

IMPLICIT ANXIETY: NO EVIDENCE FOR A RELATION WITH CHILDHOOD FEARS AND PARENTAL REARING BEHAVIOUR

Stefan Stieger*

University of Vienna, Austria

Although the measurement of implicit (i.e., automatic) evaluations is widespread, little is known about their origins. Some researchers have argued that implicit evaluations develop early in life through socialisation processes and are stable over time. In two studies this assumption was questioned for implicit anxiety by asking participants about their childhood fears and participants' mothers about their children's childhood fears (Study 1: $N = 230$). Furthermore, pairs of siblings were asked about their parents rearing behaviour (Study 2: $N = 120$ sibling pairs). Implicit anxiety (measured with the Implicit Association Test – IAT) was not correlated with recalled anxiety in childhood, independent of whether the latter was self-assessed or rated by participants' mothers. Also, implicit anxiety (measured with the Single-Category-IAT) was neither correlated with parents rearing behaviour nor had siblings similar implicit anxiety scores. These results suggest that implicit anxiety is either not built in childhood or not stable over time (or both). Possible explanations and implications for future research are discussed.

The measurement of implicit social cognitions has primarily influenced social and personality psychology, but has meanwhile spilled over to other disciplines within psychology (e.g., clinical psychology: De Raedt, 2006; Roefs, Huijding, Smulders, MacLeod, de Jong, Wiers et al., 2011). It is argued that implicit (i.e., automatic) evaluations are different from explicit (i.e., conscious, deliberate) evaluations (for a definition, see De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009) which are caused by different mental processes (i.e., dual-process theories; see Strack & Deutsch, 2004). A recent meta-analysis found that implicit evaluations show incremental predictive validity over and above explicit evaluations (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), supporting the assumption of dual processes.

A still unsettled question is about the origins of these implicit evaluations. Greenwald and Banaji (1995) defined implicit evaluations as “introspectively unidentified (or inaccurately identified) traces of past experience that mediate favourable or unfavourable feeling, thought, or action toward social objects”

* Stefan Stieger, Department of Basic Psychological Research and Research Methods, School of Psychology, University of Vienna.

Correspondence concerning this article should be addressed to Stefan Stieger, Department of Basic Psychological Research and Research Methods, School of Psychology, University of Vienna, Liebiggasse 5, 1010 Vienna, Austria. E-mail: stefan.stieger@univie.ac.at

(Greenwald & Banaji, 1995, p. 8). Other researchers argued that implicit evaluations develop early in life (maybe even in childhood) through socialisation processes (e.g., family), are stable over time (e.g., Gregg, Seibt, & Banaji, 2006; Koole, Dijksterhuis, & van Knippenberg, 2001; Rudman, 2004; Rudman, Phelan, & Heppen, 2007), and even have genetic grounds (Osinsky, Alexander, Schmitz, Kuepper, Müller, Beer et al., 2010). Furthermore, it is assumed that explicit evaluations develop more recently compared to implicit evaluations. However, more recent research suggests that the present may weigh more than the past when it comes to implicit evaluations (e.g., Castelli, Carraro, Gawronski, & Gava, 2010) and implicit evaluations might even be easier to change than explicit evaluations (e.g., Gawronski & LeBel, 2008; for a review see Gawronski & Bodenhausen, 2006). So the origins and stability of implicit evaluations are still under debate.

Measuring implicit evaluations in addition to explicit evaluations is rapidly growing in popularity and is reflected by several systematic reviews (e.g., Roefs et al., 2011). Especially in the subdomain of anxiety disorders (e.g., social and panic disorders), indirect measures of implicit evaluations (e.g., anxiety) have been frequently applied (Roefs et al., 2011). The most commonly used measure for this, is the Implicit Association Test (IAT: Greenwald, McGhee, & Schwartz, 1998) which is computer-based and uses reaction-time differences of a speeded categorisation task as a measure of implicit evaluations. For anxiety, Egloff and Schmukle (2002) developed an anxiety IAT by using words that are associated with *anxiety* and *calmness* (i.e., attribute concept) combined with words associated with *I* and *others* (i.e., target concept). The anxiety IAT proved to be a reliable and valid measure of implicit anxiety (Egloff & Schmukle, 2002; Egloff, Schwerdtfeger, & Schmukle, 2005; Egloff, Weck, & Schmukle, 2008; Schmukle & Egloff, 2004; Stieger, Görnitz, & Burger, 2010).

