Childhood emotional maltreatment : impact on cognition and the brain

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CHAPTER 2: CHILD ABUSE AND NEGATIVE EXPLICIT AND AUTOMATIC SELF-ASSOCIATIONS: THE COGNITIVE SCARS OF EMOTIONAL MALTREATMENT.

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Abstract

Individuals reporting Childhood Abuse (CA) (i.e., emotional neglect, emotional, physical and sexual abuse) are marked by increased explicit (i.e. self-reported) negative self-associations, and an increased risk to develop depression or anxiety disorders. Automatic self-associations might play an important role in the development and maintenance of affective disorders after exposure to CA, since automatic associations are assumed to be involved in uncontrolled (spontaneous) affective behavior. This study examined whether individuals reporting a history of CA show stronger automatic (and explicit) self-depression and/or self-anxiety associations than individuals who report no CA in a large cohort study (Netherlands Study of Depression and Anxiety (NESDA), N = 2981). The Implicit Association Test (IAT) was utilized to assess automatic self-depression and self-anxiety associations. We found that CA was associated with enhanced automatic (and explicit) self-depression and self-anxiety associations. Additionally, when compared to physical and sexual abuse, Childhood Emotional Maltreatment (CEM; emotional abuse and emotional neglect) had the strongest link with enhanced automatic (and explicit) self-depression and self-anxiety associations. In addition, automatic and explicit negative self-associations partially mediated the association between CEM and depressive or anxious symptomatology. Implications regarding the importance of CA, and CEM in particular will be discussed.

Introduction

Childhood abuse (CA) (e.g. emotional neglect and emotional, physical or sexual abuse) is a widespread phenomenon with incidence rates between 3-32% in the general population (Brown, Cohen, Johnson, & Salzinger, 1998; Briere & Elliott, 2003). Converging evidence in children, adolescents and adults indicates that CA can have a chronic impact on emotional functioning (Alloy, Abramson, Smith, Gibb, & Neeren, 2006; Silverman, Reinherz, & Giaconia, 1996). This is supported by associations between self-reported CA and the enhanced risk to develop both depressive (Agid et al., 1999; Kessler, Avenevoli, & Ries Merikangas 2001; Weiss, Longhurst, & Mazure, 1999) and/or anxiety disorders in later life (Gibb, Chelminsky, & Zimmerman, 2007; Hovens et al., 2010; Kendler et al., 2000; Kessler, Davis, & Kendler, 1997; Levitan, Rector, Sheldon, & Goering, 2003; Safren, Gershuny, Marzol, Otto, & Pollack, 2002; Spinhoven et al., 2010).

Experiences of CA have been suggested to lead to (an increase in) negative self-associations such as negative (self-) inferential styles, dysfunctional (self-)attitudes, and low self-worth (Beck, 1967; Beck, 2008). This is corroborated by numerous studies linking CA to enhanced negative self-associations (Alloy et al., 2006; Gibb, 2002; Jacobs, Reinecke, Gollan, & Kane 2008; Rose & Abramson, 1992). Furthermore, these increased negative self-associations, in itself, are hypothesized to enhance (negative) bias and recall when engaged in new situations, and when retrieving memories. Abused individuals, therefore, may get caught in a negative loop, where CA may enhance negative biases, which may result in more frequent and more intense negative experiences, which in its turn may enhance negative self-associations, etc. Due to this process, abused individuals may be more vulnerable to develop and/or maintain a mood and/or anxiety disorder (Beck, 2008).

It has been argued that childhood emotional abuse may be more strongly related to negative self-associations than childhood sexual and/or physical abuse, since during emotionally abusive episodes negative self-associations are explicitly handed to the child (for example '*you are such a stupid child, you are worthless'* see Rose & Abramson, 1992). This is corroborated by an accumulating number of studies indicating that childhood emotional abuse is more strongly related to negative cognitive styles (dysfunctional self-attitudes and negative (self-) inferential styles) than childhood sexual or physical abuse (Alloy, Abramson, Smith, Gibb, & Neeren, 2006; Gibb, 2002; Gibb, Abramson, & Alloy, 2004). Moreover, Gibb et al. (2001) found that, in healthy college freshmen, reported childhood emotional (and not physical or sexual) abuse was related to episodes of non-endogenous major depression and hopelessness depression during a 2.5 year follow up. More importantly, these relations were fully mediated by the presence versus absence of negative cognitive styles, which is indicative of the important role that negative self-associations play in predisposing an individual to the development of psychopathology.

Cognitive functioning is often divided into two distinct mental processes; propositional and automatic processes (Chaiken &Trope, 1999; Gawronski & Bodenhausen, 2006; Haeffel et al., 2007). Propositional processes are characterized by evaluative judgments (explicit cognitions), which are based on syllogistic inferences about the stimulus or event (e.g. I am being criticized; I know I made a mistake, thus I am inadequate). These explicit cognitions are thought to mainly influence deliberate and controlled behavior (Gawronski & Bodenhausen, 2006), and have been shown to be good predictors of long-term depressive and anxious symptoms (Haeffel et al., 2007; Engelhard, Huijding, van den Hout, & de Jong, 2007). Explicit cognitions can be measured with self-report instruments such as the Cognitive Style Questionnaire (CSQ) (see Haeffel et al., 2008). So far, studies examining the link between CA and enhanced negative self-associations are based on explicit (self-reported) self-associations (Alloy et al., 2006; Gibb et al., 2001; Gibb, 2002; Gibb, Alloy, Abramson, & Marx, 2003; Gibb et al., 2004; Gibb & Abela, 2008; Wright, Crawford, & Del Castillo, 2009). However, self-report measures can be prone to bias and distortion (e.g. McNally, 2001). For instance, individuals with a current depression might over report their negative self-associations, whilst individuals without a current depression might underreport their negative self-associations. Moreover, explicit cognitions are, due to their dependence on syllogistic inferences, controlled by conscious effort, thus an individual can override an initially negative association via conscious effort (e.g. I am being criticized; However, I know I did not make a mistake, thus I am not inadequate).

