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IMPLICIT ATTITUDES IN VERY YOUNG CHILDREN: AN ADAPTATION OF THE IAT

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ABSTRACT

We investigated the applicability of the Implicit Association Test (IAT) to children, 100 three to seven year-olds attempting a fully non-verbal adaptation of the IAT involving insect and flower stimuli. Ninety-four achieved 75% accuracy, and these participants attempted a second IAT, incorporating fat and thin female body shapes. Implicit attitude effects in both tests occurred throughout the age range, and were consistent across age and sex. We conclude that this IAT adaptation is effective for very young children, with potential for attitudinal research in pre-schoolers, and that the "thin idea" is internalised at an early stage of development.

INTRODUCTION

The Implicit Association Task (IAT) was devised for measuring entrenched attitudes and stereotypes held either consciously or unconsciously (Greenwald, McGhee & Schwartz, 1998). The term "implicit" refers to properties of "(un)awareness", and may be used in the broader sense of "automatic" (De Houwer, 2005). Implicit attitudes can be a more reliable indication of an individual's true attitudes, particularly attitudes regarded as socially undesirable such as prejudices (Nosek, Greenwald, & Banaji, 2007). Thus the IAT is often used to detect attitudes that individuals might not recognise in themselves or are unwilling to express openly, such as racial prejudice (e.g., Greenwald et al., 1998). The IAT also has potential for assessing children's attitudes as it avoids problems such as acquiescence and self-preservation bias to which explicit procedures are vulnerable. Despite this potential, little research has examined how the IAT could be adapted to increase its suitability for younger children.

Previous researchers working with young children have focused on explicit measures of attitudes, such as direct questioning and story-telling techniques. However, such techniques are problematic, because expressed attitudes can be influenced or contaminated by extraneous factors such as self-preservation biases (Spence, 2005). Although a long tradition of child-friendly attitude-assessment tools has developed using props such as dolls (e.g., Clark & Clark, 1947), these, by and large, provide only coarse-grained measurement for individuals.

Techniques for accessing young children's attitudes that require no oral response or comprehension of verbal material would be a distinct advantage, possibly reducing the "noise" associated with poor comprehension of task requirements, acquiescence and/or immature verbal expression. The IAT is a potentially appropriate method, if it can be adapted from a verbal to a purely non-verbal format.

The IAT is the most widely used and researched implicit technique for investigating attitudes (Spence, 2005). It relies on the assumption that if two concepts are highly associated, dual categorisation tasks will be easier when those concepts share the same response than when they require different responses. Thus, the IAT presumes that judgments congruent with participants' implicit associations of a stereotypically positive target category, such as flowers, with an evaluative category, such as "pleasant", will be made more quickly than incongruent judgments, requiring a common response to flowers and "unpleasant" (Hummert et al., 2002). The well-replicated observation that people respond faster to congruent than to incongruent pairings is termed the IAT effect.

In its original form, the IAT involves presenting on a monitor individual words drawn from two target categories, such as flowers and insects, and two evaluatively contrasting categories, such as "pleasant" and "unpleasant". Participants use two response keys to assign each word to one of two categories. After separate training on the two target categories and the two evaluative categories, the participant is asked to respond to a sequence of stimuli which includes both target and evaluative words (e.g., responding to pleasant or flower words using the right-hand key, and to unpleasant or insect words using the left-hand key). After retraining on the separate word sets, the combination task is repeated with reversed pairings (e.g., responding to pleasant or insect words using the right-hand key, and to unpleasant or flower words using the left-hand key).

Differences in mean reaction time between the trials with the original and reversed pairings indicate the direction and extent of any evaluative associations attached to the target words: faster responses to the original pairing than to the reversed pairing above would indicate that flowers evoked more positive associations than insects.