Present study

If implicit anxiety is built in childhood and stable over time, then implicit anxiety should correlate with the level of anxiety in childhood. In Study 1 participants were asked retrospectively about their childhood typical fears (e.g., anxiety about darkness, animals, foreign people). Additionally, participants' mothers rated their children's childhood fears to check for consistency because ratings were retrospective. If implicit anxiety is built in childhood, participants with high implicit anxiety should also indicate having had high amounts of childhood fears. Furthermore, it is known that a refusing, controlling, and cold parental rearing behaviour results in a higher prevalence of developing depression or anxiety disorders in later life (e.g., Ihle, Jahnke, Heerwagen, & Neuperdt, 2005). If implicit anxiety is built in childhood, par-

ticipants reporting this particular parental rearing behaviour should show higher levels of implicit anxiety than participants reared by supporting, warm-hearted, and non-controlling parents. This was analysed in Study 2 by using a different measure of implicit anxiety – the Single Category Implicit Association Test (SC-IAT; Karpinski & Steinman, 2006) which is similar in procedure to the IAT, but measures the concept *anxiety* without a second category (i.e., *calmness*). Also dyadic data were used from siblings. If implicit anxiety is built in childhood and stable over time, then siblings who grew up together should have a similar level of implicit anxiety.

Method – Study 1

Participants

Participants were German-speaking volunteers with various living backgrounds ($N = 230$; 70% Austria, 30% Germany; 51.3% women). Participants were on average 23.7 years of age ($SD = 5.9$; range 18-50 years) and were recruited opportunistically from the general population using a snowball-sampling technique. Additionally, participants' mothers ($M_{\text{age}} = 52.2$ years, $SD = 7.1$, range 40-82 years) were interviewed by judging their sons/daughters anxiety in childhood.

Measures for participants

Explicit anxiety: State-Trait Anxiety Inventory (STAI)

The STAI (Laux, Glanzmann, Schaffner, & Spielberger, 1981) is a frequently used measure of explicit anxiety. The trait subscale were used which comprises 20 items for measuring a general feeling of anxiety stable over time. Items had to be rated on 4-point Likert scales (0 = *(almost) never*, 1 = *sometimes*, 2 = *often*, 3 = *(almost) always*). Higher scores reflect higher trait explicit anxiety (sample $\alpha = .89$).

Implicit anxiety: personalised Implicit Association Test (IAT)

The IAT has been suspected of being contaminated with extrapersonal (cultural) associations. Therefore, Olson and Fazio (2004) introduced a personalised IAT by using idiosyncratic categories (*I like vs. I don't like*) and also using evaluation-laden stimulus words for which there was little social consensus (e.g., coffee, football, beer, Monday). For the present study, stimuli for measuring anxiety and calmness were taken from Egloff and Schmukle (2002) and instead of using the categories *I vs. other* as in the traditional self-concept IAT, the categories *I like vs. I don't like* were used as suggested by

Olson and Fazio (2004). This personalised anxiety IAT consisted of five blocks (see Table 1). Because of the idiosyncratic nature of the stimuli, no error feedback was given in line with Olson and Fazio (2004). Stimuli were presented in a fixed sequence to minimise order effects (Intertrial Interval = 300 ms). Blocks 3 and 5 were not counterbalanced.

Area-Specific Anxiety in Childhood – children form (ASAC)

The ASAC (Mack, 2007) is a 56-item measure and is used to assess specific fears of children on a 4-point scale (0 = *no anxiety*; 3 = *high anxiety*). The ASAC consists of seven subscales (eight items each) with high face-validity as they ask for very specific objects or situations: Medical care (e.g., dentist, injection; $\alpha = .81$); forces of nature (e.g., thunder, darkness; $\alpha = .87$); small animals (e.g., worms, spiders; $\alpha = .75$); isolation/unknown (e.g., strangers, to be looked in; $\alpha = .77$); school (e.g., teachers, bad grades; $\alpha = .85$), mistakes/criticism (e.g., punishment, bad conscience; $\alpha = .86$), accident/death (e.g., get hurt, drowning; $\alpha = .77$). The reliability of the total score was $\alpha = .93$.

Feeling thermometer

Participants had to indicate on a feeling thermometer (0 degree = *no anxiety*; 100 degree = *high anxiety*), how anxious they felt in general as if they were a child.

Measures for participants' mothers

Area-Specific Anxiety in Childhood – parent form (ASAC)

The ASAC (Mack, 2007) also includes a form for parents which consist of the same 56 items (medical care: $\alpha = .86$; forces of nature: $\alpha = .86$; small animals: $\alpha = .84$; isolation/unknown: $\alpha = .75$; school: $\alpha = .88$; mistakes/criticism: $\alpha = .83$; accident/death: $\alpha = .82$). The reliability of the total score was $\alpha = .93$.

Feeling thermometer

Mothers had to rate their childrens' anxiety in childhood on a feeling thermometer equal to their childrens' feeling thermometer.

