Looking for mediators: cognition, perceived control and coping in the treatment of anxiety-disordered children
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Chapter 2

An indirect and direct measure of anxiety-related perceived control in children: The Implicit Association Procedure (IAP) and Anxiety Control Questionnaire for Children (ACQ-C)

Abstract

A perceived lack of control over negative events is assumed central to the development of anxiety disorders. So far, only questionnaires were used to test this theory, but they have several disadvantages. In this study, the Implicit Association Procedure (IAP) was adapted to measure anxiety-related perceived control in an indirect way. IAP data of 33 non-selected children were compared to a direct measure of perceived control, the Anxiety Control Questionnaire for Children (ACQ-C). Results showed that higher anxious children had lower perceived control over anxiety-related events than lower anxious children, on both the indirect and the direct measure.
Introduction

Anxiety disorders are among the most common psychiatric disorders in children, occurring in 5-18% of all children and adolescents (James, Soler, & Weatherall, 2009). Existing treatments like cognitive behavioral therapy are effective in about 56% of children (James et al., 2009). To improve treatment efficacy, it is essential to gain more insight in causal and maintaining factors of anxiety disorders. According to Barlow (Barlow, 2002; Chorpita & Barlow, 1998), a perceived lack of control over negative events is central to the development of anxiety disorders. These negative events can be threatening external events or negative internal emotional and bodily reactions. In Barlow’s model, early experiences with uncontrollable events lead to a chronic feeling of uncontrollability, and to a psychological vulnerability of perceiving future events as uncontrollable. Ultimately, this can result in negative emotion and clinical anxiety.

Research has, indeed, demonstrated a relationship between perceived control and anxiety disorders in adults and children. Rapee, Craske, Brown, and Barlow (1996) found that clinically anxious adults had lower scores on a self-report measure of perceived control, the Anxiety Control Questionnaire (ACQ), than non-clinical adults. In addition, it has been found that clinically referred children with an anxiety disorder had significantly lower levels of perceived control than non-referred children, as measured with a children’s version of the ACQ (Weems, Silverman, Rapee, & Pina, 2003). Moreover, perceived control predicted a diagnosis of clinical anxiety—even after controlling for self-reported anxiety as measured by the RCMAS (Weems et al., 2003).

So far, all studies of perceived control have been based on questionnaires like the ACQ-C. A disadvantage of direct measures is that they may be biased by limited introspective abilities and strategic processes, like social desirability. Moreover, questionnaires rely on the ability and willingness to answer in a reflective way (Greenwald & Banaji, 1995). This could especially be difficult for children. Furthermore, it is unknown whether questionnaires reflect unconscious and automatic processes. Sensitivity for these processes may be especially important in the study of treatment effects, in order to distinguish the results of conscious learning in therapy from changes on an unconscious and automatic level. Both might contribute to structural cognitive and behavioral changes.

To overcome these shortcomings, tasks have been developed that measure the construct of interest without asking the participant directly. These tasks, based on reaction times, are the so-called indirect measures (Fazio & Olson, 2003). They measure automatic attitudes and associations, which are harder to control consciously even though the participant may be aware of what the task measures (Fazio & Olson, 2003). As a result, indirect measures have shown to be more robust against response biases than questionnaires. Correlations between direct and indirect measures are quite variable and low, with average $r$ of .24 (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005) and .37 (Nosek, 2005) for measures on different domains.

1 We use the word “children” to refer to children and adolescents, unless specified otherwise.
These low correlations might stem from the fact that indirect measures primarily reflect automatically activated associations, while responses on questionnaires may be based on both automatically activated responses and reflective or controlled processes (Fazio & Olson, 2003; Hofmann et al., 2005). Direct and indirect measures probably tap two different facets of attitudes (Greenwald & Farnham, 2000). This makes it interesting to study direct and indirect measures in concordance. So far, to our knowledge, no indirect measures have been reported in the study of perceived control.