Although Hummert et al. (2002) argue that there remains some uncertainty about precisely what such implicit associations really signify, the IAT is one of the most reliable implicit tools available and is sufficiently predictive of target-relevant behaviour to qualify as an attitude assessment instrument (Spence, 2005). However, its efficacy for assessing children's attitudes has barely been studied, the only exception being Baron and Banaji's (2006) Ch-IAT. Adapting the IAT by using graphics of flowers and insects as target stimuli but retaining words for the evaluative stimuli, Baron and Banaji found that children as young as six responded significantly faster on congruent trials (insect and negative word, flower and positive word) than on incongruent trials (insect and positive word, flower and negative word). They obtained a similar result using a racial Ch-IAT, involving graphics of black and white children, with a sample of 27 children aged between five and six, 30 children aged ten, and 22 university students. Baron and Banaji maintain their data are "the first to reveal the emergence of implicit attitudes toward social groups in children as young as six years of age" (p.8).

The Present Study

Like Baron and Banaji's (2006) investigation, the present study was designed to establish whether an adaptation of the IAT can yield reliable and interpretable responses from young children. As in the adult version, Baron and Banaji's adaptation retained textual presentation of evaluative word stimuli, but this was simultaneously doubled by a recorded adult female voice. However, in the present study only pictorial stimuli were used, so that children unable to read could more easily participate, providing that they understood the task. This enabled the testing of much younger children than those involved in Baron and Banaji's study. In addition, attitudes to body shape and size in pre-school children were investigated for the first time using implicit measurement.

Given the established replicability of the flower/insect IAT effect, we assumed that a child's ability to cope with the task would be indicated by faster responses on congruent trials, where the positive and flower categories share one response, and the negative and insect categories share the other response, than on incongruent trials, where positive and insect categories share a response and negative and flower categories share the other. For present purposes, the likelihood that children would view insects more favourably than flowers and would show a reverse effect was assumed to be negligible.

We further hypothesised that children who completed the flower/insect IAT successfully, and who attempted a body-shape IAT, would generally respond faster to what we refer to below as congruent pairings (thin bodies and positive stimuli versus fat bodies and negative stimuli) than to incongruent pairings (thin bodies and negative stimuli versus fat bodies and positive stimuli). Such a response pattern would imply a more positive attitude to thin than to fat bodies. The age at which this was manifest would in turn indicate whether children at that stage had already internalised societal attitudes to fat and thin body shapes.

METHOD

Design

Both experiments in the present study employed a 5 (Age: 3, 4, 5, 6, 7) by 2 (Sex: Male, Female) by 2 (Congruency: Congruent, Incongruent) mixed design. The dependent variable was mean response time.

Participants

In Experiment 1, 100 children participated, 10 of each sex at each age level (3-, 4-, 5-, 6- and 7-year-olds). Six of these were excluded from Experiment 2 because of inadequate understanding of the task in Experiment 1. Those excluded were one female and four male three-year-olds, and one male four-year-old, leaving 49 females and 45 males. Recruitment was through advertising at childcare facilities and by personal invitation.

Apparatus and Materials

The experiments were run on a Pentium laptop computer with a touchscreen, using the Inquisit software package (Millisecond Software, 1996-2007). The task for Experiment 1 was based on Greenwald et al. (1998), replacing positive and negative word stimuli by various facial graphics ("smileys") with positive versus negative expressions, and replacing flower and insect words by photo images of several varieties of bright and colourful flowers versus several species of insects (excluding butterflies).

The IAT for Experiment 2 involved the same ten positive and negative smileys used in Experiment 1. However, instead of flower and insect stimuli, graphics of five fat and five thin adults were used. These were photographs of women, which had been "stampised" using photographic editing software, converting them into black and white minimal detail drawings and reducing distraction by non-body-size features like race or clothing colour. Each thin body was matched with a fat one for other prominent characteristics such as clothing style or posture. Although both boys and girls were participating, only female body stimuli were used as the aim was to investigate the internalisation of a cultural ideal for female bodies, and not the participants' own body satisfaction.

Procedure

Children were tested individually either at home or at a participating childcare facility with the child seated within comfortable reach of the laptop computer. Following consent procedures, the experimenter explained that she was investigating children's attitudes using a computer technique previously untried with small children. The first experiment, involving pleasant/unpleasant and flower/insect associations, was then run, familiarising the participant with the computer and the experimental environment, and establishing whether the participant could follow the instructions and complete the IAT.