Automatic associations, on the other hand, are thought to be spontaneous and unintentional. Automatic self-associations (e.g. '*I - worthless*') become activated directly in response to certain stimuli or events (e.g. being yelled at), and are therefore hypothesized to play an important role in automatic affective behavior (e.g., crying) (Gawronski & Bodenhausen, 2006; Gawronski, Hoffman, & Wilbur, 2006; Haeffel et al., 2007). This is corroborated by findings that automatic self-worth associations predicted immediate affective reactions to a lab stressor, whilst explicit self-worth associations are predictive of depressive symptomatology on the long-term (Haeffel et al., 2007). Similarly, in soldiers deployed to Iraq, post-deployment automatic self-vulnerability associations explained unique variance in concurrent PTSD symptoms, while explicit associations were also predictive of long-term PTSD symptomatology (Engelhard, Huijding, van den Hout, & de Jong, 2007).

Automatic associations can be activated in parallel with explicit cognitions, even when they have a diverging meaning. For instance, an individual with a history of emotional abuse might know on an explicit level that she is not a worthless person when someone is yelling at her. Despite this knowledge, she will automatically feel worthless and may start crying. Automatic processes may thus be of importance in maladaptive affective behavior and are therefore assumed to play an important role in the

development and maintenance of depressive and/or anxiety disorders. However, to our knowledge, no study has yet examined (dysfunctional) automatic self-associations in individuals reporting a history of CA.

Automatic self-associations are often indexed through the use of indirect performance measures (e.g. De Jong, Pasman, Kindt, & van den Hout, 2001). Perhaps the most often used task to assess automatic self-associations is the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998). The IAT is a computerized reaction time task, in which participants are required to sort stimuli according to two contrasted target concepts (e.g. me, other) and two attribute concepts (e.g. depressed, elated). The premise is that when a target and attribute that are strongly associated in memory share the same response key, the participant will be fast on sorting them. Accordingly, it has recently been shown that depressed individuals are faster to categorize '*me*' with depressed words (i.e. showed relatively strong self-depressive associations), anxious individuals are fast to sort '*me*' with anxious words, and patients with comorbid depression and anxiety disorder are fast on both (Glashouwer & de Jong, 2010).

Taken together, the link between CA and depressive and/or anxiety disorders has been well established (e.g. Gibb, Chelminsky, and Zimmerman, 2007), and enhanced automatic self-depressive associations have been found in individuals with a current depression, and enhanced self-anxiety associations in individuals with a current anxiety disorder (Glashouwer and de Jong, 2010). However, until now, it is unknown whether individuals who report CA are also marked by enhanced automatic self-depressive and/or self-anxiety associations, and which type of abuse is most associated with these enhanced automatic self-associations.

The main aim of this study is, therefore, to examine whether individuals reporting a history of CA show stronger automatic self-depression and/or self-anxiety associations than individuals who report no childhood abuse in a large cohort study (Netherlands Study of Depression and Anxiety (NESDA), N = 2981) (Penninx et al., 2008). Moreover, we will examine whether these enhanced negative automatic self-associations are a generic consequence of CA, or whether they are (partly) dependent on the presence of current and/or past depressive and/or anxiety disorders. In line with Rose and Abramson (1992), the third aim of this study is to investigate whether childhood emotional abuse is specifically linked with enhanced automatic self-depression and/or self-anxiety associations. Furthermore, we will investigate whether, in line with findings on explicit self-associations (Gibb, 2001; Liu, Alloy, Abramson, Jacoviello, & Whitehouse, 2009; Wright et al., 2009), enhanced automatic self-depressive or self-anxiety associations mediate the relationship between childhood emotional abuse and depressive, or anxious symptomatology. Finally, to investigate whether CA has a specific or similar association with automatic versus explicit associations, we will examine the impact of CA on explicit ratings of self-depression and self-anxiety.

METHODS

SAMPLE

This study was carried out in the context of the NESDA (Penninx et al., 2008), a multi-center, longitudinal, cohort study, designed to examine the long-term course and consequences of anxiety and depressive disorders. This study concerns the baseline assessment that started in September 2004 and was completed in February 2007. The study protocol was approved centrally by the Ethical Review Board of the VU University Medical Center Amsterdam and subsequently by the local review boards of each participating center. Recruitment of the respondents took place in the general population, in general practices, and in mental health care institutions in order to recruit individuals reflecting various settings and developmental stages of psychopathology.

Inclusion criteria in this study were: age between 18 and 65 years, and a current (during the past month) or past (lifetime) diagnosis of Major Depressive Disorder (MDD), and/or a current or past anxiety disorder (General Anxiety Disorder, Panic Disorder, Social Phobia and/or Agoraphobia). Furthermore, non-clinical controls without a present or past diagnosis were included (Healthy Controls, HC's). Exclusion criteria were a current diagnosis of psychotic disorder, bipolar disorder, or severe addiction disorder and not being fluent in Dutch. In total, 2981 participants (66.5% female; age M = 41.9 years, SD= 13.0) were included. After complete verbal and written description of the study to the participants, written consent was obtained.

