimental Participant)

_____

(Date)

INSTRUCTIONS FOR COMPLETING THE TEST

The questions in this test are to find out how clearly you can <u>think</u>; they are not concerned with how much you <u>know</u>. Work through them as carefully and as quickly as you can. You will not have to write anything at all, but only to underline certain words and tick some boxes.

The following test should take approximately 10 minutes to complete. If you have any questions concerning these instructions, please ask the experimenter for assistance.

You may commence the test once you have read and understood the above instructions, and filled out the section below.

Name:

Age:

Sex: Female.

Date:

Underline the appropriate word. Underline only one of the words in the brackets for each item.

1. Forbid means the same as (contradict, hinder, prohibit, restrain, defend).
2. Escort means the same as (accompany, watch, follow, join, defend).
3. Faith means the same as (sincerity, belief, honesty, credit, ignorance).
4. Angular means the same as (blunt, stiff, abrupt, branching, cornered).
5. Increase means the same as (grow, become greater, spread, rise up, magnify)
6. Indistinct means the same as (imperfect, doubtful, hidden, unclear, faint).
7. Awake means the same as (watchful, cautious, conscious, alive, energetic).
8. Blend means the same as (mix, combine, mingle, confuse, add).
9. Excite means the same as (move, irritate, interest, arouse, attract).
10. Hinder is the opposite of (lighten, disentangle, help, favour, improve).
11. Wicked is the opposite of (heavenly, polite, righteous, unselfish, quiet).
12. Complete is the opposite of (partial, empty, spoilt, small, indefinite).
13. Unlike is the opposite of (similar, equal, inseparable, twin, balanced).
14. Coarse is the opposite of (polite, thin, refined, nice, sharp).
15. Supply is the opposite of (sale, demand, hunger, poverty, hindrance).
16. General is the opposite of (isolated, private, special, personal, peculiar
17. Grow is the opposite of (die, return, starve, diminish, wrinkle).

Please turn over the page.

Tick the appropriate box for the last 3 questions.

18. It is said that the age at which people marry in Britain is steadily rising, because:

1) People do not start earning until later in life than formerly. ☐

2) People do not fall in love so early. ☐

3) A man needs to earn more when he is married that when he is single. ☐

4) Women are less attractive. ☐

19. All firs are coniferous trees. All coniferous trees are evergreens. Which is the true statement below?

1) All evergreens are coniferous. ☐

2) All coniferous trees are firs. ☐

3) Only a few coniferous trees are evergreens. ☐

4) All evergreens are firs. ☐

5) All firs are evergreens. ☐

20. A man, pointing to a portrait, exclaimed, "I have no sisters or brothers, but that man's father is my father's son."

The man whose portrait he was looking at was:

1) His father. ☐

2) Himself. ☐

3) His son. ☐

4) His uncle. ☐

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
in collaboration with
R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs

STAI Form Y-1

Name _____ Date _____ S ___

Age _____ Sex: M ___ F ___ T ___

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I feel strained	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel satisfied	①	②	③	④
9. I feel frightened	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel indecisive	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel confused	①	②	③	④
19. I feel steady	①	②	③	④
20. I feel pleasant	①	②	③	④

Consulting Psychologists Press
577 College Avenue, Palo Alto, California 94306

EATING BEHAVIOUR QUESTIONNAIRE

1. When I smell sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal.

T F

2. I usually eat too much at social occasions, like parties and picnics.

T F

3. Life is too short to worry about dieting.

T F

4. I often feel so hungry that I just have to eat something.

T F

5. When I am with someone who is overeating, I usually overeat too.

T F

6. I have a pretty good idea of the number of calories in common foods.

T F

7. Sometimes when I start eating I just can't seem to stop.

T F

8. It is not difficult for me to leave something on my plate.

T F

9. At certain times of the day, I get hungry because I have become used to eating then.

T F

10. Sometimes I get so nervous that I must have to eat something.

T F

11. While on a diet, if I eat a food that is not allowed, I deliberately eat less for a period of time to make up for it.