For this experiment, participants received verbal instructions in age-appropriate language explaining that they would see many pictures of "good smileys" and "bad smileys". The experimenter clarified the meanings of the facial icons, initiated the IAT program and demonstrated the structure of the task, asking the participant to identify each large facial icon, successively displayed mid-screen, as a "bad smiley" or a "good smiley". For a "good smiley" the child selected a small smiling facial logo in a large blue rectangle on the right of the touchscreen by touching the screen anywhere within that rectangle. If the stimulus was a "bad smiley", the participant selected a small sad facial logo in the rectangle on the left of the screen by touching within that rectangle. Following each response, the large central facial icon was replaced by the next stimulus, while the small facial logos, which served as memory prompts, remained.

There were 20 practise trials for teaching participants the basic task, using facial stimuli as described and with verbal correction from the experimenter as required. The second practise set consisted of 10 trials involving only flower and insect stimuli and response logos, allowing continued familiarisation with the procedure and the graphics. The third set was a combination task, involving four sets of stimuli (flowers, insects, and sad and smiling facial stimuli) instead of assigning pictures to only two categories. The small response logos were displayed in either congruent combinations (sad face and insect logos to the left, smiling face and flower logos to the right) or in incongruent combinations (sad face and flower to the left, smiling face and insect to the right).

There were 30 trials each for the congruent and incongruent sets, presenting the flower, insect, sad and smiling facial stimuli in random order. The congruent and incongruent sets were separated by 10 practise trials involving only flower and insect stimuli, where the sides of the screen on which the response logos were displayed were transposed to re-familiarize the child with the task. Children who understood this task adequately were asked to continue into Experiment 2, with the adapted body attitudes IAT.

In Experiment 2 the stimulus images of fat and thin female adult models replaced the flowers and insects of Experiment 1. Testing again began with 20 trials using the sad and smiling facial stimuli. The congruent combinations involved underweight model and smiling face response logos to the right and overweight model and sad face logos to the left. For both experiments, presentation of the congruent and incongruent sets was counter-balanced for order. Throughout the session, children could take a break between sets if required.

Data Analysis

In accordance with Nosek et al. (2007, p.277), practice trials were excluded, as were individual response latencies above 10,000 or below 300 ms. However, the remaining response times reflected the children's abilities poorly, preliminary results being strongly affected by extreme individual response times. The window for response times was therefore narrowed, excluding those above 7,500 ms. Further, participants who responded with less than 75% accuracy in either experiment were excluded. Three females and four males aged three, and one male aged four were thus excluded from analysis for Experiment 1, and two females and eight males aged three, as well as two males aged four, were excluded from analysis for Experiment 2. Thus, only eight per cent overall failed to achieve 75% accuracy in Experiment 1 and 12 per cent in Experiment 2.

For each experiment, every participant's mean latency for correct responses was calculated separately for congruent and incongruent trials. These means formed the raw data for repeated-measures ANOVA with Greenhouse-Geisser adjustment and an alpha level of .05 to test whether the children responded significantly faster on the congruent than on the incongruent trials, with congruency as a within-subjects factor and age and sex as between-subjects factors.

RESULTS

Experiment 1: The Flower/Insect IAT

ANOVA indicated overall that participants responded more quickly to the congruent than to the incongruent trials, $F(1, 82) = 27.73$, $p < .001$. Between-subjects tests revealed a significant age main effect, indicating that response times were significantly lower at the higher ages, $F(4, 82) = 35.78$, $p < .001$ (Table 1).

Table 1. Mean Response Times and Standard Deviations in milliseconds in relation to Age and Congruency for Experiment 1

Age (yrs)	3	4	5	6	7
Mean Congruent	2733.08	2284.49	1739.14	1516.90	1447.61
SD Congruent	530.77	476.93	243.71	266.99	205.57
Mean Incongruent	3067.82	2392.11	1879.41	1667.95	1559.46
SD Incongruent	664.40	488.93	360.61	337.56	216.51
N of Participants	13	19	20	20	20

A Ryan-Einot-Gabriel-Welsch Range (REGWR) post hoc test revealed a significantly longer mean response time for three-year-olds than for all other age groups; the four-year-olds' responses were significantly faster than the three-year-olds, but significantly slower than those of the other age groups. The five-, six-, and seven-year-olds' response times did not differ significantly. There was no significant main effect for sex and no significant congruency by age interaction, indicating constancy across the age range in the difference between reaction times for congruent and incongruent trials.