DIAGNOSTIC MEASURES

Depressive and anxiety disorders were determined by means of the Composite Interview Diagnostic Instrument (CIDI; WHO version 2.1), which classifies diagnoses according to the DSM-IV criteria (APA, 2001). The CIDI is used worldwide and WHO field research has found high interrater reliability (Wittchen et al., 1991), and high test-retest reliability (Wacker, Battegay, Mullejans, & Schlosser, 2006). Depression severity in the past week was measured with the self-report Inventory of Depressive Symptomatology (IDS; Rush et al., 1986). Severity of anxiety symptomatology of the past seven days was measured with the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988).

CHILDHOOD ABUSE

CA was assessed through the use of the Nemesis trauma interview (De Graaf, Bijl, ten Have, Beekman, & Vollebergh, 2004a; 2004b). In this interview, respondents were asked whether they had experienced emotional neglect, emotional abuse, physical abuse and/or sexual abuse before they were 16 years of age. Responses to these enquiries were recorded as: never, once, sometimes, regularly, often, or very often.

Emotional neglect was described to participants as follows: 'people at home didn't listen to you, your problems were ignored, you felt unable to find any attention or support from the people in your house'. Emotional abuse was defined as: 'you were cursed, unjustly punished, your brothers and sisters were favored – but no bodily harm was done'. Physical abuse was defined as: 'being kicked, hit with or without an object, or being physically maltreated in any other way'. Sexual abuse was defined as follows: 'being touched sexually by anyone against your will, or being forced to touch anyone sexually, or pressured into sexual contact against your will'.

CA was defined as multiple incidents (>once) of emotional neglect, emotional-, physical- and/or sexual- abuse before the age of 16 years, because (particularly in the case of emotional abuse and/or emotional neglect) we assumed that only multiple incidents of CA may lead to changes in automatic associations over period of years (25 on average). In addition, by excluding individuals who reported a history of CA that had occurred once (n=241), we wanted to construct two very distinct groups (CA vs. No Abuse).

Because emotional abuse rarely occurs in isolation, and often takes place in the context of emotional neglect (of all participants reporting CA in our sample of 3.5% reported emotional abuse without other concurrent types of abuse, and 89% reported emotional abuse and emotional neglect), we combined emotional abuse and emotional neglect to construct a new variable, Childhood Emotional Maltreatment (CEM; emotional abuse and/or emotional neglect that occurred more than once). See also the American Professional Society on the Abuse of Children (APSAC) for a similar definition (Baker, 2009; Bingelli, Hart, & Brassard, 2001; Hart, Germain, & Brassard, 1987). Amongst the individuals reporting CEM, 31% also reported physical abuse, and 29% also reported sexual abuse. In addition, 38% of all individuals reporting sexual abuse also reported physical abuse.

Implicit Association Test (IAT)

To measure automatic self-depression and self-anxiety associations, two IATs were constructed following the design of Egloff and Schmukle (2002). The participants completed the IAT in a fixed order, with the depression IAT first and the IAT anxiety second. The order of the category combinations was fixed across participants in order to enhance the sensitivity of the IAT as a measure of individual differences, which is important in the view of the prospective design of the NESDA (Asendorpf, Banse, & Mucke, 2002; Schnabel, Banse, & Asendorpf, 2006; Steffens & König, 2006). For both IATs the target labels were me and other (Pinter & Greenwald, 2005). The attribute labels were depressed and elated for the depression IAT and anxious and calm for the anxiety IAT. Each category consisted of five stimuli (see supplement). Words from all four concept categories appeared in mixed order in the middle of a computer screen and participants were instructed to sort them with a left (Q) or right (P) response key.

Explicit measures of self-depression and self-anxiety associations were also obtained. Participants rated all attribute stimuli (i.e. depressed, elated, anxiety and calm words, see supplement) that were used in the IATs on a 5-point scale, indicating to what extent the word generally applied to them (1 = hardly/not at all, 5 = very much). The correlation coefficients of the explicit and automatic self-depression and self-anxiety associations are shown in Table 1. For a more detailed description of the procedure, see Glashouwer and de Jong (2010).

Table 1. Correlation Matrix of automatic ratings of self-depressive and self-anxiety associations

Measure	1.	2.	3.
1. IAT anxiety			
2. IAT depression	.49 **		
3. Self-anxiety rating	.37 **	.35 **	
4. Self-depression rating	.31 **	.38 **	.77 **

Note. **=P<.01

We also like to note that in this study we have adapted the descriptors "self-depression" and "self-anxiety" for the IAT depression and the IAT anxiety tests, because these were the terms that were used in the paper of Glashouwer and de Jong (2010), where the same IATs were used in the same sample. The terms self-depression and self-anxiety in this study merely refer to IAT depression and IAT anxiety scores, and not to whether a person associates themselves with being depressed or anxious or having depressive or anxious symptoms, as these kinds of associations are different from the associations that are actually assessed by the present IATs.

IAT scores were computed according to the now widely used algorithm proposed by Greenwald et al. (2003). We report the D4-measure. Duplicating all statistical analyses using the traditional effect measurement (Greenwald et al., 1998) revealed a similar pattern of results as with the D-measure. We decided to report the D-measure so as to comply with other studies using the IAT as an index of automatic associations. Positive IAT effects indicate relatively fast responses when me shared the response key with either anxious or depressed. For descriptive purposes, the mean scores in ms per block per group are summarized in Table 2. The internal consistency of the present IATs was good, with Spearman-Brown corrected correlations between test halves of 0.82 for the depression IAT and 0.87 for the anxiety IAT (test halves were based on trials 1, 2, 5, 6, 9, 10, etc. v. 3, 4, 7, 8, 11, 12, etc.).

