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Short communication

Restraint, disinhibition and food-related processing bias

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ABSTRACT

This study examined associations between restraint, disinhibition and food-related processing bias (FPB, assessed by the emotional Stroop task) in males and females in the UK, Greece and Iran. Results showed high restraint was associated with higher FPB. However, high restrained current dieters showed lower FPB that high restrained non-dieters. There was no significant difference in FPB for those showing high versus low disinhibition. Results are discussed in relation to theories of incentive salience and current concerns.

Introduction

When a person abuses a substance he or she displays a processing bias for information in the environment relating to this substance (e.g., Cox, Fadardi, & Pothos, 2006). That is, the person will direct his or her attention towards such information and process it more extensively. Processing bias is important since it may contribute to the maintenance and/or escalation of the addictive behaviour (e.g., Cox, Pothos, & Hosier, 2007). Unlike drugs or alcohol, food is not physically addictive. Nevertheless, like addictive substances, food can be a powerful reinforcer. As such, many individuals overeat and have difficulty limiting their food intake.

Previous research on food-related processing bias (FPB) in non-clinical populations is limited. A well-documented result is that higher levels of restraint (i.e. attempts to limit food intake) are associated with greater FPB. However, the compellingness of this finding is reduced by methodological limitations. Most of the studies we identified (e.g., Francis, Stewart, & Hounsell, 1997; Stewart & Samoluk, 1997) have measured restraint using the Restraint Scale; a scale that confounds restraint with disinhibition (i.e. tendency to overeat, Van Strien, 1997). We found only four studies that employed alternative measures of restraint (Braet & Crombez, 2003; Green & Rogers, 1993; Long, Hinton, & Gillespie, 1994; Ogden & Greville, 1993), and of these only one (Green & Rogers, 1993), found a main effect of restraint on FPB. An additional problem with work in this area is that it has been almost exclusively conducted with females from western societies. Given societal pressures on western females to be slim (e.g., Cogan, Bhalla, SefaDedeh, & Rothblum, 1996), it seems likely that women who are more inclined to overeat may also be more likely to attempt to limit their food intake, resulting in correlations between disinhibition and restraint. These limitations raise the question of whether it is restraint that is associated with increased FPB or tendency to overeat.

We sought to address these shortcomings by including in our sample individuals displaying high disinhibition/low restraint and vice versa. This was achieved by recruiting males and females in the UK, Greece and Iran, since there is evidence to indicate that men and non-western women are less subject to pressures to be slim (e.g., Cogan et al., 1996; Wardle et al., 1992). Additionally, we employed the Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986), which assesses restraint and disinhibition separately. If, as suggested by previous research

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(e.g., Francis et al., 1997; Green & Rogers, 1993; Stewart & Samoluk, 1997), restraint is associated with increased FPB, we would also expect to see such an association in the present sample of men and women from diverse cultures. However, if previous findings of an association between restraint and FPB are simply a result of underlying associations with tendency to overeat, then we would expect to see an association between FPB and disinhibition.

Method

Participants were 224 native undergraduates at the universities of Swansea, UK (36 females, 30 males), Ioannina, Greece (30 females, 30 males) and Ferdowsi of Mashhad, Iran (60 females, 38 males). Mean age was 21.7 years (S.D. = 3.91; range = 17–47) and mean BMI was 22 kg/m^2 (S.D. = 3.57; range = 16–36).

To test for FPB we employed a food version of the emotional Stroop task. This consisted of one card containing 20 different neutral travel-related words and one card containing 20 different food words (e.g., chocolate, salad, potato). For Greek and Persian translations, where possible we used words that were identical in meaning to the British lists. However, in some instances different words were used in order to ensure a match in terms of cultural use/significance (e.g., burger in English was translated to souvlaki in Greek). In each of the three languages the two word lists were matched in terms of the average number of characters (Cox et al., 2006). Each word was presented four times (80 words per card) and printed in blue, green, red or orange. Word order was randomly determined.

Participants were tested in their native language between 10.00–12.00 and 14.00–16.00 h. In order to familiarize them with the task they were first provided with 20 neutral words printed in the four colours and were asked to name the colour of each word. Subsequently, they received either the food or neutral card (the order was counterbalanced across participants) and were asked to name the colour of each word on the card out loud, as quickly and as accurately as possible. The experimenter recorded the time it took the participant to complete the card by starting a stopwatch when the participant started naming the colour of the first word and stopping it as soon as they named the colour of the last word. The experimenter also made a note of any errors. This procedure was then repeated for the other card, after which participants completed the DEBQ and the Grand (1968) Hunger Scale and recorded whether or not they were currently dieting to lose weight ('yes' or 'no').

Results

For each participant we computed: a FPB score, by subtracting the time it took them to read through the card of neutral words from the time it took them to read through the card of food words; BMI; DEBQ scores (ranging from 1 to 5) for restraint and disinhibition (Van Strien et al., 1986; the latter was computed by taking the mean of the emotional and external eating subscales) and hunger (according to guidelines provided by Grand, 1968).