Regarding the question of whether children aged between three and seven years are capable of completing the adapted IAT, 92 of the 100 participants responded at 75% accuracy or better, with all but a few of the youngest mastering the task. Furthermore, an IAT effect was obtained, in that children at all ages responded significantly faster on average to congruent than to incongruent pairings.

Experiment 2: The Thin/Fat IAT

ANOVA was conducted on the mean response times of the 88 participants who achieved 75% accuracy. Results indicated faster responses to congruent than to incongruent pairings, $F(1, 78) = 21.78$, $p < .001$. Tests of between-subjects effects revealed a significant main effect for age, indicating faster responses in higher age ranges, $F(4, 78) = 25.40$, $p < .001$ (Table 2).

Table 2. Mean Response Times and Standard Deviations in milliseconds in relation to Age and Congruency for Experiment 2

Age (yrs)	3	4	5	6	7
Mean Congruent	2806.08	2324.12	1884.35	1689.90	1542.57
SD Congruent	399.19	413.51	249.02	329.26	382.05
Mean Incongruent	3178.00	2490.24	1987.15	1821.18	1628.49
SD Incongruent	516.71	585.44	374.98	462.30	302.56
N of Participants	10	18	20	20	20

A REGWR post hoc test revealed that the response time for three-year-olds was significantly longer than for all other age groups; the four-year-olds' response times were significantly shorter than for the three-year-olds' but significantly longer than all other age groups. The response time for those aged five was significantly shorter than for those aged three or four, significantly longer than for those aged seven but not significantly different from the response time of the six-year-olds. The mean response time for the seven-year-olds was significantly shorter than for all other ages except age six. As in Experiment 1, the main effect for sex and the congruency by age interaction were non-significant, indicating no variation across the age range in the difference between response times for congruent and incongruent trials.

Once again, children from the age of three were able to carry out the IAT, in that 88 of the 100 participants achieved accuracy of 75% or above. Four children who did not achieve 75% accuracy for Experiment 2 had done so for Experiment 1, suggesting that, although capable of the task itself, they did not categorise thin and fat bodies accurately, which could reflect lack of awareness in regard to body size. The participants included in the analysis displayed a significant IAT effect, with mean response times for congruent pairings (thin and good; fat and bad) significantly shorter than those for incongruent pairings (thin and bad; fat and good). Again, the mean response times were significantly shorter for the older children, but, as in the first experiment, the non-significant congruency by age interaction indicates that the mean difference between response times for congruent and incongruent trials remained consistent across the age range.

DISCUSSION

Collectively, our data indicate that implicitly measurable attitudes to both non-social and social stimulus categories emerge in early childhood. By age three, children display detectable implicit attitudes to different human body shapes, which appear similar to those of older children. The present findings are consistent with those of Baron and Banaji (2006) who obtained faster responses from children on congruent than on incongruent trials for both flower/insect and racial IATs, and reported stability in these implicit attitudes between six and ten years of age and adulthood. Baron and Banaji also investigated explicit attitudes at the same ages, reporting that explicit racist attitudes decreased with age. This highlights the value of applying implicit measures in areas of social sensitivity, such as racial prejudice or prejudice against obese individuals.

Baron and Banaji (2006) found that all children in their study responded faster to congruent combinations on the flower/insect task. However, there were no significant sex differences in IAT effect, a finding replicated in this study. Baron and Banaji provided no flower/insect IAT means with which to compare the present data, but did present IAT effect values for the racial IAT, which averaged approximately 0.23. Similar values were obtained in our flower/insect IAT experiment, confirming the effectiveness of the IAT adaptation developed here.