To compute the explicit self-associations, the mean ratings of the calm (elated) IAT-stimuli were subtracted from the mean ratings of the anxious (depressed) IAT-stimuli. Hence, a positive effect indicates a strong explicit association between me and anxious (or me and depressed). The internal consistency of the explicit self-associations was good, with Cronbach's α =.94 for the difference scores of anxious and calm words and α =.95 of depressed and elated words.

Of the 2981 participants that were included in the NESDA, 129 had no IAT data, due to technical problems. Furthermore, we excluded ten participants from the analyses because more than 10% of the IAT trials were below 300 ms, suggesting that they were trying to respond too rapidly. In addition, we discarded 5 participants because of unusual IAT scores (>5 SD divergent from mean) that were explained by a very slow overall responding tendency (>4000 ms.) and/or high overall error rates (>28.8%). Consequently data of 2837 participants were available for the analysis.

GROUPS

Following the design of Glashouwer and de Jong (2010), groups were constructed based on current or remitted (R-) major depressive disorder (MDD), anxiety disorder (AD), both MDD &AD, or healthy controls (HC). Individuals with a current or lifetime dysthymia and/or minor depression (without MDD or anxiety disorders) were excluded from the analysis (n=133). Altogether, this resulted in the following groups: individuals reporting a history of CA (i.e. MDD (n=151), AD (n=259), MDD&AD (n=300), R-MDD (n=120), R-AD (n=53), R-MDD&AD (n= 183), and HC (n=133)), and individuals reporting No Abuse (i.e. MDD (n=109), AD (n=214), MDD&AD (n=144), R-MDD (n=172), R-AD (n=74), R-MDD&AD (n=144), and HC (n=457)). Participant characteristics and scores on the depression and anxiety IAT and the

Table 2. Mean and standard errors of demographic, explicit ratings of self-association and automatic self-associations scores of all groups.

	Individuals with a current depressive and/or anxiety disorder						Individuals remitted (R) from a depressive and/or anxiety disorder						Healthy controls	
	MDD	MDD	AD	AD	MDD&AD	MDD&AD	R-MDD	R-MDD	R-AD	R-AD	R-MDD&AD	R-MDD&AD	HC	HC
	Abuse	No Abuse	Abuse	No Abuse	Abuse	No Abuse	Abuse	No Abuse	Abuse	No Abuse	Abuse	No Abuse	Abuse	No Abuse
N	151	109	259	214	300	144	120	172	53	74	183	114	133	457
Female	66.9%	50.5%	71.0%	59.8%	70.3%	54.9%	67.5%	63.9%	79.2%	58.1%	75.4%	70.2%	69.9%	56.9%
Education	11.79	11.54	12.02	12.24	11.13	10.92	12.99	12.66	12.89	12.24	12.20	12.73	12.91	12.68
(SE)	0.27	0.27	0.20	0.22	0.19	0.25	0.32	0.23	0.45	0.37	0.24	0.28	0.29	0.15
Age	42.52	40.39	43.47	40.68	42.59	40.99	44.70	41.40	45.36	38.31	43.07	39.73	46.02	39.36
(SE)	0.99	1.25	0.75	0.90	0.64	1.03	1.12	1.04	1.90	1.79	0.87	1.26	1.12	0.70
self-dep rating	-0.13	-0.45	-0.83	-1.59	0.60	0.26	-2.03	-2.08	-2.04	-2.31	-1.55	-1.74	-2.44	-2.79
(SE)	0.12	0.16	0.09	0.08	0.09	0.12	0.11	0.09	0.15	0.12	0.09	0.11	0.08	0.04
self-anx rating	-0.06	-0.25	0.40	-0.06	1.15	1.07	-1.35	-1.55	-1.22	-1.42	-0.74	-1.06	-1.75	-2.30
(SE)	0.11	0.13	0.08	0.09	0.07	0.11	0.11	0.09	0.16	0.13	0.09	0.12	0.10	0.05
IAT dep	-0.10	-0.11	-0.15	-0.24	-0.03	-0.09	-0.31	-0.33	-0.33	-0.34	-0.18	-0.24	-0.36	-0.41
(SE)	0.03	0.04	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.03	0.02
IAT anx	-0.21	-0.28	-0.08	-0.16	-0.03	-0.08	-0.46	-0.43	-0.34	-0.44	-0.29	-0.36	-0.47	-0.49
(SE)	0.04	0.05	0.03	0.04	0.03	0.05	0.05	0.03	0.06	0.06	0.03	0.04	0.04	0.02

Note. MDD=Major depressive disorder, AD= Anxiety disorder and HC =Healthy controls, dep=depression, anx=anxiety

explicit ratings of self-depression and self-anxiety associations are presented in Table 2. The CA vs. No Abuse groups differed significantly relative to age (F(13,2469)=4.55, P<.001), gender (χ2 =39.66, df=1, P<.001) and years of education (F(13,2469)=7.60, P<.001). Overall, the CA group was generally older, had less years of education and consisted of more females when compared to the No Abuse group.

STATISTICAL ANALYSIS

To investigate the main effect of CA on automatic self-depression and self-anxiety associations, and to investigate whether this effect is potentially dependent on current psychopathology, a repeated measures (RM) ANOVA was performed with Group (MDD, AD, MDD&AD, R-MDD, R-AD, R-MDD&AD and HC) and CA (CA vs. No Abuse) as fixed factors, and IAT depression and IAT anxiety scores as dependent variables. To investigate whether the impact of CA on negative self-associations is affected by gender, age or education level, we repeated the analysis while covarying for gender, age and years of education.