Procedure

Participants filled in demographic questions followed by the IAT, STAI, feeling thermometer, and the ASAC. Participants were then thanked and debriefed. Mothers filled in the feeling thermometer and the parent form of the ASAC and were also thanked and debriefed. For anonymity, all paper-

Table 1
IAT and SC-IATs task sequence

Personalised anxiety IAT					Anxiety SC-IAT [‡]				
Block	Trials	Type	Concept label		Block	Trials	Type	Concept label	
			Left-key	Right-key				Left-key	Right-key
1	40	Practice	Anxiety	Calmness	1	30	Practice	I	Other
2	40	Practice	I like	I don't like					
3	80	Test	I like + Anxiety	I don't like + Calmness	2	45	Test	I + Anxiety	Other
4	40	Practice	Calmness	Anxiety					
5	80	Test	I like + Calmness	I don't like + Anxiety	3	45	Test	I	Other + Anxiety

Note. IAT = Implicit Association Test; SC-IAT = Single Category Implicit Association Test.

[‡] The calmness SC-IAT used "calmness" instead of "anxiety" as the concept label but was equivalent to the anxiety SC-IAT in terms of procedure.

pencil questionnaires were put into an envelope and thrown into a box. All participants and their mothers took part on a voluntary basis and were not remunerated for participation.

Analysis

Calculation of individual IAT scores followed the D measure (D_1 : Greenwald, Nosek, & Banaji, 2003). Internal consistency of the IAT was $\alpha = .86$. After excluding participants with more than 10% of response latencies < 300 ms (i.e., clicked through the IAT), the final sample consisted of $N = 215$ participants. However, due to the skewed distributions of the feeling thermometers, Spearman rank-order correlations were calculated.

Results and discussion – Study 1

Explicit anxiety, and anxiety in childhood, were significantly higher for women compared to men (explicit anxiety: $d = .27$; self-rated anxiety in childhood: $d = .42$, other-rated, $d = .61$). No sex-specific effect was found for the remaining measures (detailed results omitted for brevity).

Table 2
Descriptives and correlations of study variables (Study 1)

		M (SD)	2.	3.	4.	5.	6.
Self-rating	1. IAT	-0.42 (0.36)	.05	-.12 [‡]	-.12 [‡]	-.07	-.15*
	2. STAI	37.06 (8.80)		.34***	.31***	.23**	.17*
	3. ASAC	6.93 (3.08)			.37***	.48***	.32***
	4. FT	38.21 (26.36)				.28***	.49***
Other-rating (mother)	5. ASAC	6.18 (2.95)					.49***
	6. FT	34.38 (21.53)					

Note. IAT = Implicit Association Test; STAI = State Trait Anxiety Inventory; ASAC = Area-Specific Anxiety in Childhood; FT = Feeling Thermometer (anxiety in childhood).

‡ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed)

As can be seen from Table 2, explicit anxiety was not correlated with implicit anxiety in line with past research (for a review, see Roefs et al., 2011). Furthermore, negative scores were found for implicit anxiety in line with past research (e.g., Egloff et al., 2008) which means that participants were in general more calm than anxious. Implicit anxiety was *negatively* correlated with other-rated anxiety during childhood, (but only when measured with feeling thermometers). Correlations of childhood anxiety with explicit anxiety were all positive and of a low to medium size as expected. Analyses were also performed separately for all subscales of the ASAC replicating the

results with implicit anxiety; all correlations were non-significant except for the self-rated anxiety about small animals, $r = -.15$, $p = .03$ (detailed results omitted). In general, these results rather suggest that either the origins of implicit anxiety cannot be found in childhood, or implicit anxiety is not stable over time (i.e., childhood experiences might have influenced implicit anxiety in childhood, but changed later through other socialisation processes, e.g., adolescence).^[1]

In Study 2 a different approach was applied. If implicit anxiety is built in childhood and stable over time, then parental rearing behaviours (which have been found to be correlated with childrens' explicit anxiety when grown up) might also affect implicit anxiety. A similar effect has been found for implicit self-esteem (DeHart, Pelham, & Tennen, 2006). Young adult children which were reared by nurturing but not overprotective parents had higher implicit self-esteem than children from less nurturing but overprotective parents (DeHart et al., 2006). Furthermore, if siblings are reared together by the same parents (assuming that parents apply the same parental rearing behaviour for all their children), then siblings should have similar implicit anxiety. Therefore, siblings were recruited for Study 2. Because the IAT is a measure of association strengths between two complementary concepts (e.g., anxiety vs. calmness), one may suspect it is unsuitable to analyse the origins of implicit anxiety because the complementary concept *calmness* might distort it, for example, through anxiety-independent changes of calmness over time. Furthermore, the outcome of the used personalised anxiety IAT might be confounded with attitudes towards or preferences for anxiety related stimuli (rather than individual implicit anxiety), because the used target concept was not *I* vs. *other* as in the classical anxiety IAT, but *I like* vs. *I don't like*. Therefore, Single Category IATs (SC-IATs) without any personalisation were used in Study 2 to assess implicit anxiety and calmness separately.

