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Dietary restraint and self-reported meal sizes: diary studies with differentially informed consent

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Psychometric methods were used to explore the reliability and criterion validity of self-reported food intake in studies of dietary restraint. In Study 1 the reliabilities over days of daily aggregate intakes and of intakes at meals at particular times of day were assessed in 7 day food dairies by 27 low-BMI females. The sizes of particular meals correlated poorly with each other and with the total of all other meals; daily aggregate intakes also had poor reliability (Cronbach's alpha). Individuals meal sizes were consistent from day to day, with high inter-correlations between meal sizes, high correlations between meals at particular times and the sum of the remainder and high reliabilities. Aggregate intake had moderate criterion validity. Of individual meals, only breakfast achieved criterion validity, but there was a significant cubic component in its relationship with restraint. In Study 2, young male and female participants with various BMIs, completed a food diary on a single day. Again, aggregate daily intake had low reliability. Total intake and breakfast both had criterion validity, dietary restraint correlating negatively with total intake and breakfast size in the whole sample and in females, but there were significant quadratic components in the relationships. In contrast, restraint correlated positively with lunch size in the whole sample and in males. The combination of low reliability of individual meals as estimates of total intake, and the low criterion validity of all meals except breakfast, suggests that it may be inappropriate to study dietary restraint using aggregate self-reported intake measures.

Introduction

Dietary restraint "restraint", the mental set thought to motivate dieting (Herman & Polivy, 1988; Stunkard & Messick, 1985), is associated with individual differences in food intake following events like eating high calorie food or anxiety induction (Federoff *et al*., 1997; Herman & Polivy, 1988; Stunkard & Wadden, 1990; Wardle, 1988), but its role in control of day-to-day intake is unclear (Alexander & Tepper, 1995; de Castro, 1995; Heusel and de Castro, 1997; Hill *et al*., 1991; Lindroos *et al*., 1997; Westenhoefer *et al*., 1990; Williamson *et al*., 1995; Steere & Cooper, 1993). Using diaries or retrospective food questionnaires, some authors have found the expected negative correlation between self-reported food intake and restraint (de Castro, 1995; Lindroos *et al*., 1997; Tuschl *et al*., 1990; Westenhoefer *et al*., 1990) but the correlations are low and this finding is not universal (Lindroos *et al*., 1997; Tepper *et al*., 1996). The weakness of observed correlations between restraint and self-reported intake could come about either because restraint has a small but constant impact on intake at all opportunities to eat or because restraint has much greater impact on some opportunities to eat than on others, and that these variations in impact are obscured by the use of intake measures aggregated across meals in previous studies. The present paper uses psychometric techniques to explore the reliability and validity of using aggregate intake measures in diary studies of dietary restraint.

Restraint is a stable disposition that should influence eating consistently. Aggregating intake assumes that

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each meal acts as a separate estimate of restraint, in the same way as individual items on restraint scales. While individual meals represent inaccurate estimates of restraint, aggregating cancels out random error, leaving a more reliable estimate. However, this is only true if restraint has the same direction of impact on every meal and the same factors contribute to error at each meal. Since self-reports of meal sizes are a product of a number of interacting factors, including the physiological signals that influence actual intake (Campfield & Smith, 1990; de Castro, 1996; Friedman, 1990; McGregor *et al*., 1996; Rowland & Morien, 1996; van Itallie & Kissileff, 1990) and psychological biases in reporting (Bingham *et al*., 1995; Herbert *et al*., 1995), which may combine in different ways at different times of the day, this assumption may not be valid. The validity of aggregating intake can be tested using the psychometric principles used to evaluate self-reports as estimates of other traits. Relating restraint to aggregate intake presupposes an underlying "meal size" variable that is related both to individual meal sizes and dietary restraint. Consequently, individual meal sizes should correlate with each other and with dietary restraint. The size of each meal should correlate with the sum of all of the other meals (giving a corrected "meal-total" correlation), the overall scale, based on individual meal size reports, should have high reliability and individual meals should have high item validity, as measured by their correlations with the criterion variable, dietary restraint (Rust & Golombok, 1989). Since dietary restraint is considered a linear scale, meal sizes should correlate with it linearly.

Response sets may bias self-reports of eating behaviour (Bingham *et al*., 1995; Herbert *et al*., 1995); participants may seek either to provide the results that researchers expect (compliance) or to make their actions appear socially desirable. Frequent contact between researchers and participants, such as in longitudinal studies, may exacerbate these biases (Van Strien, 1985). In the absence of specific information, research participants hypothesise about the nature of studies in which they are involved, and modify their behaviour to meet the expectations created (Orne & Gustafson, 1965). In the absence of descriptions of the instructions to participants in some of the previous studies, the contribution of response set is unclear (de Castro, 1995; Lindroos *et al*., 1997; Tuschl *et al*., 1990). Compliance is improbable for participants in a correlational study, as they would have to judge their restraint scores correctly relative to other participants, which is difficult with an inventory in which dietary restraint questions are embedded among items on other aspects of eating. In order to reduce the risk of social desirability effects, the present research used both longitudinal and cross-sectional methods to assess food intake. In addition, participants were explicitly instructed as to the nature of the studies in which they were enrolled, but the rationales for the two studies differed.

Study 1 explored the reliability and validity of composite measures of daily intake and their validity against restraint using a longitudinal design in a sample of women with a narrow range of body mass index (BMI) at the low end of normal, to control for the influence of variations in weight on self-reported intake and restraint (Alexander & Tepper, 1995; de Castro, 1995; Garrow, 1993; Hill *et al*., 1991; Lawson *et al*., 1995; Lindroos *et al*., 1997; McNeill, 1993; Rand & Kuldau, 1991; Westenhoefer *et al*., 1990; Williamson *et al*., 1995). There was regular contact between researchers and participants, which would have heightened the impact of response sets (Van Strien, 1985) but a rationale was given that would have encouraged over-reporting of intake and under-reporting of dietary restraint.

Having established in the first study that day-to-day variability in the sizes of meals at particular times of day is relatively low, the second study explored the relationship between dietary restraint and food intake assessed on a single day in a cross-sectional design in a larger sample, comprising both males and females, including a wider weight range, and using statistical procedures to control for variations in weight. As participants met the researchers twice only, once at recruitment and once to return their food diaries, the impact of response sets should have been reduced. Investigation of exploring the impact of patterns of food intake on the experience of dietary restraint was given as rationale for the study, which should have created a focus on the distribution of food choices across eating opportunities, rather than on caloric intake.

Method

Participants

Study 1 involved 26 women (characteristics given in Table 1), recruited from the staff and students at City University. All were known personally to the researchers and were recruited on the basis of their slim appearance.

Study 2 was carried out after Study 1, and none of the participants in Study 2 had been involved in Study 1. Sixty-three volunteers (characteristics given in Table 1), none personally known to the researchers, were recruited from a hall of residence at City University. This total N gives 80% power of detecting a correlation coefficient of as low as 0·35 with $p < 0·05$.