The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is one of these indirect measures. The IAT paradigm has frequently been used to assess automatic associations in different domains, for example, anxiety, self-esteem and racial attitudes (Egloff & Schmukle, 2002; for an overview see Greenwald, Poehlman, Uhlmann, & Banaji, 2009). The IAT has good internal consistency (average α between .70 and .90; Nosek, Greenwald, & Banaji, 2006), is difficult to fake without specific instructions (Egloff & Schmukle; Kim, 2003; Schnabel, 2004) and especially useful when social desirability concerns are high (Greenwald et al., 2009). Finally, indirect measures like the IAT might be better to predict relapse in disorders than direct measures (De Jong, Pasman, Kindt, & Van den Hout, 2001).

Recently, Schnabel (2004; see also Schnabel, Banse, & Asendorpf, 2006) developed another indirect measure of self-concept: the Implicit Association Procedure (IAP). The IAP was originally developed to test the convergent validity of the IAT. However, it appears that the IAP might be an even more promising instrument than the IAT. Although psychometric properties of the IAP were similar to the IAT, the IAP tended to be even more robust to faking instructions.

The IAP is based on the Evaluative Movement Assessment (EMA; Brendl, Markman, & Messner, 2005). In the EMA the intrinsic meaning or valence of the response is used, based on "automatic movement tendencies." A movement towards the target is seen as approach behavior, with positive valence. A movement away from the target is seen as avoidance behavior, with negative valence. Brendl and colleagues (2005) assume that moving an attitude towards oneself is an approach response and away from oneself is an avoidance response (also see Rinck & Becker, 2007). Following this, in the IAP it is assumed that participants react faster with a movement towards themselves, than with a movement away from themselves, when confronted with concepts that belong to "self." When confronted with concepts that do not belong to "self", participants are assumed to react faster with a movement away, than with a movement towards themselves.

Building on this principle, in the IAP the participant has to pull a joystick toward or push it away from oneself, depending on whether a stimulus has to be associated with Me or Notme target words. Schnabel’s IAP consisted of three phases. In the first phase, the target phase, participants had to pull the joystick towards themselves when they saw Me words, like "I" or "self"; and push it away when they saw Notme words, like "they." In the second phase, the combined phase, the attribute categories Shy and Nonshy were introduced. The participant had to pull the joystick towards themselves when they saw Me stimuli and Shy stimuli (e.g.
"inhibited"). After Nonshy stimuli (e.g. "uninhibited") and after Notme stimuli, the participant had to push the joystick away. In the third phase, the reversed combined phase, the instruction for the attribute stimuli (Shy / Nonshy) was reversed. In the end, the IAP score is calculated, which reflects indirect measured self-concept. It is calculated as the difference between reaction times in the combined and reversed phases (Schnabel, 2004).

The main objective of the present study was to adapt the IAP to measure anxiety-related perceived control in children. First, instead of words for the target and attribute stimuli, we used pictures. This had the advantage of not having to cover the complicated concept of perceived control in one word. Furthermore, pictures are more appealing for children and do not rely on reading ability. Second, we individualized the IAP, so the children could identify themselves more easily with the stimuli (see method section for details). The data of the IAP were compared to a direct measure of perceived control, the Dutch translation of the Anxiety Control Questionnaire for Children.

Our first research question was whether an indirect measure of perceived control could predict anxiety level. We expected more anxious children to show weaker associations between Control pictures and Me pictures than less anxious children on the Perceived Control IAP, as reflected in lower (or even negative) IAP scores. Our second research question was if we could replicate the relation between anxiety and directly measured perceived control in a sample of Dutch children. We expected higher anxious children to have lower scores on the ACQ-C than lower anxious children. Third, we examined the correlation between the indirect and the direct measure. We expected a low to moderate correlation between the ACQ-C and the IAP. Furthermore, we examined the internal reliability of the IAP and explored the influence of age on IAP scores.

Method

Participants
Participants were 33 children and adolescents between 7 and 17 years of age (11 boys; 22 girls; age \( M = 12.4 \) years). Children were recruited from three different schools: two regular, public secondary schools and an elementary school in one large and two small cities. Participants were invited as part of a larger study on information processing in children and adolescents. Children were included after written informed consent from themselves and their parents. Exclusion criteria were vision problems (not corrected with glasses/lenses) and use of medication that could interfere with reaction times. Furthermore, the Child Behavior Checklist (CBCL; Achenbach, 1991) was filled out by the parents to screen for psychiatric problems. Children were excluded if they had a clinical score on the Internalizing Scale of the CBCL or received treatment for their problem. Based on these criteria, we did not have to exclude any children. Two children in every secondary school could win a gift coupon, worth 25 euros.
Assessments and Measures