1. To apply a more stringent test of possible associations between childhood fears and implicit anxiety, I also calculated Structural Equation Models (SEM; detailed results omitted for brevity) by modelling childhood anxiety as the shared variance of the participants' and their mothers' ratings constituting a latent variable. This has been done separately for the ASAC and the feeling thermometers. The results fully replicated the correlational approach presented in Table 2. The latent variable of childhood fears measured with the ASAC were associated with the STAI (standardised regression weight = .23, $p < .01$), but not the IAT (-.12). Furthermore, the latent variable of childhood fears measured with the feeling thermometers were associated with the STAI (.20, $p < .01$), but not the IAT (-.07).

Method – Study 2

Participants

There were 120 pairs of German-speaking siblings (41 women, 28 men, 51 mixed; overall 55% women) who were on average 27.4 years old ($SD = 12.3$, range 13-79 years). The sample was recruited from the general population through personal contacts as in Study 1.

Materials

Explicit anxiety

The trait subscale of the STAI was used as in Study 1 ($\alpha = .89$).

Implicit anxiety: Single Category Implicit Association Test (SC-IAT)

The SC-IAT (Karpinski & Steinman, 2006) is based on the same principles as the IAT, but only one attribute category is presented at a time. This results in three blocks instead of five (Table 1). Thus, to measure both anxiety and calmness, two SC-IATs (anxiety SC-IAT, calmness SC-IAT) were used and presented in a counterbalanced way across participants (anxiety SC-IAT: $\alpha = .74$; calmness SC-IAT: $\alpha = .74$). The same stimuli were used as in the study by Egloff and Schmukle (2002) without any individualisation as in Study 1. Higher scores reflect higher implicit anxiety and calmness respectively.

Recalled Parental Rearing Behaviour (RPRB)

The RPRB (Perris, Jacobsson, Lindström, von Knorring, & Perris, 1980; German short-form: Schumacher, Eisemann, & Brähler, 2000) is a well-known, standardised, and frequently applied questionnaire of recalled parental rearing behaviour of parents during the individuals' childhood and youth. It consists of 24 items which are assessed twice, once for the mothers' and then for the fathers' rearing behaviour using a 4-point Likert scale (1 = *never*, 2 = *sometimes*, 3 = *often*, 4 = *always*). The RPRB divides into three subscales: rejection (Father: $\alpha = .67$; Mother: $\alpha = .77$; sample item: "Did your parents punish you also for trifles?"), emotional warmth (Father: $\alpha = .89$; Mother: $\alpha = .89$; sample item: "Did you feel that your parents liked you?"), and overprotection (Father: $\alpha = .67$; Mother: $\alpha = .72$; sample item: "Did your parents drive you to become 'the best'?").

Procedure

First, participants performed both SC-IATs followed by all other measures as paper-pencil questionnaires (demographics, STAI, RPRB). Participants were tested individually and were not remunerated for their participation. Once completed, they were thanked and debriefed.

Analysis

For the SC-IATs, the D measure (D_4 ; Greenwald et al., 2003) was applied. Participants with high error rates (i.e., more than 10% of response latencies < 300 ms) on one of both SC-IATs were excluded ($N = 19$). The final sample consisted of $N = 221$ participants (101 sibling pairs).

Results and Discussion – Study 2

Order effects of implicit measures

Past research found order effects of consecutively applied SC-IATs (Karpinski & Steinman, 2006; Wigboldus, Holland, & van Knippenberg, 2006), therefore order effects were analysed first. Indeed, when the anxiety SC-IAT preceded the calmness SC-IAT, implicit anxiety was lower than when the calmness SC-IAT preceded the anxiety SC-IAT, $M = -0.19$ vs. $M = -0.08$, $t(238) = -2.49$, $p = .013$, $d = 0.33$. Interestingly, this effect did not apply for the calmness SC-IAT, $M = -0.05$ vs. $M = -0.10$, $t(238) = -1.14$, $p = .26$; i.e., the anxiety SC-IAT was prone to order effects, but not the calmness SC-IAT. Therefore, the following analyses were performed separately for the different orders of presentation.

Sex and age differences of study variables

Age was uncorrelated with all measures of anxiety and calmness (detailed results omitted). Regarding parental rearing behaviour, age was negatively correlated with emotional warmth (warmth-father: $r = -.30$, $p < .001$; warmth-mother: $r = -.35$, $p < .001$), but uncorrelated with the other two subscales (results omitted). Older participants experienced less emotional warmth through their fathers and mothers than younger participants. This might represent a cohort effect (e.g., older participants had a more rigorous upbringing). To control for this possible influence, all analyses were controlled for age.

Effects were also found for participants' sex. Women scored significantly higher on anxiety than men (explicit anxiety: $d = 0.46$, implicit anxiety: $d =$

0.34). All other study variables were sex-unspecific (i.e., parental rearing behaviour, implicit calmness; detailed results omitted).

