Explicit and implicit attitudes towards food and physical activity in childhood obesity

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Abstract

This study investigated differences in the explicit and implicit attitudes towards food and physical activities between children with obesity (n = 38) and a matched control group (n = 38). The implicit attitude was assessed using the Extrinsic Affective Simon Task (EAST; J. Exp. Psychol. (50) (2003) 77), a modified version of the Implicit Association Test (IAT; J. Personality Social Psychol. (74) (1999) 1464). It was expected that both groups would report a positive explicit attitude towards healthy food and intense physical activities, and a negative explicit attitude towards unhealthy food and sedentary activities. Of particular interest was the hypothesis that children with obesity would have a more positive implicit attitude towards unhealthy food and sedentary activities than the control group. Results revealed no differences between groups in the explicit attitude towards food and physical activity. Children and adolescents with obesity had a more pronounced positive implicit attitude towards food in general. The relevance of these findings in terms of prevention, treatment and further research is discussed.

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1. Introduction

Worldwide, childhood obesity is a serious and prevalent problem (Popkin, 1998). It is acknowledged that obesity is the result of both a genetic predisposition and a behavioural pattern of unhealthy eating and physical inactivity. Research has shown that youngsters with obesity participate less in moderate or vigorous exercise (Trost, Sirard, Dowda, Pfeiffer, & Pate, 2003) and consume more fat, sugar and proteins than peers without obesity (McGloin, et al., 2002; Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003).

One of the possible explanations for this behavioural pattern may be their attitudes towards food (Brug, Lechner, & De Vries, 1995) and exercise (Smith & Biddle, 1999): Youngsters with obesity may have a positive attitude towards unhealthy food and sedentary activities. However, empirical evidence is at odds with this view. Studies revealed that children with obesity report a positive attitude towards physical activity (Deforche, Bourdeaudhuij, Tanghe, Hills, & Bode, in press), and even a less positive one towards unhealthy food than controls (Perl, Mandic, Primorac, Klapec, & Perl, 1998). A simple explanation in terms of attitudes is therefore not straightforward.

To understand the inconsistency between attitudes and behaviour, it is worthwhile to consider the view of Fazio (1990), who proposed two different modes by which attitudes can guide behaviour. According to him, ‘explicit attitudes’ may guide one’s behaviour by a deliberate and conscious analysis of the costs and the benefits of that behaviour. Alternatively, ‘implicit attitudes’ may guide behaviour in a more spontaneous and affective manner, without actively considering the pros and the cons. Explicit attitudes may be assessed by methods in which deliberation is possible, such as questionnaires. Implicit attitudes are preferentially measured indirectly by using reaction time paradigms such as the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998).

Implicit and explicit attitudes towards food in adulthood obesity have been studied by Roefs and Jansen (2002) using an IAT and questionnaires. Consistent with their hypothesis, no differences between adults with and without obesity were found for the explicit attitude towards high-fat food. However, the adults of the obese group did not show a more implicit positive attitude towards high-fat food: they reported an implicit negative attitude towards high-fat food. This unexpected finding may be owing to the nature of the IAT, which may have activated societal instead of personal attitudes towards the categories ‘low-fat’ and ‘high-fat’ (see De Houwer, 2001; Wiers, & de Jong, in press). Indeed, in Western society words such as ‘low-fat’ and ‘high-fat’ are strongly associated with a ‘positive’ and ‘negative’ valence respectively. Therefore, it is not inconceivable that Roefs and Jansen (2002) assessed the societal views towards the labels ‘high-fat’ and ‘low-fat’, rather than the implicit attitudes.

The objective of this study was to investigate the personal explicit and implicit attitudes towards different kinds of food and physical activities in children with obesity and a lean control group. Explicit attitudes were assessed by self-reports. Implicit attitudes were measured by the Extrinsic Affective Simon Task (EAST; De Houwer, 2003), a modified version of the IAT in which the labels ‘high-fat’ and ‘low-fat’ do not have to be used. For the explicit attitude, we expected that both groups prefer healthy food, and moderate and high intense physical activities in comparison with unhealthy food and sedentary activities. For the implicit attitude, we expected that, in comparison with the control group, participants with obesity prefer...
unhealthy food to healthy food, and prefer sedentary activities to moderate and high intense physical activities.

2. Method

2.1. Participants

Thirty-eight children and adolescents with severe obesity (mean ABMI$^2 = 166.09\%$, SD = 31.18; 17 boys; age: M = 13.69, SD = 2.63, range 9–18 years old) were recruited during the first week of an inpatient treatment in a Belgian medical-paediatric centre, which is specialized in the treatment of youth obesity. Thirty-eight youngsters without obesity were recruited in schools, and were matched by gender, age and educational level (mean ABMI = 107.34\%, SD = 18.85; 17 boys; age: M = 13.53; SD = 2.52, range: 9–18 years old).