Overall Procedure
After informed consent was given, individual appointments with the children were made. The first three authors—all psychologists—tested the children at school in a standardized way. All participants respectively rated themselves on the STAI(C), filled out the ACQ-C and completed the IAP. The ACQ-C was always filled out before the IAP, because research has shown that context can influence the measured associations: self-report can make certain evaluations more accessible for processing (Ellwart, Becker, & Rinck, 2005; Nosek, Greenwald, & Banaji, 2005). By filling out the ACQ-C first, all children had the same “frame of reference”, which was important, because the ACQ-C and IAP were part of a larger test-battery, including other indirect measures.

Implicit Association Procedure (IAP)

Task design and instructions. The Perceived Control IAP (Table 1) was based on the procedure developed by Schnabel (2004). Participants had to pull a joystick toward themselves or push it away, dependent on whether they had to associate a stimulus with Me or Notme. The IAP combined the discrimination of targets (Me versus Notme) with the discrimination of attributes (Control versus Noncontrol). The joystick was placed in the middle in front of the keyboard, so it could be handled with either the right or left hand. The participants were instructed to hold on to the joystick and respond as accurate and quick as possible.

Table 1. Implicit Association Procedure for perceived control: task sequence

<table>
<thead>
<tr>
<th>Phase</th>
<th>N of trials</th>
<th>Task</th>
<th>Joystick direction assignment</th>
<th>Target discrimination</th>
<th>Combined task</th>
<th>Reversed task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Toward participant</td>
<td>Me</td>
<td>Me, Control</td>
<td>Me, Noncontrol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Away from participant</td>
<td>Notme</td>
<td>Notme, Noncontrol</td>
<td>Notme, Control</td>
</tr>
</tbody>
</table>

Note. The first 10 trials of the combined and reversed phase were included as practice trials.

In the first-target-phase, participants learned to discriminate three Me and three Notme pictures. During all phases the Me pictures had to be pulled towards themselves; the Notme pictures had to be pushed away. Following this phase the concept of “control” was introduced and the five Control and five Noncontrol pictures were shown on paper. Control was described as knowing what to do in situations and the feeling that one can handle something on their own. In the second-combined-phase, these five Control and five Noncontrol pictures were added and these had to be pulled towards or pushed away from oneself, respectively. In the third and
An indirect (IAP) and direct (ACQ-C) measure of perceived control in children

The task duration was approximately 20 minutes. The combined and reversed phases were each preceded by ten practice trials. The test trials in the combined and reversed phase were randomized in order within eight blocks of 16 trials. Stimulus order was the same for each participant. The IAP Control score was computed by subtracting mean reaction times for Control pictures in phase 2 from phase 3. The IAP Noncontrol score was computed in the same way using the mean reaction times for Noncontrol pictures. A positive IAP score reflects a stronger association with Control; a negative IAP score reflects a stronger association with Noncontrol. Other than Schnabel (2004), we do not report one IAP score for all trials (both target and attribute trials), because we were interested in the results for Control and Noncontrol pictures separately. One score can theoretically reflect only an effect on the target (Me, Notme) pictures or just reflect an effect on one attribute picture (Control or Noncontrol). The assumption of one score is that both attribute pictures are comparable (or direct opposites), but this is possibly not the case. Moreover, although the IAP is still a relative measure like the IAT, it minimizes this limitation by not showing the opposite category (e.g. Notme) explicitly (Schnabel et al., 2006).

Apparatus. The IAP was programmed and presented using the Presentation software package (Presentation 9.9, 2005) on a Dell Inspiron 9300 laptop with a 17-inch color monitor and an adapted USB joystick.