T F

12. Being with someone who is eating makes me hungry enough to eat also.

T F

13. I enjoy eating too much to spoil it by counting calories or watching my weight.

T F

14. I often stop eating when I am not full as a deliberate effort to limit the amount that I eat.

T F

15. I get so hungry that my stomach often seems like a bottomless pit.

T F

16. I am always so hungry it is hard for me to stop eating before I finish the food on my plate.

T F

17. I eat anything I want, anytime I want.

T F

18. Without even thinking about it, I take a long time to eat.

T F

19. I count calories on purpose in order to control my weight.

T F

20. I do not eat some foods because they make me fat.

T F

21. I am always hungry enough to eat at any time.

T F

22. While on a diet, if I eat a food that is not allowed, I often then splurge and eat other high calorie foods.

T F

23. How often are you dieting in a deliberate effort to control your weight?

1	2	3	4
rarely	sometimes	usually	always

24. How often do you feel hungry?

1	2	3	4
only at mealtimes	sometimes between meals	often between meals	almost always

25. Do feelings of guilt about overeating help you to control your food intake?

1	2	3	4
never	rarely	often	always

26. How difficult would it be for you to stop eating half-way through dinner and not eat for the next four hours?

1	2	3	4
easy	slightly difficult	moderately difficult	very difficult

27. How aware are you of what you are eating?

1	2	3	4
not at all	slightly	moderately	extremely

28. Do you eat sensibly in front of others and splurge alone?

1	2	3	4
never	rarely	often	always

To what extent does this statement describe your eating behaviour?

"I start dieting in the morning, but because of any number of things that happen during the day, by evening I have given up and eat what I want, promising myself that I will start dieting again tomorrow."

1	2	3	4
not like me	a little like me	quite a lot like me	a lot like me

On a scale of 0 to 10, where 0 means no restraint in eating (eat what you like when you like) and 10 means total restraint (constantly limiting and never "giving in"), what number would you give yourself?

0 eat whatever you want
1
2 usually eat whatever you want
3
4 often eat whatever you want
5
6 often limit food intake
7
8 usually limit food intake
9
10 constantly limit food intake

Thank you for completing this questionnaire - please could you now fill out your name and date of birth below. All the information that you give as you take part in this study will remain CONFIDENTIAL.

Name:

Date of Birth:

BISCUIT RATING AND TASTING

Please could you complete this questionnaire concerning tasting and rating the biscuits in front of you on the plates marked A to E.

Give a mark out of 10 for each biscuit for the following questions and enter in the appropriate column below:

	A	B	C	D	E
1. How sweet is it?					
2. How coarse is it?					
3. How tasty is it?					
4. How nice does it look?					
5. How nice does it smell?					
6. How chewy is it?					
7. How crunchy is it?					
8. How salty is it?					
9. How colourful is it?					
10. How disgusting is it?					

Finally, I would like you to list on the following line the biscuits, A to E, in order of preference, listing your favourite first. So for example, if you liked B the best, write B first, then your next favourite and so on to your least favourite biscuit.

Thank you for completing this questionnaire.

NAME: AGE:

NAME -

If you were given a choice, which of the following would you eat NOW (you may choose one or more options):

a an apple

b a banana

c fish and chips

d Big Mac with fries

e steak, chips and veg

f a bag of crisps

g a milkshake

h a mars bar

i cheese toastie

j salad roll

CONFIDENTIAL

NAME: AGE (yrs, mos):

his questionnaire which you have been asked to fill out, will provide nformation about your eating habits and is preliminary to a perception tudy concerning food.

here are no right or wrong answers. Please underline the most ppropriate response for you to the following questions:

. When you have put on weight do you eat less than you usually do?

Not Relevant Never Seldom Sometimes Often Very Often

2. Do you try to eat less at mealtimes than you would like to eat?

Never Seldom Sometimes Often Very Often

3. How often do you refuse food or drink offered you because you are concerned about your weight?

Never Seldom Sometimes Often Very Often

4. Do you watch exactly what you eat?

Never Seldom Sometimes Often Very Often

5. Do you deliberately eat foods that are slimming?

Never Seldom Sometimes Often Very Often

6. When you have eaten too much, do you eat less than usual the following day?

Not Relevant Never Seldom Sometimes Often Very Often

7. Do you deliberately eat less in order not to become heavier?

Never Seldom Sometimes Often Very Often

8. How often do you try not to eat between meals because you are watching your weight?

Never Seldom Sometimes Often Very Often

9. How often in the evenings do you try not to eat because you are watching your weight?

Never Seldom Sometimes Often Very Often

10. Do you take your weight into account with what you eat?

Never Seldom Sometimes Often Very Often

NAME:

derline the appropriate word. Underline only one of the words in the ackets for each item.