To investigate whether CEM is specifically related to enhanced negative automatic self-association, two forced entry (ENTER) regression analyses were run with dummy variables for CEM, physical abuse, and sexual abuse, as predictors and automatic self-depression association or automatic self-anxiety associations as dependent variable.

To further investigate whether enhanced automatic self-depression and automatic self-anxiety associations mediate the association between CEM and depressive or anxious symptomatology, and to investigate whether the results for implicit associations hold when controlling for explicit cognitions, we conducted tests for simple and multiple mediators using 10 000 bootstraps (Preacher & Hayes, 2004; Preacher & Hayes, 2008), with IAT depression and/or IAT anxiety as mediator(s) between CEM and depressive or anxious symptomatology. All analyses were conducted with α <.05, and if necessary corrected using the Bonferroni correction.

Finally, all tests were repeated with explicit ratings of the depression and anxiety words as dependent variables, to investigate if we could replicate previous findings of the impact of CA on explicit self-depression and anxiety ratings, and to investigate whether CA has a specific or similar impact on explicit vs. automatic self-associations.

RESULTS
CHILDHOOD ABUSE AND AUTOMATIC SELF- ASSOCIATIONS

In the RM ANOVA, with Group (MDD, AD, MDD&AD, R-MDD, R-AD, R-MDD&AD and HC) and CA (CA vs. non abuse) as fixed factors, and IAT depression and IAT anxiety as dependent variables, CA had a significant main effect on automatic self-depression and self-anxiety associations (F(1, 2469)=8.34, P<.01, Cohen's d=.12). Moreover, there was no interaction between IAT type and CA (F(1, 2469)=.04, P=.69). These findings suggest

that abused individuals have generally stronger self-depression and self-anxiety associations than non abused individuals. As previously described by Glashouwer and de Jong (2010), group had a significant main effect on automatic self-associations (F(6,2469)=51.82, P<.01, d=.34), and group had a significant interaction with IAT type (F(6,2469)=11.20, P<.001)[I]. In short, depressed individuals had higher automatic self-depression associations; whereas individuals with a current anxiety disorder showed stronger automatic self-anxiety associations, and individuals with a comorbid depressive and anxiety disorder had both high self-depressive and self-anxiety associations (see Glashouwer and de Jong, 2010). No interaction was found between group and CA (F(6,2469)=.50, P=.81), and no interaction was found between group, CA and IAT type (F(6,2469)=.69, P=.66). Finally, IAT type had a significant main effect (F(1,2479)=35.62, P<.001, d=.17), showing that participants scored significantly higher on the IAT depression (M=- .23, SE=.01) when compared to the IAT anxiety, (M=- .29, SE=.01).

Figure 1. Adjusted mean (and SE) of IAT depression and IAT anxiety scores
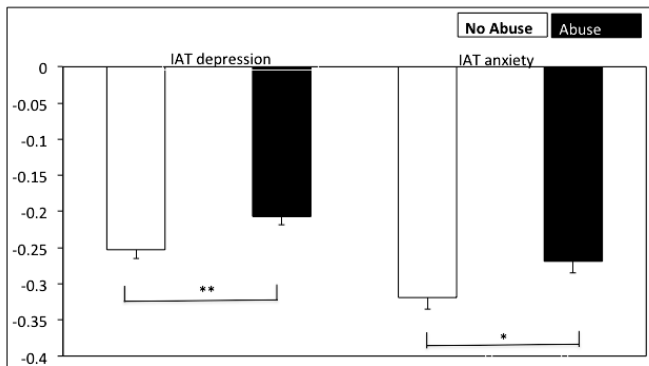
Note. In the ANOVAs, group (*MDD, AD, MDD&AD, R-MDD, R-AD, R-MDD&AD and HC*) and abuse (*Abuse vs. No Abuse*) were defined as fixed factors and IAT depression or IAT anxiety as dependent factor. An IAT score closer to 0 indicates stronger associations between me and depression/ anxiety words (*=sign at α<.05, **=sign at α<.01, two tailed).

All results remained significant if the covariates age, gender and years of education were added to the model, including the main effect of CA (F(1,2466)=5.98, P<.05, Cohen's d=.10), indicating that the effect of CA on automatic self-depression and self-anxiety associations cannot be explained by differences in age, gender or years of education. In this analysis, age (F(1, 2453)=.29, P=.59), and education level did not have a significant main effect (F(1, 2453)=1.32, P=.25). Gender did have a significant main effect (F(1,2453)=11.14, P<.01), with females (M=-.24, SE=.01) showing higher

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[I] *The effects of depression and anxiety diagnosis (current, past and no history) on implicit and explicit self-depression and self-anxiety associations have been described in detail by Glashouwer and the Jong (2010). Therefore in this paper, these results will not be described in detail.*

negative automatic self-associations than males (M=-.30, SE=.02). However, gender did not interact with CA (F(1, 2453)=.008, P=.93) confirming that gender does not moderate the effect of CA on negative automatic self-associations.

Additionally, in a model where severity of depressive and anxiety symptoms were added as covariates (and group was removed as fixed factor), the main effect of CA remained significant (F(1,2479)=8.37, P<.01, d=.12). Therefore, more severe depressive and/or anxiety symptomatology amongst abused individuals cannot explain the effect of CA on automatic self-depression and self-anxiety associations.

TYPE OF CA AND ENHANCED AUTOMATIC SELF-ASSOCIATIONS

To investigate whether CEM is more related to enhanced negative self-associations, two forced entry (ENTER) regression analyses were run with dummy variables for CEM, physical abuse, and sexual abuse as predictors, and automatic self-depression and self-anxiety associations as dependent variable. The analysis showed that CEM was the strongest predictor of automatic self-depression associations (Beta=.14, t=6.27, P<.001).