During all trials, the word “ME” (in green, with a green frame around) representing the participant was shown at the bottom center of the screen. During the second and third phase, the instruction for the pictures which had to be pulled towards the participant was shown in the left upper corner of the computer in yellow: “me = control” in phase 2 and “me = noncontrol” in phase 3. Each trial started with a green fixation cross in the middle of the screen, that lasted for 600 ms. This was followed by the black and white target or attribute picture, for a maximum of 3000 ms. The pictures moved across the screen according to the reaction of the participant and disappeared when they reached the upper or lower edge of the screen. Reaction time (in milliseconds) was measured as the time passed from the beginning of stimulus presentation to the disappearance of the stimulus. After a correct response, the interstimulus interval was 1000 ms. After an incorrect response, the participant immediately got feedback in red, in the center of the screen. This feedback was: 1) “too fast” when the response was within 100 ms from the beginning of the stimulus; 2) “too slow” if there was no response after 2000 ms or 3) “wrong” if the response was in the wrong direction. The feedback duration was 200 ms, followed by a 1000 ms interstimulus interval.

Stimuli. Pictures created by a professional drawer represented the target and attribute concepts. To individualize the IAP, we developed a girl and a boy version of the task and the first

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1 We did calculate one total score however, and results resembled results for the IAP Noncontrol score (with an age x group interaction effect).
letter of the child’s first name was used as one of the Me stimuli. The three Me pictures were 1) a young girl; 2) a girl pointing at herself; 3) a girl with the first letter of her name on her chest. The three Notme pictures were 1) an old man; 2) a boy pointing at himself; 3) a girl with the letter “q” on her chest (if “q” was not the first letter of the name). For boys, the sexes of the pictures were reversed.

Similar to the ACQ-C (see below), which represents control over external events and internal reactions in two subscales, the Control and Noncontrol pictures had to represent these situations. The five Control pictures were 1) a child (boy or girl) that solved a puzzle; 2) a child walking calmly and whistling; 3) a child thinking of something positive while feeling scared; 4) a child thinking of something nice while “pushing a scary thought away”; and 5) a child who, although scared, extinguishes a fire. The five Noncontrol pictures were 1) a child that does not know what to do; 2) a scared, shivering child; 3) a child having scary thoughts; 4) a child feeling uncomfortable in a group; 5) a child that has trouble breathing. Examples of a Control and Noncontrol picture are given in Figure 1.

Figure 1. Example of a Noncontrol picture for girls: trouble breathing (left) and an example of a Control picture for boys: pushing scary thought away (right)

Questionnaires
- **Child Behavior Checklist** (CBCL; Achenbach, 1991). The CBCL was used to screen for psychiatric problems in children.
- **Spielberger State Trait Inventory for Children** (STAIC; Spielberger, Edwards, Lushene, Montuori, & Platzeck, 1973). The STAIC trait subscale (20 items) was used to measure anxiety
level. Higher scores indicate more anxiety. For adolescents (15 years and older), the adult version of the scale was used (Spielberger State Trait Inventory, STAI; Spielberger, 1983).

Anxiety Control Questionnaire for Children (ACQ-C; Weems, Silverman, Rapee, & Pina, 2003). The ACQ-C was adapted from the adult Anxiety Control Questionnaire (Rapee et al., 1996), which was developed to measure perceived control. The ACQ-C is a self-report measure for children aged 7-16 years with 30 items scored on a 5-point scale. Lower scores reflect less perceived control. The Total scale consists of two subscales, in line with Barlow’s theory (2002). One subscale (14 items) assesses perceived lack of control over anxiety-related negative "internal" emotional and bodily reactions. The other subscale (16 items) assesses control over "external" threats. The total scale and subscales showed good internal consistency in a sample of high school students, with Cronbach’s α of .86 to .93 (Weems et al., 2003). The ACQ-C also has an adequate one year test-retest reliability of \( r = .59 \) (Weems, Costa, Watts, Taylor, & Cannon, 2007). For the purpose of this study the ACQ-C was translated into Dutch by the authors and back-translated by a native English speaker. During the translation process, the original author was consulted for the exact meaning of some items.