Further support for the present adaptation can be inferred from its sheer practicability. Baron and Banaji (2006) found two of their 27 six-year-olds unable to complete the racial IAT, whereas we found that a majority of three and four year-olds, and all five to seven year-olds completed the tasks with 75% accuracy. Thus, the present adaptation of the IAT appears, if anything, more viable for very young children.

Our results from the thin/fat IAT extend previous research, such as Cramer and Steinwert's (1998) demonstration of body size stigmatisation in preschoolers as young as three, using explicit attitude measurement. In our study, children aged three correctly categorised not only body stimuli but facial icon stimuli in the same task, with at least 75% accuracy, notwithstanding the complexity of categorising two sets of intermingled stimuli on different dimensions

Cramer and Steinwert (1998) reported that the “fat is bad” stereotype was shared by both sexes, as we also found using implicit measurement. The absence of variation over sex and age found in our implicit attitude measure suggests that this implicitly measurable attitude is evident in children as young as three and remains relatively stable. Future research needs to examine these factors to gain insight into the processes of original attitude internalisation and later overt expression.

This study and that of and Baron and Banaji (2006) have both demonstrated the viability of adapted IATs with children, but we have shown that this viability extends downwards at least to age three. Further, the work of Cramer and Steinwert (1998) has been complemented with evidence from an implicit measure that such young children attach unfavourable associations to female obesity.

Although there remain methodological issues which should be considered before generalising these results, such as the reduced number of IAT task phases used to facilitate participation for very young participants, this study yielded a consistently detectable IAT effect in most three-year-olds. The reliability and validity of this IAT adaptation needs examination with a larger sample, including older children and adults, to provide commensurable data across a wide age range and to facilitate comparison with other research such as Baron and Banaji’s (2006) study. This would allow a fuller understanding of the present results and the developmental tolerability of the task.

Implications and Future Research

The data indicate that our adaptation of the IAT technique can be administered to children at least as young as three years. Notwithstanding the need to examine the reliability and validity of the present adaptation, as well as optimising stimuli and task duration, this technique has

potential for assessing children's attitudes to a variety of concepts. The IAT can be used whenever categories can be meaningfully dichotomised, such as weight, race or sex, and could be applied, for instance, to gender stigmatisation in preschool children, a neglected topic owing to problems associated with methods requiring children to rate or nominate friends (Asher, Singleton, Tinsley, & Hymel, 1979; Bullock, Ironsmith, & Poteat, 1988).

Further investigation of children's attitudes to body shape is indicated by the present findings, which imply that children are internalising western society's "thin ideal" at a very young age. Existing evidence that overweight children who accept this ideal are more likely to experience body dissatisfaction and low self-esteem (Musher-Eizenman, et al., 2004) points to the value of applying implicit methodology to this, given that body dissatisfaction is associated with depression and eating disorders (McVey, Tweed, & Blackmore, 2004).

Dohnt and Tiggemann (2005) have suggested that in children the "thinness schemata" that underlie eating problems are less consolidated, and therefore more susceptible to intervention than in adolescents or adults. Many current preventive interventions targeting adolescents may therefore come too late. A practical implication of the present study is the need for programs to educate preschoolers about accepting diversity of body shape. However, given current campaigns to reduce childhood obesity in English-speaking countries, it may be an uphill battle to promote in children empathy for their overweight peers.

As a tool that avoids problems such as acquiescence, and in a bright, colourful and enjoyable format like that of the current study, the present non-verbal IAT could be a practical addition to the existing measures used to study children's attitudes. The task could also easily be adapted to use photographs of the participating child and other children, linking "self" versus "other" with positive and negative facial icons to assess implicit self-worth. Additionally, self and other could be combined with fat and thin bodies to examine how children view their own bodies. This information, combined with implicit measurement of children's attitudes towards differing body shapes in general, could offer insight into attitudes that they are unwilling to express explicitly. It could also offer the prospect of a less distressing research experience for overweight children than explicit methodology.