Correlations of implicit anxiety and calmness with parental rearing behaviour

No significant correlation were found between all implicit measures (see Table 3), in line with past research (e.g., Bosson, Swann, & Pennebaker, 2000). Furthermore, a significant (albeit weak) positive correlation between implicit and explicit measures of anxiety (only when the anxiety SC-IAT preceded the calmness SC-IAT) was found, again in line with past research (e.g., Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005).

Explicit anxiety correlated with the parental rearing behaviour as expected (e.g., Ihle et al., 2005). Participants who reported higher levels of anxiety in adulthood also reported having experienced more rejecting, over-protecting, and less warm-hearted parental rearing behaviours. As in Study 1, no significant correlation between childhood (represented by parents rearing behaviour) and implicit concepts (anxiety, calmness) were found, except for a small negative correlation although failing to reach nominal significance. Participants who reported a more warm-hearted mothers' rearing behaviour, also reported lower levels implicit anxiety in adulthood (again only when the anxiety SC-IAT preceded the calmness SC-IAT).

Also multiple linear regressions with parents rearing behaviours as dependent variable and anxiety (explicit, implicit), calmness (implicit), age, sex, and order of SC-IATs as independent variables were calculated. In all regression models, explicit anxiety was always a significant predictor, whereas implicit anxiety or calmness never had any predictive value (detailed results omitted).

Implicit anxiety and calmness of siblings

First of all, data were sorted by age, i.e., the first sibling was always younger than the second sibling. If childhood experiences have a direct influence on implicit evaluations and these evaluations are stable over time, then siblings reared in the same family should have similar implicit anxiety and implicit calmness. Although a correlation was found for explicit anxiety, $r = .21$, $p = .04$ (siblings also agreed about their parents rearing behaviour: all r s between .31 and .57, all p s < .001), no significant correlation was found for implicit anxiety or calmness independent of whether one controls for the order of the SC-IATs, nor when controlling for participant's sex, all $|r| < .06$, *ns*.

Table 3
Descriptives and correlations of study variables (Study 2)

		M (SD)	2	3	4	5	6	7	8	9	10
1	RPRB – rejection	9.80 (2.11)	.63***	-.33***	-.39	.22**	.11	.17*	-.06	-.03	.06
2		9.96 (2.30)		-.28***	-.37	.09	.27***	.18**	-.14	-.01	.03
3	RPRB – warmth	21.74 (5.45)			.66***	-.03	-.13*	-.28***	.04	.04	-.04
4		24.56 (5.18)				-.08	-.10	-.27***	-.15 [‡]	-.05	-.06
5	RPRB – control	13.31 (3.43)					.66***	.15*	-.06	.07	.02
6		14.55 (3.88)						.22**	-.05	.11	.04
7	STAI	38.81 (8.89)							.26**	.13	-.05
8	Anxiety SC-IAT	-0.20 (0.34)								-.02	-.02
9		-0.07 (0.29)									.16
10	Calmness SC-IAT	-0.07 (0.31)									

Note: RPRB = recalled parental rearing behaviour; STAI = State Trait Anxiety Inventory; SC-IAT = Single Category Implicit Association Test; A first = Anxiety SC-IAT preceded the Calmness SC-IAT; C first = Calmness SC-IAT preceded the Anxiety SC-IAT.

[‡] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed)

General Discussion

The results of the present two studies are not in line with the assumption that implicit evaluations (at least for anxiety and calmness) are built in childhood or are stable over time. In Study 1, implicit anxiety was not correlated with anxiety in childhood independent whether this was self-assessed or rated by participants' mothers. In Study 2, implicit anxiety and calmness were not correlated with parents' rearing behaviour in childhood nor had siblings similar implicit anxiety and calmness scores. In both studies, *explicit* anxiety showed weak to medium correlations with childhood anxiety and rearing behaviour. Overall, this rather suggests that either implicit anxiety is not built in childhood or not stable over time. However, there are several aspects that need to be discussed and taken care of in future studies.

First, only some implicit evaluations might be built in childhood and stable over time, but others not. For example, DeHart and colleagues (2006) found that implicit *self-esteem* is influenced by early life events (e.g., parental divorce or parenting style). In the current study, parents rearing behaviours (which are similar to parenting styles, i.e., authoritative, authoritarian, and permissive) were assessed, but no correlation with implicit *anxiety* was found. So the initial assumptions (origins in childhood, stability) may only apply for some implicit evaluations (e.g., self-esteem), but not for others (e.g., anxiety).

Second, the used indirect measure might be in charge for differences in results. Some indirect measures are based on response inference (for a review see Gawronski, Deutsch, & Banse, 2011), others on sequential priming or affect misattribution (e.g., Payne, Cheng, Govorun, & Stewart, 2005). Usually implicit evaluations measured with different indirect measurement procedures do not correlate (e.g., Bosson et al., 2000). Reasons for this are still not entirely understood (for a discussion, see Lane, Banaji, Nosek, & Greenwald, 2007). Different measures might assess different mental processes assuming that there is not *one* implicit evaluation but rather several which are largely unrelated (e.g., Back, Krause, Hirschmüller, Stopfer, Egloff, & Schmukle, 2009; Stieger, Voracek, & Formann, 2012). So some aspects of implicit evaluations might be built in childhood, whereas others are built more recently. Furthermore, some might be more stable than others.