Data analysis

For data reduction we followed to a large extent the procedure described by Schnabel et al. (2006). Reaction times below 300 ms were recoded as 300 ms. Error trials (trials the joystick was pushed in the wrong direction) were not included in the analysis of the reaction times. Practice trials were not analyzed, because they were primarily for training. Reaction times were not log-transformed to calculate internal consistencies and IAP scores, because all relevant data were normally distributed

We analyzed the IAP data by means of repeated and factorial ANOVAs with picture category (Me, Notme, Control, Noncontrol) and phases (combined, reversed) as within subjects factors; and anxiety level (lower and higher) and age (7-11 years and 12-17 years) as between subjects factors. For the analysis of the ACQ-C we used one-tailed independent sample \( t \) tests. Simple regression analyses were performed with respectively IAP scores and ACQ-C total score as predictors and anxiety \( z \)-scores of STAI-trait and STAIC-trait as dependent variables. Product-moment correlation \( (r) \) is reported as effect size (Field, 2006). An \( r \) of .10, .30 or .50 was used as a threshold to define small, medium and large effects (Cohen, 1992).

\[1\] Analogue to Schnabel's study (2004), we do not report results for the improved D-scores (Greenwald, Nosek, & Banaji, 2003). However, we did calculate D-scores and results were all in the same direction.
Results

Detailed characteristics of the IAP

Mean error rates (i.e., incorrect complete responses) were 5.64% (SD = 3.82%) for the Perceived Control IAP. One child did not complete the IAP and one child had to be excluded from the analysis because she had an extreme error score of 21.70%. Consequently, analyses on the IAP data were performed on 31 participants. All other error rates were below 15.23%. Due to an unforeseen feature of the joystick, reaction times of some trials were not recorded and were excluded from analysis. However, error rates were comparable to the results of the first IAP study (Schnabel et al., 2006). Cronbach’s α for internal consistency was calculated for the difference between the combined phase and the reversed phase for four groups of trials, containing the trials 11-42, 43-74, 75-106, 107-138. Cronbach’s α was .78.

Table 2. Mean reaction times (and SD) and IAP scores for the entire group (N = 31)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Target</th>
<th>Combined</th>
<th>Reversed</th>
<th>IAP score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Me</td>
<td>885.4 (209.67)</td>
<td>848.9 (220.35)</td>
<td>959.1 (254.30)</td>
<td>–</td>
</tr>
<tr>
<td>Notme</td>
<td>992.8 (231.60)</td>
<td>967.7 (226.16)</td>
<td>1072.9 (246.22)</td>
<td>–</td>
</tr>
<tr>
<td>Control</td>
<td>968.0 (238.9)</td>
<td>1169.4 (278.54)</td>
<td>201.3 (154.3)</td>
<td>–</td>
</tr>
<tr>
<td>Noncontrol</td>
<td>1010.2 (273.49)</td>
<td>1045.0 (254.38)</td>
<td>34.9 (156.8)</td>
<td>–</td>
</tr>
</tbody>
</table>

Note. IAP scores were calculated by subtracting the mean RT in the combined phase from the reversed phase. No IAP scores were computed for Me and Notme pictures.

Before conducting analysis on the lower and higher anxious groups, we tested for IAP effects in the whole group, with a 2 (combined phases) x 4 (categories) ANOVA with repeated measures, in order to describe the working of the task with children in general. Table 2 presents the mean reaction times (MRT) and SDs for the whole group. A significant main effect was found for phase, F(1, 30) = 26.79, p < .001, r = .69: all participants reacted faster in the combined phase (M = 948.69, SE = 42.41) than in the reversed phase (M = 1061.62, SE = 44.48). There was also a significant main effect of picture category, F(1, 30) = 54.23, p < .001. Contrasts revealed a quadratic trend, F(1, 30) = 104.65, p < .001, r = .88. Pairwise comparisons showed that participants reacted significantly faster on Me pictures (M = 903.99, SE = 40.62) than on Notme pictures (M = 1020.32, SE = 40.91); they reacted equally fast on Notme pictures and Noncontrol pictures (M = 1027.63, SE = 45.30) and they reacted slower on control pictures (M =

The joystick had to return back in the middle before each trial, but when children held on to the joystick in between trials, it did not return well, so the reaction time was not recorded. The mean number of non recorded trials was 19.65 (SD = 22.81), range 0-67, which was 7.02% of the total amount of 8680 trials.
An indirect (IAP) and direct (ACQ-C) measure of perceived control in children

The interaction effect between phase and picture category was significant, $F(1, 30) = 15.87, p < .001$. Planned simple and hierarchical contrasts showed that in the reversed phase, compared to the combined phase, the reaction times for Control pictures increased more than reaction times for Me ($F(1, 30) = 11.08, p = .002, r = .52$), Notme ($F(1, 30) = 22.60, p < .001, r = .66$) and Noncontrol pictures ($F(1,30) = 44.33, p < .001, r = .77$). And reaction times for Me and Notme pictures increased more than Noncontrol pictures, respectively with $F(1, 30) = 6.68, p = .02, r = .43$, and $F(1, 30) = 9.36, p = .01, r = .49$.