2.2. Materials and procedure

EAST paradigm: The EAST (De Houwer, 2003) consists of two practice blocks and a subsequent test block. In the first practice block, white words are presented. Participants press a left or a right key in response to the valence of the words (I like to do or to eat/I do not like to do or to eat). That way, participants learn an extrinsic association between a positive (negative) valence, and the left (right) key. In the second practice block, participants press the left or the right key in response to the colour of words. In the experimental block, a combination of white and coloured words is presented. Participants categorise the white words in response to their valence, and the coloured words in response to their colour. Of importance is the performance on the coloured words. It has been shown that the valence of the coloured words affects the colour categorisation: task performance is better when the response for the colour is compatible with the response for the valence of the word (congruent trials; e.g., press right for happy because it is written in green when the right response is also correct for positive white words), and the performance is less when the response for the colour is incompatible with the response for the valence of the word (incongruent trials; e.g., press left for happy because it is written in blue when the left response is also correct for negative white words).

Participants carried out two EASTs: One task was related to physical activity, and one was related to food. Each task lasted about 15 min. The order of the tasks was counterbalanced. The tasks were run on an IBM compatible Pentium II laptop with a 15” colour screen using Inquisit 1.31 software, which measures RTs to keyboard presses with millisecond accuracy (De Clercq, Crombez, Roeyers, & Buysse, 2003).

$^2$The Body Mass Index (BMI; weight/height$^2$; kg/m$^2$) is accepted as a reliable and valid index of relative adiposity. However, since mean normal values of BMI vary substantially with age and values for individuals of different ages are difficult to compare, an adjusted BMI (ABMI) was used. ABMI was calculated using the formula (actual BMI/ideal BMI [50th percentile for same sex and age]) $\times$ 100 (Valverde, Patin, Oliveira, Lopez, & Vitolo, 1998). The 50th percentiles were derived from Flemish growth reference charts.
EAST words: Before each task, the participant provided words for physical activities or foods that he/she really (dis)liked. All words were possible, except the ones for the coloured trials. These individually selected words were used for the white EAST trials. There were nine preselected words related to physical activity, divided into three categories: sedentary activities (‘reading’, ‘resting’ and ‘watching television’), moderate intense activities (‘walking’, ‘cycling’ and ‘swimming’) and high intense activities (‘running’, ‘training’ and ‘exercising’). There were also six preselected words related to food, divided into two categories: unhealthy food (‘French fries’, ‘crisps’ and ‘coke’) and healthy food (‘tomato’, ‘apple’ and ‘water’). Preselected words were chosen by the experimenters based upon results of earlier studies (Deforche et al., in press). These words were used for the coloured EAST trials.

EAST trial and blocks: Each trial began with a white fixation cross for 315 ms; next, a (white/blue/green) word was presented until a correct response was given. In case of an incorrect response, a red cross appeared for 400 ms at the place of the word. The default Inquisit values were used for white. Blue was created by setting the red, green and blue values of Inquisit at 0, 125, and 150, respectively. Green was created by setting the red, green and blue values of Inquisit at 0, 150, and 125, respectively. All words were presented on a black background. A letter was 7 mm high and 5 mm wide. The inter-trial interval was 1200 ms. During the first practice block, the individually selected words appeared randomly four times in a white colour on the screen. Participants were instructed to classify the words according to their valence as quickly and as accurately as possible, by pressing the m-(positive) or the q-(negative) key of an AZERTY keyboard. In the second practice block, each of the coloured words was presented at least once in blue and once in green. In the food task 12 trials were presented, and in the activity task 24 trials. Half of the participants pressed the m-key in response to green words and the q-key in response to blue words; the others pressed the m-key in response to blue words and the q-key in response to green words. The physical activity task contained four test blocks of 32 trials (14 white trials, 18 coloured trials) each; the food task contained four test blocks of 38 trials each (14 white trials and 24 coloured trials). The words had to be classified depending on valence (for white words) or colour (for green and blue words).

Self-report: After the EAST tasks, participants rated the valence of the preselected food and physical activities words using a 7-point scale (−3: dislike; +3: like).

3. Results

3.1. EAST tasks

The responses on the coloured test trials were analysed (De Houwer, 2003). Trials with an incorrect response were discarded. In line with Greenwald et al. (1998), reaction times (RTs) below 300 ms or above 3000 ms were recoded to 300 and 3000 ms, respectively. All RTs were log-transformed. Delta (d) is reported as an estimate of effect size. A d of .01, .10 and .25 was used as a threshold to define small, medium and large effects, respectively (Cohen, 1988).