Of the 224 participants 31 indicated that they were currently dieting to lose weight (Britain = 6 females, 4 males; Greece = 7 females, 2 males; Iran = 9 females, 3 males). Our analyses consider (a) those who were not currently dieting and (b) the whole sample. Of the 193 participants who were not currently dieting one participant (British, female) scored greater than 3.5 S.Ds. from the mean on the FPB score and was excluded leaving 192 participants. Of the 31 participants who were currently dieting one participant (Greek, female) scored greater than 3.5 S.Ds. from the mean on the FPB score and was also excluded. A further six participants (1 British female, 2 British males, 1 Iranian female, 2 Iranian males), despite currently dieting, scored under three on the Restraint Scale. These were taken to be spurious responses and were also eliminated, thus leaving a total of 24 participants in the dieting group, 216 across the whole sample.

Across the whole sample ($n = 216$), the mean length of time it took to read the food words was 64.07 s (S.D. = 12.74) whilst the mean length of time it took to read the neutral words was 61.19 s (S.D. = 11.57). Mean error rates were 0.77% for the food card (S.D. = 0.95) and 0.56% for the neutral card (S.D. = 0.98) and no participant's error rate exceeded 5%. Mean FPB score was 2.88 (S.D. = 7.39). Mean FPB scores were 4.35 for British participants (S.D. = 6.94, $n = 62$), 2.22 for Greek participants (S.D. = 7.64, $n = 59$), 2.32 for Iranian participants (S.D. = 7.45, $n = 95$), 2.62 for females (S.D. = 6.59, $n = 122$) and 3.20 for males (S.D. = 8.34, $n = 94$). For the DEBQ mean levels of restraint were 2.38 (S.D. = 0.95) whilst mean disinhibition was 2.73 (S.D. = 0.61). There were significant correlations between restraint and disinhibition for British ($r = .33$, $p < .05$) and Greek ($r = .28$, $p < .05$) participants, but not for Iranians ($r = .03$, NS). For females the correlation was .20 ($p < .05$) and for males .19 (NS). Across the whole sample the correlation was .21 ($p < .005$).

Considering that (a) preliminary correlational analyses revealed considerable noise in the DEBQ continuous measures and (b) an important analytical objective concerned an examination of interactions, where restraint and disinhibition were employed as independent variables we adopted a dichotomization approach, taking care not to introduce spurious variance (MacCallum, Zhang, Preacher, & Rucker, 2002). As such, restraint and disinhibition scales were dichotomized above and below a score of 3 (which represented the midpoint of the 5-point scales).

To test for hunger biases across the whole sample ($n = 216$) a four-way ANOVA was employed with country, gender, restraint (high/low) and disinhibition (high/low) as independent variables and hunger as the dependent variable. Results showed no significant main or interaction effects, ($F(2,202) = 0.35$ for country, $F(1,202) = 0.21$ for gender, $F(1,202) = 0.35$ for restraint, $F(1,202) = 0.97$ for disinhibition). This analysis was then repeated for non-dieters only ($n = 192$). Again, no significant main or interaction effects were observed. Finally, three independent t-tests were employed to examine possible hunger differences between low restrained non-dieters ($M = 5.44$, S.D. = 2.96, $n = 164$), high restrained non-dieters ($M = 4.51$, S.D. = 2.08, $n = 28$), and high restrained current dieters ($M = 5.46$, S.D. = 2.80, $n = 24$) (see below). Results showed no significant hunger difference between low and high restrained non-dieters, $t(190) = 1.59$, no significant difference between low restrained non-dieters and high restrained current dieters $t(186) = 0.04$, and no significant difference between high restrained non-dieters and high restrained current dieters, $t(50) = 1.40$.

Across the whole sample ($n = 216$), a two-way MANOVA was employed to examine country and gender effects on restraint and disinhibition. As predicted, there was a main effect of country on restraint with lower restraint in Iran than in Britain and Greece ($F(2,210) = 3.97$, $p < .05$; Britain: $M = 2.50$, S.D. = 0.93; Greece: $M = 2.52$, S.D. = 1.06; Iran: $M = 2.21$, S.D. = 0.87). Also as predicted, there was a main effect of gender on restraint, with males showing lower restraint than females, ($F(1,210) = 22.38$, $p < .001$; females: $M = 2.62$, S.D. = 0.99; males: $M = 2.07$, S.D. = 0.79). There was no interaction between country and gender on restraint. There was also a main effect of country on disinhibition, with higher levels in Britain than in Greece and Iran, ($F(2,210) = 5.42$, $p < .01$; Britain: $M = 2.93$, S.D. = 0.68; Greece: $M = 2.58$, S.D. = 0.66; Iran = 2.68, S.D. = 0.47). There was no main effect of gender on disinhibition, ($F(1,210) = 3.28$, NS; females: $M = 2.78$, S.D. = 0.58; males: $M = 2.66$, S.D. = 0.64) but there was an interaction between country and gender, ($F(2,210) = 3.54$, $p < .05$). Means revealed that there were higher levels of disinhibition among females compared to