Forbid means the same as (contradict, hinder, prohibit, restrain, defend).

Escort means the same as (accompany, watch, follow, join, defend).

Faith means the same as (sincerity, belief, honesty, credit, ignorance).

Angular means the same as (blunt, stiff, abrupt, branching, cornered).

Increase means the same as (grow, become greater, spread, rise up, magnify).

Indistinct means the same as (imperfect, doubtful, hidden, unclear, faint).

Awake means the same as (watchful, cautious, conscious, alive, energetic).

Blend means the same as (mix, combine, mingle, confuse, add).

Excite means the same as (move, irritate, interest, arouse, attract).

rcle the appropriate number for the last 3 questions.

It is said that the age at which people marry in Britain is steadily rising, because:

1) People do not start earning until later in life than formerly.

2) People do not fall in love so early.

3) A man needs to earn more when he is married that when he is single.

4) Women are less attractive.

All firs are coniferous trees. All coniferous trees are evergreens. Which is the true statement below?

1) All evergreens are coniferous.

2) All coniferous trees are firs.

3) Only a few coniferous trees are evergreens.

4) All evergreens are firs.

5) All firs are evergreens.

A man, pointing to a portrait, exclaimed, "I have no sisters or brothers, but that man's father is my father's son."

The man whose portrait he was looking at was:

1) His father.

2) Himself.

3) His son.

4) His uncle.

CIRCLE ONE ANSWER

1. How often are you dieting?

Never Rarely Sometimes Usually Always

2. What is the maximum amount of weight you have ever lost within 1 month (in pounds)?

0-4 5-9 10-14 15-19 20+

3. What is your maximum weight gain within a week (in pounds)?

0-1 1.1-2 2.1-3 3.1-5 5.1+

4. In a typical week, how much does your weight fluctuate?

0-1 1.1-2 2.1-3 3.1-5 5.1+

5. Would a weight fluctuation of 5 pounds affect the way you live your life?

Not at all Slightly Moderately Very much

6. Do you eat sensibly in front of others and splurge alone?

Never Rarely Often Always

7. Do you give too much time and thought to food?

Never Rarely Often Always

8. Do you have feelings of guilt after overeating?

Never Rarely Often Always

9. How conscious are you of what you are eating?

Not at all Slightly Moderately Extremely

10. How many pounds over your desired weight were you at your maximum weight?

0-1 1-5 6-10 11-20 21

RESTRAINT - 21

1. When I have eaten my quota of calories, I am usually good --about not eating any more.
T/F

2. I deliberately take small helpings as a means of controlling my weight.
T/F

3. Life is too short to worry about dieting.
T/F

4. I have a pretty good idea of the number of calories in common food.
T/F

5. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it.
T/F

6. I enjoy eating too much to spoil it by counting calories or watching my weight.
T/F

7. I often stop eating when I am not really full as a conscious means of limiting the amount that I eat.
T/F

8. I consciously hold back at meals in order not to gain weight.
T/F

9. I eat anything I want, anytime I want.
T/F

10. I count calories as a conscious means of controlling my weight.
T/F

11. I do not eat some foods because they make me fat.
T/F

12. I pay a great deal of attention to changes in my figure.
T/F

13. How often are you dieting in a conscious effort to control your weight?

1	2	3	4
Rarely	Sometimes	Usually	Always

14. Would a weight fluctuation of 5lbs affect the way you live your life?

1	2	3	4
Not at all	Slightly	Moderately	Very much

15. Do your feelings of guilt about overeating help you to control your food intake?

1	2	3	4
Never	Rarely	Often	Always

16. How conscious are you of what you are eating?

1	2	3	4
Not at all	Slightly	Moderately	Extremely

17. How frequently do you avoid "stocking up" on tempting foods?

1	2	3	4
Almost never	Seldom	Usually	Almost always

18. How likely are you to shop for low calorie foods?

1	2	3	4
Unlikely	Slightly likely	Moderately likely	Very likely

19. How likely are you to consciously eat slowly in order to cut down on how much you eat?

1	2	3	4
Unlikely	Slightly likely	Moderately likely	Very likely

20. How likely are you to consciously eat less than you want?

1	2	3	4
Unlikely	Slightly likely	Moderately likely	Very likely

21. On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want, whenever you want it) and 5 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?