To test for the hypothesis that every participant associates Control more with self than Noncontrol, we performed a one-tailed dependent $t$ test for the difference between IAP scores for Control pictures and Noncontrol pictures (IAP scores are shown in Table 2). IAP scores for Control pictures were significantly higher than for Noncontrol pictures: $t(30) = -6.66, p < .001$, their correlation was $r = .60$. IAP Control score differed significantly from zero, $t(30) = 7.26, p < .001$, IAP Noncontrol score did not significantly differ from zero, $t(30) = 1.24, p = .11$.

Anxiety and the Perceived Control IAP

We performed a regression analysis to examine the relation between anxiety ($z$-scores of STAI-trait and STAIC-trait) and perceived control as measured with the IAP. Anxiety was significantly predicted by IAP Control score, $F(1, 29) = 5.98, p = .02, \beta = -.41$ and IAP Noncontrol score, $F(1, 29) = 5.45, p = .03, \beta = -.36$. IAP Control score and IAP Noncontrol score accounted for respectively 17.1% and 15.8% of the variance in anxiety. High scores on the anxiety measure, indicating more anxiety, correlated with lower scores on the IAP, indicating less perceived control.

We also divided children into lower ($n = 16$) and higher anxious ($n = 15$) groups according to whether their scores were on / below the median, or above the median of the STAI-trait ($Mdn = 30$) or STAIC-trait ($Mdn = 31$). STAI-trait scores for lower and higher anxious children were $M = 28.17$ ($SD = 0.98$) and $M = 33.50$ ($SD = 1.64$) respectively. For the STAIC-trait the scores were $M = 25.90$ ($SD = 1.60$) and $M = 36.56$ ($SD = 4.50$). To test whether low and high-anxious children differed on perceived control as reflected in IAP scores, a 2 (anxiety) x 2 (age) ANOVA was performed for each score (see Figure 2 and 3 for results). Age groups (below and above 12 years) were included to explore if age differed on perceived control.

A main effect for anxiety on IAP Control score was found, $F(1, 27) = 4.29, p < .05$, with medium effect size $r = .37$. Higher anxious children had lower IAP Control scores ($M = 146.38, SD = 128.73$) than lower anxious children ($M = 252.85, SD = 162.24$). The main effect of age and the interaction effect of age and anxiety were not significant, respectively $F(1, 27) = 0.35, p = .56$ and $F(1, 27) = 0.71, p = .41$.

Note that anxiety scores were low for the whole group, especially for the STAI-trait. Even the higher anxious group scored below the mean of a Dutch reference group on the STAI-trait (Van der Ploeg, 2000). There was more variation on the STAIC-trait scores. Higher anxious children had a mean just above the mean of a Dutch reference group (Bakker, Van Wieringen, Van der Ploeg, & Spielberger, 1989).
A main effect for anxiety on IAP Noncontrol score was found in the second ANOVA, $F(1, 27) = 8.49, p = .01$, with medium effect size $r = .49$. Again, higher anxious children had lower IAP Noncontrol scores ($M = -30.49, SD = 151.24$) than lower anxious children ($M = 96.25, SD = 139.83$). The main effect of age was not significant, $F(1, 27) = 3.41, p = .08$.

**Figure 2.** Means for IAP Control score separate for anxiety level and age

* Higher anxious children have lower IAP Control score in both age categories, $p < .05$.

**Figure 3.** Means for IAP Noncontrol score separate for anxiety level and age

* IAP Noncontrol score differs significantly for lower and higher anxious children under 12 years of age, $p = .01$. 


There was a significant interaction effect between anxiety level and age, $F(1, 27) = 6.69, p = .02$, with medium effect size $r = .45$. To break down the interaction effect, two $t$ tests were performed. These showed that for children younger than 12 years, higher anxious children had lower IAP Noncontrol scores ($M = -140.68$, $SD = 142.78$) than lower anxious children ($M = 115.65$, $SD = 159.32$) under 12 years, $t(12) = 3.17, p = .01$. IAP Noncontrol scores did not differ for children aged 12 years and older, $t(15) = 0.29, p = .78$.