The contribution of sexual abuse was marginally significant (Beta=.04, t=1.68, P=.09), and physical abuse did not contribute significantly to automatic self-depression associations (Beta=.00, t=-.15, P=.88). Similarly, in the regression analysis with automatic self-anxiety associations as dependent variable, CEM (Beta=.08, t=3.62, P<.001), sexual abuse (Beta=.06, t=2.61, P<.01) and physical abuse (Beta=.05, t=2.30, P<.05) were all significant predictors of automatic self-anxiety associations, with CEM being the strongest predictor.

Previous studies have suggested that negative self-associations are most likely to develop when the negative self-concepts are explicitly handed to the child (see Rose and Abramson, 1992). Therefore, we specifically wanted to investigate whether emotional abuse in itself is associated with changes in the IAT, outside the context of emotional neglect, and of physical and sexual abuse, leaving only 42 participants with emotional abuse. We performed a RM ANOVA with individuals reporting only emotional abuse (emotional abuse vs. no abuse) and Group (MDD, AD, MDD&AD, R-MDD, R-AD, R-MDD&AD and HC) as fixed factors, and IAT depression and IAT anxiety as dependent variables. Despite the relatively small sample, emotional abuse had a significant main effect on IAT depression and IAT anxiety scores (F(1,1312)=6.19, P<.05, d=.39). A similar analysis with individuals reporting only neglect and no other types of CA (i.e., no emotional abuse, and no physical or sexual abuse, n=306), showed that emotional neglect had a marginal significant main effect on IAT depression and IAT anxiety score (F(1,1576)=3.60, P=.06, d=.23), suggesting that both emotional abuse and emotional neglect are related to enhanced automatic negative self-associations.

MEDIATION ANALYSES.

To further investigate whether enhanced automatic self-depressive associations mediate the association between self-reported CEM (CEM n=1105, No Abuse n=1284) and depressive or anxious symptomatology, we performed a test for simple mediation (Preacher & Hayes, 2004) using 10 000 bootstraps, with CEM as independent factor, IAT depression or IAT anxiety as mediator, and IDS or BAI score as dependent variables. In this model, CEM was significantly related to depressive symptomatology (see Table 3 for the pathway coefficients). When IAT depression was added as a mediator, the relation between CEM and depressive symptomatology partially reduced, and this reduction was significant (Z=7.15, P<.001). In a second mediation analysis, CEM was significantly related to anxious symptomatology, and when IAT anxiety was added as a mediator, this association reduced significantly, but not entirely (Z=5.99, P<.001). In addition, multiple mediator analyses (Preacher & Hayes, 2008) revealed that when explicit self-depressive, or self-anxiety associations were added as mediators in the model, automatic self-depressive associations and automatic self-anxiety associations remained significant mediators of the relationship between CEM and depressive or anxious symptomatology (Table 3). These findings not only suggest that negative automatic self-depressive or self-anxiety associations partially mediate the relationship between CEM and depressive or anxious symptomatology, these findings also suggest that automatic and explicit self-associations are differentially related to depressive and anxious symptomatology.

CHILDHOOD ABUSE AND EXPLICIT RATINGS OF SELF-ASSOCIATIONS

Using a similar RM ANOVA as with the IAT, CA had a main effect on ratings of self-depression and self-anxiety associations

Table 3. Negative self-associations mediate the relation between CEM and depressive or anxious severity.

IV	MV	DV	Pathways coefficients (β)						Bootstrap results IV→MV→DV	
			IV→MV	MV→DV	IV→DV	IV→MV→DV	Effect	Z score	Effect	SE
CEM	IAT depression	IDS	0.13 ***	10.73 ***	9.85 ***	8.48 ***	1.36	7.15 ***	1.36	0.19
CEM	IAT anxiety	BAI	0.14 ***	6.03 ***	5.52 ***	4.69 ***	0.82	5.99 ***	0.82	0.14
CEM	Explicit depression	IDS	1.05 ***	6.06 ***	9.85 ***	3.46 ***	6.39	15.15 ***	6.39	0.42
CEM	Explicit anxiety	BAI	1.04 ***	4.16 ***	5.52 ***	1.20 ***	4.32	14.56 ***	4.32	0.30
CEM	IAT depression	IDS	0.13 ***	1.89 ***	9.85 ***	3.39 ***	0.24	3.23 **	0.24	0.07
	Explicit depression		1.05 ***	5.89 ***			6.23	15.02 ***	6.22	0.41
CEM	IAT anxiety	BAI	0.14 ***	1.44 ***	5.52 ***	1.17 ***	0.20	3.56 ***	0.20	0.06
	Explicit anxiety		1.04 ***	4.00 ***			4.15	14.37 ***	4.15	0.30

Note. CEM: *n* =1105, No Abuse: *n* =1284, IV=independent variable, MV= mediator variable, DV= dependent variable, IDS= Inventory of Depressive score, BAI= Beck Anxiety Inventory score, ***=sign at α<.001, **=sign at α<.01, two tailed

(F(1,2469)=45.43, P<.0001, d=.27). There was no interaction between CA and ratings of self-anxiety or self-depressive associations (F(1,2469)=.58, P=.45), indicating that the CA group had higher ratings of both self-depressive and self-anxiety associations. The main effect of CA remained significant if the covariates age, gender and years of education were added to the model (F(1,2466)=40.70, P<.000, d=.26). In addition, in a model where severity of depressive and anxiety symptoms were defined as covariates (and group was removed as fixed factor), the main effects of CA also remained significant (F(1,2479)=30.23, P<.01, d=.22).