0
eat whatever you want, when you want it
1
usually eat whatever you want, whenever you want it
2
often eat whatever you want, whenever you want it
3
often limit food intake, but often "give in"
4
usually limit food intake, rarely "give in"
5
constantly limiting food intake, never "giving in"

DISINHIBITION - 16

1. When I smell a sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal.
T/F

2. I usually eat too much at social occasions, like parties and
picnics.
T/F

3. Sometimes things just taste so good that I keep on eating even when I am no longer hungry.
T/F

4. When I feel anxious, I find myself eating.
T/F

5. Since my weight goes up and down, I have gone on reducing diets more than once.
T/F

6. When I am with someone who is overeating, I usually overeat too.
T/F

7. Sometimes when I start eating, I just can't seem to stop.
T/F

8. It is not difficult for me to leave something on my plate.
T/F

9. When I feel blue, I often overeat.
T/F

10. My weight has hardly changed at all in the last ten years.
T/F

11. When I feel lonely, I console myself by eating.
T/F

12. Without even thinking about it, I take a long time to eat.
T/F

13. While on a diet, if I eat a food that is not allowed, I often then splurge and eat other high calorie foods.
T/F

14. Do you eat sensibly in front of others and splurge alone?

1	2	3	4
Never	Rarely	Often	Always

15. Do you go on eating binges though you are not hungry?

1	2	3	4
Never	Rarely	Sometimes	At least once a week

16. To what extent does this statement describe your eating behaviour? "I start dieting in the morning, but because of any number of things that happen during the day, by evening I have given up and eat what I want, promising myself to start dieting again tomorrow."

1	2	3	4
Not like me	Little like me	Pretty good description of me	Describes me perfectly

APPENDIX FIFTEEN

DIRECTIONS FOR THE EXPERIMENTAL CONDITION

Good morning/afternoon. You have agreed to take part in a psychological experiment concerned with the effects of short-term starvation on cognition. Although your involvement in this study will require going without food for 24 hours, I would like to stress the point that you will experience no undue expected discomfort or undertake any risks.

As of (state the appropriate time - 9am, 9.45am, 10.30am etc) I would like you to abstain completely from any kind of solid food, though I would encourage you to take liquids and in fact would state that this is in fact necessary fro your physiological well-being. Please be aware that you will come to no physical harm whatsoever as a result of a 24-hour fast. At the end of the 24 hours I would ask you to return so that I may assess your cognitive state asking you to complete a short questionnaire and answer some questions which I will tape record for analysis.

I would like to add finally that I will be glad to answer any questions you might have regarding the nature of this study once the experimental sessions are over. In fact, you will receive a debriefing sheet which describes the rationale of the experiment once all the data have been gathered. Should you wish to withdraw from the experiment at any time, you are free to do so. If you have any questions please ask them no.

Before you go, please can you read and put your signature to this "Declaration of Informed Consent" from which I shall now give you.

APPENDIX SIXTEEN

DIRECTIONS FOR THE CONTROL CONDITION

Good morning/afternoon. You have agreed to take part in a psychological experiment concerned with the effects of sleep and food deprivation on IQ. Although your involvement in this study will require going without food for 24 hours and at the next stage of the experiment, going without sleep for 24 hours, I would like to stress the point that you will experience no undue expected discomfort or undertake any risks.

As I have explained, this experiment is concerned with the effects of food and sleep deprivation on IQ; and for this phase of the experiment it is required that you do not consume any food whatsoever during the next 24 hours before taking the IQ test and having a tape-recorded interview tomorrow at this time. Of course, it is essential you consume fluids (but not alcohol) in order that you do not become dehydrated. Your period of fasting began at (state time of entry eg. 9am, 9.45am, 10.30am, etc)

I would like to add finally that I will be glad to answer any questions you might have regarding the nature of this study once the experimental sessions are over. In fact, you will receive a debriefing sheet which describes the rationale of the experiment once all the data have been gathered. Should you wish to withdraw form the experiment at any time, you are free to do so. If you have any questions, please ask them now.

Before you go, please can you read and put your signature to this "Declaration of Informed Consent" form which I shall now give you.