The ACQ-C and Anxiety

Data on the ACQ-C were analyzed for 33 children. To assess internal consistency of the Dutch translation, Cronbach’s $\alpha$ was calculated for the Total scale, Internal Reactions subscale and External Events subscale. Cronbach’s $\alpha$ was .92, .84 and .87 respectively.

To test whether the ACQ-C could predict anxiety scores, we performed a regression analysis with ACQ-C Total scale as predictor and anxiety as outcome variable. The ACQ-C Total scale predicted anxiety significantly, $F(1, 31) = 5.85, p = .02, \beta = -.40$, and the ACQ-C accounted for 15.9% of the variance in anxiety. Lower perceived control scores indicated higher anxiety scores. To test if the ACQ-C Total scale also differed for lower and higher anxious children, a one-tailed independent $t$ tests was performed. Higher anxious children had significant lower perceived control scores ($M = 67.00$, $SD = 14.90$) than lower anxious children on the Total scale ($M = 77.50$, $SD = 17.79$), $t(31) = 1.82, p = .04$.

The ACQ-C and Perceived Control IAP

To explore the relationship between the indirect and direct measure of perceived control, correlations between the ACQ-C Total scale and respectively IAP Control score and IAP Noncontrol score were computed. These correlations were low and not significant, respectively $r = .03, p = .43$ and $r = .17, p = .18$.

Discussion

In this study, we tested a new measure that assesses anxiety-related perceived control in an indirect way: the Implicit Association Procedure (IAP). Furthermore, we compared this indirect measure with the Dutch translation of a direct measure of perceived control: the Anxiety Control Questionnaire for Children (ACQ-C). Our main question was whether there is a relationship between anxiety and perceived control, measured indirectly and directly, in a non-selected sample of children. The results support our hypotheses: children with higher anxiety levels had lower IAP and ACQ-C scores than lower anxious children. This implies that higher anxious children have lower perceived control over anxiety-related events than lower anxious children.
Because we adapted the IAP to measure perceived control, we examined the psychometric properties of our measure. The results show that the internal consistency of the IAP was satisfactory and comparable to a previous study (Schnabel et al., 2006).

Before considering anxiety in our analyses, we checked in the entire group whether the IAP worked at all. Analysis of the Perceived Control IAP showed that the mean IAP Control score was positive. This means that, when confronted with Control pictures, children react faster with a movement toward themselves than away from themselves. We indeed believe that children in general perceive themselves as being in control. The mean IAP Noncontrol score was not different from zero. This means that overall, children react equally fast with a movement away from or towards themselves when confronted with Noncontrol pictures. Although we did not explicitly state a hypothesis for Noncontrol pictures, this was against expectations; because low control is not generally a concept that belongs to “self” and children in general should have more difficulties (so take more time) to pull Noncontrol pictures towards self than to push them away.

When taking anxiety into account, the results confirmed our hypothesis and demonstrated that both IAP Control and Noncontrol score significantly predicted anxiety scores. Lower IAP scores corresponded with higher anxiety levels. This supports earlier research on perceived control: more anxious children have less perceived control. Interestingly, there was an interaction effect when age was added to the analysis, but only for the Noncontrol score. Only higher anxious children under 12 years of age had significantly lower IAP Noncontrol scores than lower anxious children. They even had a negative score, which means that they associated noncontrol more with self than control. There was no difference on IAP Noncontrol score between anxiety groups in children 12 years and older. This effect may be partly explained by the overlap between anxiety scores and age. Although the whole group had very low anxiety scores, the scores for lower and higher anxious children differed the most on the child version of the anxiety measure (STAIC). Moreover, the child version scores for higher anxious children had the greatest variability. Anxiety scores on the adolescent version of the anxiety measure (STAI) were below the mean for a reference group (Van der Ploeg, 2000), even for the group that scored above the median. So, it is not very surprising that the IAP could not differentiate anxiety groups in this older sample. However, a genuine interaction effect—young anxious children having a lack of perceived control—is a possibility.