Third, indirect measures are more prone to measurement error than direct measures. Therefore a heightened measurement error might have blurred the effect. For example, Cunningham, Preacher, and Banaji (2001) used three different indirect measures of racial preference in a retest design. A latent variable analysis did not only improve the stability of measures, but also their intercorrelations substantially (e.g., two IATs were correlated .77). Future studies might use multiple measures of implicit (although there can be spill-

over effects – see Study 2) and explicit anxiety to apply structural equation models, to see whether correlations with aspects from childhood improve substantially.

The current studies also have some limitations. Anxiety in childhood and parents rearing behaviour were assessed using a cross-sectional design rather than a longitudinal design which would be superior. However, one needs to keep in mind that the IAT is a rather “young” task having been introduced in the year 1998, and IATs for children (using pictures or auditive material as stimuli) were only developed recently (for a review, see Olson & Dunham, 2010). Therefore, data from longitudinal designs with a time-lag of several years to compare childhood and adult anxiety might be under way, but studies can hardly be finished yet. Another limitation applies to retrospective reports. It could be that these reports are biased and do not adequately mirror the real childhood environment. More specifically, it has been found that people suffering from emotional disorders (this also includes high anxious people) exhibit difficulties in consistently retrieving past events from memory (e.g., VanVreeswijk & de Wilde, 2004). For this reason the mothers’ evaluations of childhood fears were assessed in Study 1 as well as siblings were asked in Study 2 to evaluate the consistency of their ratings. In both studies, ratings showed acceptable consistency (Study 1: $r_{ASAC} = .44$ to $.46$, see Table 2; Study 2: parents rearing behaviour $r_{sibling1,sibling2} = .31$ to $.57$), and an additionally calculated structural equation model by using the shared variance of mothers and their children in Study 1, did not change conclusions based on the classical correlational approach. Although this rather assumes that the found nil results are not entirely due to false retrospection, using retrospective reports remains a strong shortcoming of the used cross-sectional design. Furthermore, another limitation is the different level of specificity of explicit and implicit anxiety. Research found that correlations between explicit and implicit measures can only be expected when the level of specificity or the content (e.g., general, speech, or spider anxiety) is the same for both measures (Gschwendner, Hofmann, & Schmitt, 2008). Childhood fears in Study 1 were assessed at a very specific level, whereas implicit anxiety was measured at a rather general level. Furthermore, some subscales revealed rather low reliabilities (e.g., RPRB rejection and overprotection) because of using a short form. Future research should use longer forms for reliability reasons.

Finally, the predominantly found nil findings can also be due to a lack of statistical power (Quertemont, 2011). Therefore, we conducted a power analysis using G*Power (Erdfelder, Faul, & Buchner, 1996). Based on past research, we expected a small to medium effect size ($r = .20$). Hofmann et al. (2005) found in their meta-analysis a mean implicit/explicit correlation of $.21$ for self-concepts and $.19$ for clinical concepts (such as anxiety). Higher effect sizes were found in the meta-analysis by Greenwald et al. (2009) on the pre-

dictive value of the IAT. They found mean implicit/explicit correlations of .25, and .30 for the implicit/criterion correlation (both for clinical concepts). Therefore, the chosen effect size of .20 is even at the lower end of expectable effect sizes. For Study 1 ($N = 215$) we found a statistical power of 84% and for Study 2 ($N = 221$) a power of 85%. Compared with the recommended minimum power of 80% (Cohen, 1988), both studies cannot be regarded as statistically underpowered to detect effects (significance level 5%, two-sided testing) and their nil findings are unlikely due to statistical type II errors.

To sum up, the current initial studies analysing the origins of implicit anxiety found connections of explicit anxiety with anxiety in childhood and parental rearing behaviours, but not for implicit anxiety. Future research is needed to further clarify the true nature of implicit anxiety by keeping in mind the aspects discussed above.