TYPE OF CA AND ENHANCED EXPLICIT SELF-ASSOCIATIONS

Two forced entry (ENTER) regression analyses were run with dummy variables for CEM, physical abuse, and sexual abuse as predictors, and explicit self-depression, or self-anxiety associations as dependent variable. In line with findings on the automatic self-associations, CEM was the strongest predictor of self-depression (Beta=.28, t=12.87, P<.001), and self-anxiety associations (Beta=.26, t=11.87, P<.001). Physical abuse was a significant predictor of both self-depression associations (Beta=.05, t=2.45, P<.01) and self-anxiety associations (Beta=.06, t=2.80, P<.001), and sexual abuse predicted self-anxiety associations (Beta=.04, t=2.08, P<.05), but not self-depression associations (Beta=.02, t=.96, P=.34).

In addition, a test for simple mediation (preacher and Hayes, 2004) using 10 000 bootstraps, with CEM (CEM n=1105, No Abuse n=1284) as independent, explicit self-depression or explicit self-anxiety associations as mediator, and IDS or BAI score as dependent variable, showed that negative explicit self-depressive or self-anxiety associations partially mediate the relationship between CEM and depressive or anxious symptomatology (see Table 3).

DISCUSSION

The first aim of this study was to investigate whether childhood abuse (CA) was associated with enhanced automatic negative self-depression and self-anxiety associations. In line with our predictions, CA was associated with both increased automatic self-depression and self-anxiety associations. Similarly, and in line with previous studies (Alloy et al., 2006; Gibb, 2002; Gibb et al., 2003; Gibb & Abela, 2008; Wright et al., 2009), CA was also associated with enhanced explicit self-depressive and self-anxiety associations. The effects of CA remained significant when adding severity of depressive and anxiety symptomatology as covariates to the model, suggesting that these effects cannot be explained by more severe depression and/or anxiety symptoms amongst individuals reporting CA. Moreover, the relationship between CA and negative self-associations was consistently found within all groups (i.e., current, past, or no history of depressive and/or anxiety disorders). This pattern indicates that the stronger negative self-associations in individuals with a history of CA cannot beinterpreted as mere

symptoms of concurrent psychopathology. However, given the prominent role that is attributed to negative self-associations in mood and anxiety disorders (e.g. Beck, 2008), it seems reasonable to assume that these enhanced negative self-associations increase an individual's generic vulnerability to develop a mood and/or anxiety disorder. In the face of other factors, such as genetic make-up, stressful life events and/or (lack of) social support, this generic vulnerability may lead to the development of psychopathology (see Beck, 2008; Caspi et al., 2003; Caspi & Moffitt, 2006).

In line with our hypothesis, CEM (consisting of emotional neglect and psychological abuse) was the most potent predictor of both automatic self-depression and automatic self-anxiety associations. In addition, sexual and physical abuse were only significant predictors of automatic self-anxiety associations. Similarly, ratings of self-depression and self-anxiety associations were also especially enhanced in individuals reporting a history of CEM. Additionally, subsequent analyses revealed that relatively small subgroups of individuals reporting emotional abuse (n=42), and even emotional neglect (n=306), also showed significantly enhanced automatic negative self-associations. Moreover, in these groups the effect sizes for the automatic (d=.39 and .23) were larger than those for the total CA group (d=.12), suggesting that a history of emotional abuse and emotional neglect is sufficient to enhance negative automatic self-associations.

Taken together, our findings suggest that CEM is related to both enhanced deliberate and automatic self-associations. These findings are in line with earlier findings of a strong relationship between emotional abuse and explicit negative self-associations (Alloy et al., 2006; Gibb, 2001; Gibb, 2002; Gibb et al., 2003; Gibb & Abela, 2008; Wright et al., 2009).

In addition, our findings build on and extend the hypothesis that compared to childhood physical and sexual abuse, emotional abuse is more likely to enhance negative self-cognitions (see Rose & Abrahamson, 1992). Moreover, our findings also suggest that negative self-associations do not only develop when these are explicitly handed to the child during emotionally abusive episodes (e.g. '*you are such a stupid child*'), but also seem to arise in the context of emotional neglect, where the meaning is mostly suggested, rather than explicitly stated (e.g. '*I am such a worthless child, because mommy doesn't give me any attention*').

Moreover, the mediation analyses revealed that automatic (and explicit) negative self-associations statistically partially mediate the relation between CEM and depression or anxiety severity. Perhaps even more importantly, tests of multiple mediators (Preacher & Hayes, 2008) revealed that, when explicit self-associations were also added as a mediator in the model, automatic self-associations remained significant mediators of the relationship between CEM and depressive or anxious symptomatology. These results suggest that both automatic and explicit self-associations might (partly) have an independent contribution to the development of depressive or anxious symptomatology. Together with our findings that CEM is related to enhanced negative self-associations irrespective of current

psychopathology, these findings indicate that CEM is related to depressive and anxious symptomatology, although CEM in itself does not predict whether someone actually develops a depressive or anxiety disorder. Rather, and in line with Beck (2008), experiencing CEM might be marked as a generic cognitive vulnerability factor for the development of (more severe) depressive and anxiety symptoms via the generation of negative automatic self-associations.

It should be acknowledged that the cross sectional design of our study does not allow any firm conclusion regarding the direction of the present relationship between CEM and enhanced negative self-associations, nor between negative self-associations and depression. Thus the present findings should be interpreted with care. To arrive at more solid grounds in this respect it would be important to test further the proposed interrelationship in a longitudinal design. As a next step it might therefore be helpful to investigate whether CEM-related negative automatic (and explicit) self-depression and self-anxiety associations indeed have prognostic value for the onset of mood and/or anxiety disorders in a prospective design (e.g. Gibb et al., 2001; Liu et al., 2009; Wright et al., 2009).