The second question in our study was if we could replicate the relation between the direct measure of perceived control, the ACQ-C, and anxiety in a Dutch sample. As hypothesized, the ACQ-C predicted anxiety level. Moreover, higher anxious children had lower ACQ-C scores than lower anxious children. So, even in this small sample, we found a relation between perceived control and anxiety. Naturally, these results should be replicated in a larger sample.

Next, we investigated the correlation between the indirect IAP and the direct ACQ-C. Although the correlations were positive, they were close to zero. This is in line with previous research, where correlations between direct and indirect measures were quite weak, with
An indirect (IAP) and direct (ACQ-C) measure of perceived control in children | 

averages of .24 (Hofmann et al., 2005) and .37 (Nosek, 2005) for the IAT. How can this weak correlation be explained when both measures assess perceived control?

The first explanation is that the low correlation between the Perceived Control IAP and the ACQ-C might be an inherent characteristic of direct and indirect measures. Research suggests that automatic and controlled responses stem from different sources and reflect different constructs or tap different facets of attitudes (De Raedt, Schacht, Franck, & De Houwer, 2006). Because of the possibility to control the direct measure consciously, a discrepancy could be expected, especially with a measure related to perceived control. So, it is possible that the IAP and ACQ-C measure different aspects of perceived control.

Another explanation for the low correlation is that the IAP does not measure perceived control, but another construct. This should be examined by validating the measure, which is difficult, because no related and validated indirect measure of perceived control exists. Another option to find out if the IAP measures perceived control is to rate the used exemplars directly. We do not know whether the children perceived the pictures as good exemplars of these categories. De Houwer (2002) suggests that participants sometimes recode the attributes into positive or negative, using the salience of the pictures, with the aim of simplifying the task. Perhaps the task did not measure Control and Noncontrol, but positive and negative attributes, or even low and high anxiety. Although the pictures are about anxiety-related control, especially the Noncontrol pictures might primarily signal high anxiety, while the Control pictures do not clearly signal low anxiety. This might be another reason why the Noncontrol score differentiated more between groups and another argument not to construct one composite IAP score. However, even if the task would measure positive and negative attributes associated with self, or low and high anxiety, a positive correlation with the ACQ-C would still be expected: higher anxious children probably associate themselves more with negative than lower anxious children. More evidence should be sought for the validity and test-retest reliability of the IAP.

Limitations

Although the results are promising, some limitations should be considered. Reaction times on the reversed trials were longer than on the combined trials. However, this could be due to a practice effect. The children first had to pull Control words towards themselves and had to push them away in the third phase. So in the reversed phase, they had to unlearn their previous instructions. Both phases consisted of 128 trials each, preceded by ten practice trials. It will be interesting to compare these results with a task where the reversed phase is preceded by doubled practice trials or where the reversed phase is administered before the combined phase. This should guarantee that differences in reaction times are due to differences in self-concept and not to practice. However, the reaction times for Noncontrol pictures were almost equal in the combined and reversed phase, arguing against a practice effect.

We assume that the ACQ-C does measure perceived control, because it has convergent, discriminant and incremental validity (Weems, Silverman, Alfano & Tarolla, 1999).
In this study, no behavioral data were collected to test the incremental validity of the IAP. This is a recommendation for future studies. Moreover, a longitudinal design would be interesting for investigating the predictive validity, as previous research showed that indirect measures might predict relapse in disorders better than direct measures (De Jong et al., 2001).

With respect to the participants, we used a small sample of non-selected children. The variance in anxiety levels was very small and even low when compared to reference groups. The difference in anxiety scores between groups was not very large, because the median was used as cut-off point. Using scores in the upper and lower quartiles would have created more different groups. With our sample size this was not possible. We recommend a replication of this study with a group of clinically anxious children or a non-selected group with anxiety scores in the upper and lower quartiles of an anxiety measure. However, it is encouraging that the IAP is apparently sensitive to even relatively small variations in self-reported anxiety.

In summary, we conclude that the Perceived Control IAP is internally stable and sensitive for levels of anxiety. We believe that the Perceived Control IAP is a promising instrument to measure perceived control in an indirect way. It is a supplement to the existing direct measure of perceived control, the ACQ-C. The results of this study add to the mounting evidence that perceived control is a central concept in anxiety disorders.

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