References

- Back, M.D., Krause, S., Hirschmüller, S., Stopfer, J.M., Egloff, B., & Schmukle, S.C. (2009). Unraveling the three faces of self-esteem: A new information-processing sociometer perspective. *Journal of Research in Personality, 43*, 933-937. <http://dx.doi.org/10.1016/j.jrp.2009.04.002>
- Bosson, J.K., Swann, W.B., & Pennebaker, J.W. (2000). Stalking the perfect measure of self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology, 79*, 631-643. <http://dx.doi.org/10.1037//0022-3514.79.4.631>
- Castelli, L., Carraro, L., Gawronski, B., & Gava, K. (2010). On the determinants of implicit evaluations: When the present weighs more than the past. *Journal of Experimental Social Psychology, 46*, 186-191. <http://dx.doi.org/10.1016/j.jesp.2009.10.006>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cunningham, W.A., Preacher, K.J., & Banaji, M.R. (2001). Implicit attitude measures: Consistency, stability, and convergent validity. *Psychological Science, 12*, 163-170. <http://dx.doi.org/10.1111/1467-9280.00328>
- DeHart, T., Pelham, B.W., & Tennen, H. (2006). What lies beneath: Parenting style and implicit self-esteem. *Journal of Experimental Social Psychology, 42*, 1-17. <http://dx.doi.org/10.1016/j.jesp.2004.12.005>
- De Houwer, J., Teige-Mocigemba, S., Spruyt, A., & Moors, A. (2009). Implicit measures: A normative analysis and review. *Psychological Bulletin, 135*, 347-368. <http://dx.doi.org/10.1037/a0014211>
- De Raedt, R. (2006). Activation of implicit self-schemas and a difficulty to disengage from negative cognitions in depression: An experimental psychopathology approach. *Psychologica Belgica, 46*, 117-130.

- Dijksterhuis, A. (2004). I like myself but I don't know why: Enhancing implicit self-esteem by subliminal evaluative conditioning. *Journal of Personality and Social Psychology, 86*, 345-355. <http://dx.doi.org/10.1037/0022-3514.86.2.345>
- Egloff, B., & Schmukle, S.C. (2002). Predictive validity of an implicit association test for assessing anxiety. *Journal of Personality and Social Psychology, 83*, 1441-1455. <http://dx.doi.org/10.1037/0022-3514.83.6.1441>
- Egloff, B., Schwerdtfeger, A., & Schmukle, S.C. (2005). Temporal stability of the implicit association test-anxiety. *Journal of Personality Assessment, 84*, 82-88. http://dx.doi.org/10.1207/s15327752jpa8401_14
- Egloff, B., Weck, F., & Schmukle, S.C. (2008). Thinking about anxiety moderates the relationship between implicit and explicit anxiety measures. *Journal of Research in Personality, 42*, 771-778. <http://dx.doi.org/10.1016/j.jrp.2007.08.005>
- Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, and Computers, 28*, 1-11.
- Gawronski, B., & Bodenhausen, G.V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132*, 692-731.
- Gawronski, B., Deutsch, R., & Banse, R. (2011). Response interference tasks as indirect measures of automatic associations. In K.C. Klauer, A. Voss, & C. Stahl (Eds.), *Cognitive Methods in Social Psychology* (pp. 78-123). New York: Guilford.
- Gawronski, B., & LeBel, E.P. (2008). Understanding patterns of attitude change: When implicit measures show change, but explicit measures do not. *Journal of Experimental Social Psychology, 44*, 1355-1361. <http://dx.doi.org/10.1016/j.jesp.2008.04.005>
- Greenwald, A.G., & Banaji, M.R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*, 4-27. <http://dx.doi.org/10.1037//0033-295X.102.1.4>
- 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. <http://dx.doi.org/10.1037/0022-3514.74.6.1464>
- Greenwald, A.G., Nosek, B.A., & Banaji, M.R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85*, 197-216. <http://dx.doi.org/10.1037/0022-3514.85.2.197>
- Greenwald, A.G., Poehlman, T.A., Uhlmann, E.L., & Banaji, M.R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology, 97*, 17-41. <http://dx.doi.org/10.1037/a0015575>
- Gregg, A.P., Seibt, B., & Banaji, M.R. (2006). Easier done than undone: Asymmetry in the malleability of implicit preferences. *Journal of Personality and Social Psychology, 90*, 1-20. <http://dx.doi.org/10.1037/0022-3514.90.1.1>
- Gschwendner, T., Hofmann, W., & Schmitt, M. (2008). Convergent and predictive validity of implicit and explicit anxiety measures as a function of specificity sim-