Physical activity: All relevant means can be found in Table 1. A 2 (group: youngsters with obesity vs. youngsters without obesity) × 3 (word category: sedentary, moderate intense, vs. high intense physical activities) × 2 (extrinsic response valence: positive vs. negative)-ANOVA was
performed on the mean log-transformed RTs. There were no significant effects, $F < 2.09$, except a borderline significant main effect of extrinsic response valence, $F(1, 74) = 3.63$, $p = .06$, $\delta = .05$: participants tended to be faster to give a response that was associated with a positive valence (e.g., the right key; $M = 830\text{ ms}, SD = 234\text{ ms}$) than to give a response that was associated with a negative valence (e.g., the left key; $M = 841\text{ ms}, SD = 210\text{ ms}$). The percentage of errors was analysed using the same $2 \times 2$ ANOVA. No effects were significant, $F < 2.15$.

**Food:** The reaction times (see Table 1) were analysed using a $2$ (group: youngsters with obesity vs. youngsters without obesity) $\times 2$ (word category: healthy vs. unhealthy food) $\times 2$ (extrinsic response valence: positive vs. negative)-ANOVA. Again there was a significant main effect of extrinsic response valence, $F(1, 73) = 7.86$, $p < .01$, $\delta = .10$: participants were faster to give a response that was associated with a positive valence ($M = 800\text{ ms}, SD = 202\text{ ms}$) than to give a response that was associated with a negative valence ($M = 828\text{ ms}, SD = 207\text{ ms}$). The analysis also revealed a borderline significant interaction effect between group and extrinsic response valence, $F(1, 73) = 3.68$, $p = .06$, $\delta = .05$. For the youngsters with obesity, there was a significant difference in RT between the trials with a positive ($M = 795\text{ ms}, SD = 226\text{ ms}$) and trials with a negative ($M = 846\text{ ms}, SD = 252\text{ ms}$) extrinsic response valence, $t(36) = 3.19$, $p < .01$, $\delta = .22$. For the control group, this effect was not significant, $t < 1$ ($M = 806\text{ ms}, SD = 178\text{ ms}$; $M = 810\text{ ms}$, $SD = 182\text{ ms}$).

### Table 1
Mean and standardized reaction times (RT) and percentage of errors of the obesity and normal-weight group on physical activity and food trials as a function of word category and extrinsic response valence

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SD = 163 ms, respectively). This pattern indicates that youngsters with obesity have a positive implicit attitude towards the presented food items, whereas the normal-weight youngsters were rather neutral towards them (see Fig. 1).

The same 2 × 2 ANOVA was performed upon the percentage of errors. Only the interaction effect of word category and extrinsic response valence was marginally significant, \( F(1, 73) = 3.29, p = .07, \delta = .04 \). For the healthy food words, there was a significant difference in the percentage of errors between trials with a positive (M = 7.71%, SD = 8.75%) and trials with a negative (M = 10.23%, SD = 8.50%) extrinsic response valence, \( t(74) = 2.07, p < .05, \delta = .06 \). For the unhealthy food words, this effect was not significant, \( t < 1 \) (respectively M = 8.43%, SD = 7.39%; M = 8.20%, SD = 9.30%). This pattern of results indicates that both groups have a positive attitude towards healthy food, and a neutral attitude towards unhealthy food.

3.2. Self-report

The explicit attitudes towards physical activity and food were obtained by averaging the item scores for each category of physical activity and for each category of food (see Table 2).

Physical activity: A 2 (group: youngsters with obesity vs. youngsters without obesity) × 3 (word category: sedentary vs. moderate intense vs. high intense physical activities)-ANOVA was used. The main effect of group was not significant, \( F(1, 74) = 1.19 \), but the main effect of word category was, \( F(1, 73) = 5.43, p < .01, \delta = .29 \): both groups were more positive towards moderate intense
physical activities ($M = 1.78$, $SD = 1.05$) than towards sedentary ones ($M = 1.48$, $SD = .94$), $t(75) = 2.14, p < .05, \delta = .06$. They were also more positive towards moderately intense physical activities than towards high intense ones ($M = 1.20$, $SD = 1.10$). The interaction effect of group and word category was not significant, $F(1,73) = 1.31$, nor were any of the other effects, all $F < 1$. Additional $t$-tests showed that all word categories were positively evaluated (i.e., received a mean rating above zero), $t > 9.58, p < .001$.