Although the differences between the abused and non-abused individuals regarding automatic and deliberate self-associations were generally in the same direction, the correlations between the implicit and explicit measurements were only moderate (see Table 1). This is consistent with other studies (e.g. Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005) and in accordance with the assumption that different memory processes form the basis of explicit and automatic cognitions (Gawronski & Bodenhausen, 2006).

The effect sizes of CA on explicit negative self-associations appeared larger (i.e. d ranging between .22 -.45) than those of the automatic self-associations (i.e. d ranging between .10 and .12), even though it should be noted that in the subsamples of individuals reporting only emotional abuse or only emotional neglect, the effect sizes for the automatic self-associations (d=.39 & d=.23) were similar when compared to the effect sizes found on the explicit measures (i.e. d=.22-.45), suggesting that emotional abuse and emotional neglect have a similar impact on both automatic and explicit negative self-associations. Nevertheless, at least for CA in general this seems to suggest that abuse in childhood mostly influences deliberate associations rather than automatic self-associations and are therefore more informative when studying the impact of negative self-associations on maladaptive emotional behavior. In addition, the mediation analyses suggest that when compared to automatic self-associations, explicit self-associations are stronger mediators of the relationship between CEM and depressive or anxious symptomatology. However, the difference in magnitude should be interpreted with care, because shared method variance between the explicit ratings and (self-reported) CA may have artificially inflated their

relationship compared to the relationship between CA and automatic associations. Moreover, the explicit measure in this study consisted of ratings of to what extent the participants considered that the stimulus words applied to them, and is not an empirically tested measure, although the internal consistency was good (Cronbach's Alpha's ranging from .94 to .95). To further examine the differential importance of explicit and automatic self-associations, it would be important to test the predictive validity of automatic and explicit self-associations for the onset or recurrence of anxiety and depressive episodes in prospective studies (e.g., Huijding & de Jong, 2009; Engelhard, Huijding, van den Hout & de Jong, 2007).

A main effect of IAT type was observed, indicating that participants scored significantly higher on the IAT depression when compared to the IAT anxiety. However, it is difficult to interpret such a direct comparison between the associations of CA with automatic self-depression versus automatic self-anxiety associations, because the depression IAT was always presented before the anxiety IAT, and IAT effects tend to decrease with the number of IATs presented to a participant. In the context of NESDA we nevertheless preferred a fixed order to optimize the sensitivity of the IAT as a measurement of individual differences (Asendorpf et al., 2002; Schnabel et al., 2006; Steffens & König, 2006; Glashouwer & De Jong, 2010). Additionally, the two IATs did not match up conceptually. That is, the attribute words of the IAT depression tend to be more about self-worth (i.e., useless, inadequate), whereas the IAT anxiety tended to focus more on symptoms of the disorder (i.e., anxious, afraid). In sum, differences between the two IATs might be due to several factors, including conceptual differences, which hamper a straightforward interpretation.

The cross-sectional design of our study limits our inferences regarding the causality of our findings. The assessment of CA was based on retrospective self-report, and may therefore be susceptible to distortion and/or inflation. It could be argued that individuals with enhanced negative self-associations might be more prone to over report histories of CA. However, our findings of enhanced explicit negative self-associations in individuals reporting CEM are in line with a number of prospective studies that show that children exposed to emotional maltreatment subsequently develop negative cognitive schemas (e.g. Gibb, 2001), and that cognitive schemas are predictive of depressive symptomatology in emotionally maltreated individuals over time (Gibb, 2001; Liu et al., 2009; Wright et al., 2009). Our findings, together with these prospective studies, seem to suggest that CEM leads to the development of negative explicit and implicit self-associations, which might constitute a vulnerability factor for the development of depressive and anxiety disorders over time.

Conclusion

To our knowledge, this is the first study showing that CA is related to increased automatic negative self-associations in adulthood. Moreover, due to its transdiagnostic design, this study was able to show that CA is linked

with enhanced negative automatic self-associations, irrespective of whether or not the individual has a current and/or past depression and/or anxiety disorder. Finally, due to the large set of participants (n=2483), and the fact that all types of CA (CEM, physical- and sexual- abuse) were measured, we were able to show that CEM has the strongest link with enhanced (automatic and explicit) negative self-associations. Taken together, our results are consistent with the notion that CEM plays a crucial role in increasing one's negative self-associations. Our findings build to the increasing understanding of the prolonged and adverse impact of CEM (see Gilbert et al., 2009). Nevertheless, within the scientific and public domain, the effects of CEM still seem to be considerably underestimated (Gilbert et al., 2009). Informing parents, teachers, general practitioners and therapists about the possible detrimental impact of CEM, may help to reduce this underestimation. Subsequently, this might lead to better attention to and perhaps even a reduction in the occurrence of CEM and may eventually improve the treatment of individuals reporting CEM. Consequently, informing society may thus lead to a reduction in (the shaping of) dysfunctional self-associations in individuals reporting a history of emotional maltreatment.

SUPPLEMENT
IAT STIMULUS WORDS
Me: I, myself, self, my, own
Other: other, you, they, them, themselves
Anxious: anxious, afraid, nervous, insecure, worried
Calm: calm, balanced, placid, secure, relaxed
Depressed: useless, pessimistic, inadequate, negative, meaningless
Elated: positive, optimistic, active, valuable, cheerful
Note. Words are translated from Dutch