- ilarity and content similarity. *European Journal of Psychological Assessment*, 24, 254-262. <http://dx.doi.org/10.1027/1015-5759.24.4.254>
- Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measures. *Personality and Social Psychology Bulletin*, 31, 1369-1385. <http://dx.doi.org/10.1177/0146167205275613>
- Ihle, W., Jahnke, D., Heerwagen, A., & Neuperdt, C. (2005). Depression, Angst und Essstörungssymptomatik und erinnertes elterliches Erziehungsverhalten [Depression, anxiety and symptoms of eating disorders: Recalled parental rearing behaviours]. *Kindheit und Entwicklung*, 14, 30-38. <http://dx.doi.org/10.1026/0942-5403.14.1.30>
- Karpinski, A., & Steinman, R.B. (2006). The Single Category Implicit Association Test as a measure of implicit social cognition. *Journal of Personality and Social Psychology*, 91, 16-32. <http://dx.doi.org/10.1037/0022-3514.91.1.16>
- Koole, S.L., Dijksterhuis, A., & van Knippenberg, A. (2001). What's in a name: Implicit self-esteem and the automatic self. *Journal of Personality and Social Psychology*, 80, 669-685. <http://dx.doi.org/10.1037//0022-3514.80.4.669>
- Lane, K.A., Banaji, M.R., Nosek, B.A., & Greenwald, A.G. (2007). Understanding and using the Implicit Association Test: IV. What we know (so far) about the method. In B. Wittenbrink & N. Schwarz (Eds.), *Implicit measures of attitudes* (pp. 59-102). New York: Guilford.
- Laux, L., Glanzmann, P., Schaffner, P., & Spielberger, C.D. (1981). *Das State-Trait-Angstinventar (STAI) [The State-Trait Anxiety Inventory (STAI)]*. Weinheim: Beltz.
- Mack, B.W. (2007). Der bereichsspezifische Angstfragebogen für Kinder [Area-specific anxiety in children]. *Zeitschrift für Klinische Psychologie und Psychotherapie*, 36, 189-197. <http://dx.doi.org/10.1026/1616-3443.36.3.189>
- Olson, K.R., & Dunham, Y. (2010). The development of implicit social cognition. In B. Gawronski & B.K. Payne (Eds.), *Handbook of implicit social cognition: Measurement, theory, and applications* (pp. 241-254). New York: Guilford.
- Olson, M.A., & Fazio, R.H. (2004). Reducing the influence of extrapersonal associations on the Implicit Association Test: Personalizing the IAT. *Journal of Personality and Social Psychology*, 86, 653-667. <http://dx.doi.org/10.1037/0022-3514.86.5.653>
- Osinsky, R., Alexander, N., Schmitz, A., Kuepper, Y., Müller, E., Beer, L. et al. (2010). Genetic influences on implicit measures of personality. *Journal of Individual Differences*, 31, 115-123. <http://dx.doi.org/10.1027/1614-0001/a000007>
- Payne, B.K., Cheng, C.M., Govorun, O., & Stewart, B.D. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology*, 89, 277-293. <http://dx.doi.org/10.1037/0022-3514.89.3.277>
- Perris, C., Jacobsson, H., Lindström, H., von Knorring, L., & Perris, H. (1980). Development of a new inventory for assessing memories of parental rearing behavior. *Acta Psychiatrica Scandinavica*, 61, 265-274. <http://dx.doi.org/10.1111/j.1600-0447.1980.tb00581.x>
- Quertemont, E. (2011). How to statistically show the absence of an effect. *Psychologica Belgica*, 51, 109-127.

- Roefs, A., Huijding, J., Smulders, F.T.Y., MacLeod, C.M., de Jong, P.J., Wiers, R.W., & Jansen, A.T.M. (2011). Implicit measures of association in psychopathology research. *Psychological Bulletin*, *137*, 149-193. <http://dx.doi.org/10.1037/a0021729>
- Rudman, L.A. (2004). Sources of implicit attitudes. *Current Directions in Psychological Science*, *13*, 79-82. <http://dx.doi.org/10.1111/j.0963-7214.2004.00279.x>
- Rudman, L.A., Phelan, J.E., & Heppen, J.B. (2007). Developmental sources of implicit attitudes. *Personality and Social Psychology Bulletin*, *33*, 1700-1713. <http://dx.doi.org/10.1177/0146167207307487>
- Schmukle, S., & Egloff, B. (2004). Does the Implicit Association Test for assessing anxiety measure trait and state variance? *European Journal of Personality*, *18*, 483-494. <http://dx.doi.org/10.1002/per.525>
- Schumacher, J., Eisemann, M., & Brähler, E. (2000). *Fragebogen zum erinnerten elterlichen Erziehungsverhalten [Recalled parental rearing behaviour]*. Bern: Huber.
- Stieger, S., Göritz, A.S., & Burger, C. (2010). Personalizing the IAT and the SC-IAT: Impact of idiographic stimulus selection in the measurement of implicit anxiety. *Personality and Individual Differences*, *48*, 940-944. <http://dx.doi.org/10.1016/j.paid.2010.02.027>
- Stieger, S., Voracek, M., & Formann, A.K. (2012). How to administer the Initial Preference Task. *European Journal of Personality*, *26*, 63-78. <http://dx.doi.org/10.1002/per.823>
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, *8*, 220-247. http://dx.doi.org/10.1207/s15327957pspr0803_1
- VanVreeswijk, M.F., & de Wilde, E.J. (2004). Autobiographical memory, specificity, depressed mood and the use of Autobiographical Memory Test: A meta-analysis. *Behaviour Research and Therapy*, *42*, 731-743.
- Wigboldus, D.H.J., Holland, R.W., & van Knippenberg, A. (2006). *Single target implicit associations*. Unpublished manuscript, Raboud University, Nijmegen, The Netherlands.

Received April 16, 2012

Revision received May 31, 2012

Accepted June 6, 2012