Combined when possible with information gathered through explicit measures such as scales of self-worth and body dissatisfaction, as well as other demographic and family data, the non-verbal IAT may provide means to identify children at risk of developing body dissatisfaction. Targeted programs to encourage self-worth and self-acceptance could follow, aimed at protecting children from depression and eating disorders caused by the effort to attain an impossible ideal.

In conclusion, the present research is the first to successfully investigate implicit attitudes to body shapes in children as young as three years of age. Our data show that most children at that age are capable of completing the adapted IAT and that very young preschoolers already look upon thin as good and fat as bad. This suggests that it is important to move from a pathology model, focused on treating those who have already developed problems such as eating disorders, to a preventive model aimed from preschool onwards at inculcating in children acceptance of different body shapes, while still encouraging a healthy lifestyle. The adapted IAT can contribute to this field of research and more generally to the study of attitudinal development in the very young.

REFERENCES

Asher, S. R., Singleton, L. C., Tinsley, B. R., & Hymel, S. (1979). A reliable sociometric measure for preschool children. *Developmental Psychology, 15,* 443-444.

Baron, A. S., & Banaji, M. R. (2006). The development of implicit attitudes: Evidence of race evaluations from ages 6, 10, and adulthood. *Psychological Science,* 17, 53-58.

Bullock, M. J., Ironsmith, M., & Poteat, G. M. (1988). Sociometric techniques with young children: A review of psychometrics and classification schemes. *School Psychology Review, 17*, 289-303.

Clark, K.B., & Clark, M.P. (1947). Racial identification and preference in negro children. In T.M. Newcomb & E.L. Hartley (Eds.). *Readings in Social Psychology* (pp. 169-178). New York: Holt.

Cramer, P., & Steinwert, T. (1998). Thin is good, fat is bad: How early does it begin? *Journal of Applied Developmental Psychology, 19*, 429-451.

De Houwer, J. (2005). What are implicit measures and indirect measures of attitude? A comment on Spence (2005). *Social Psychological Review, 7*, 18-20.

Dohnt, H. K., & Tiggemann, M. (2005). Peer influences on body dissatisfaction and dieting awareness in young girls. *British Journal of Developmental Psychology, 23*, 103-116.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464-1480.

Hummert, M. L., Garstka, T. A., O'Brien, L. T., Greenwald, A. G., & Mellott, D. S. (2002). Using the Implicit Association Test to measure age differences in implicit social cognitions. *Psychology and Aging, 17*, 482-495.

McVey, G., Tweed, S., & Blackmore, E. (2004). Dieting among preadolescent and young adolescent females. *Canadian Medical Association Journal, 170*, 1559-1562.

Millisecond Software. (1996-2007). Inquisit. Seattle, WA.

Musher-Eizenman, D. R., Holub, S. C., Miller, A. B., Goldstein, S. E., & Edwards-Leeper, L. (2004). Body size stigmatisation in preschool children: The role of control attributions. *Journal of Paediatric Psychology, 29*, 613-620.

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The Implicit Association Test at age 7: A methodological and conceptual review (pp. 265-292). In J. A. Bargh (Ed.), *Social psychology and the unconscious: The automaticity of higher mental processes*. New York: Psychology Press.

Spence, A. (2005). Using implicit tasks in attitude research: A review and a guide. *Social Psychological Review, 7*, 2-17.

APPENDIX

Matrix of correlations, means and standard deviations for all variables included in analyses*

	Age	Flower-Insect Congruent	Flower-Insect Incongruent	Thin-Fat Congruent	Thin-Fat Incongruent
Age		-0.75**	-0.69**	-0.74**	-0.71**
Flower-Insect Congruent			0.90**	0.79**	0.81**
Flower-Insect Incongruent				0.75**	0.83**
Thin-Fat Congruent					0.87**
Mean	5.25	1834.49	2000.67	1957.18	2106.14
SD	1.32	541.24	674.59	535.57	654.92
N		88	88	88	88

* Note that only data from participants who achieved 75% accuracy in both experiments are included in the computations. All variables other than age were measured in milliseconds.
** Correlations significant at $p<0.001$.

AUTHORS' NOTE

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