Food: A 2 (group: youngsters with obesity vs. youngsters without obesity) $\times$ 2 (word category: unhealthy vs. healthy food)-ANOVA was carried out. No effects were significant, all $F < 1.56$, and both categories were positively evaluated ($M = 1.72$, $SD = .77$), $t > 11.08, p < .001$.

4. Discussion

This study investigated whether explicit and implicit attitudes towards food and physical activity differed between children and adolescents with and without obesity. For the explicit attitude, it was expected that both groups prefer healthy food, and moderate and high intense physical activities to unhealthy food and sedentary activities. For the implicit attitude, it was hypothesized that youngsters with obesity prefer unhealthy food and sedentary activities to healthy food and physical activity.

For the explicit attitudes, results are mainly in line with our ideas. Both groups did not differ in their explicit attitudes towards food and physical activity. There was however no differential liking for healthy behaviour in comparison with unhealthy behaviour. Both groups reported a similar positive attitude towards sedentary, moderate and high intense physical activities, and towards healthy and unhealthy food. There are at least two explanations for the latter finding. First, it is possible that other attributes (such as the taste of food and the fun of activities) are more salient than health. Second, it is possible that healthy and unhealthy behaviours may not be conceived of as two opposite sides of a coin (Marshall, Biddle, Sallis, McKenzie, & Conway, 2002): People may like watching TV and reading (sedentary activities), and at the same time they
may enjoy swimming (moderate intense physical activities) and even running (high intense physical activities). The same probably holds for healthy and unhealthy food: Those who like healthy food may also like less healthy food such as crisps and coke.

The results for the implicit attitudes were not as expected. Youngsters with obesity did not have a more positive implicit attitude towards sedentary activities. They also did not have a more pronounced negative implicit attitude towards physical activities. The same was true for food: youngsters with obesity did not prefer unhealthy food to healthy food. One potentially interesting result was revealed. Youngsters with obesity had a more positive implicit attitude towards both healthy and unhealthy food. This effect was not present in youngsters without obesity. This pattern of results may indicate that children with obesity not really prefer unhealthy food, but simply like eating. Assuming that attitudes are important precursors of behaviour, it seems that obesity is not specifically related to eating unhealthy food, but rather to eating a lot. In support of this view, Jansen et al. (2003) found that children with overweight ate more than their normal-weight peers when exposed to food cues. Also in line with this idea, is that in adults with obesity a diet with calorie restriction was more effective in maintaining weight loss than a diet with fat restriction (Harvey-Berino, 1999). The idea that youngsters with obesity like food in general awaits further corroboration. The EAST may be easily adapted to investigate this idea: the attitude towards food stimuli may be compared with the attitude towards alternative stimuli.

There are a number of methodological and theoretical issues that arise from this research. First, there are few studies that have investigated implicit attitudes in obesity (Roefs & Jansen, 2002), and this study was the first to use the EAST paradigm. There is a need for replication and extension. Second, a largely unexplored issue in the attitude literature concerns the assumption that an implicit attitude measures the real attitude underlying behaviour. Although intuitive appealing, there is still limited evidence for the idea that persons who behave unhealthy have a positive implicit attitude towards that behaviour. Often those who behave unhealthy have also a negative implicit attitude (Swanson, Rudman, & Greenwald, 2001; Wiers, van Woerden, Smulders, & de Jong, 2002). Third, it is still unknown whether an implicit attitude should be conceived of as stable and context independent. It is possible that attitudes are multidimensional and consist of various attributes that mutually interact. Whether and which attribute is activated and becomes salient, may largely depend upon the context and upon the affective or motivational status of the individual (Blair, 2002; Gheldof, de Jong, Vinck, & Houben, 2004). Future research may benefit by varying exposure to food cues (e.g. food odours), and by varying the level of hunger. Fourth, it is yet unclear why there were no results at all for the implicit attitude towards physical activities. A reason may be that the attitude towards physical activities is much more context dependent (social context, weather, etc.) than the attitude towards food. Fifth, it is possible that the behavioural pattern of eating too much in obesity is less related to ‘liking’ (valence) than to ‘wanting’ (arousal) (see Berridge, 1996). This is the core idea of the incentive-sensitisation theory of addictive behaviours (Robinson & Berridge, 1993). Implicit assessments of wanting alcohol have been showed to differentiate better between heavy and light drinkers than implicit measures of liking alcohol (Wiers et al., 2002). This result has been replicated and extended in alcohol addicted patients (Houwer, Crombez, Koster, & Beul, in press). To explore this hypothesis the implicit measures may be adapted to investigate the associations between food stimuli and arousal attributes.
References


