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Adult attachment and attentional inhibition of interpersonal stimuli

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Abstract

In two studies, we used a negative affective priming task with pictures of angry (Study 1), sad (Study 2), and happy faces (Studies 1 and 2) to measure attentional inhibition of emotional stimuli as a function of attachment style. Results showed that attachment avoidance was associated with a stronger inhibition of both angry and sad faces. This indicates that the regulatory strategies of avoidant individuals involve inhibition of different types of negative, but not positive, stimuli. Attachment anxiety, on the other hand, showed no association with inhibitory responding to negative stimuli, although we did find indications of impaired inhibitory processing of happy faces in Study 1. The results are discussed in relation to current evidence on avoidant affect-regulation strategies.

Keywords: adult attachment, inhibition, avoidance, emotion regulation, negative priming

Recent formulations of attachment theory have pointed to the important role of attachment in affect regulation and cognitive functioning through the selective processing of attachment-relevant information (Mikulincer & Shaver, 2003, 2007). It has been argued that selective attention represents a key strategy for the activation and regulation of the attachment system and that individuals differ in their ability to regulate attention to emotional information as a function of existing goals, beliefs, and expectations (Main, Kaplan, & Cassidy, 1985). Furthermore, insecure attachment orientations are assumed to be characterized and maintained in part by attentional biases and inhibitory deficits (Bowlby, 1969, 1982). Few empirical studies to date have, however, examined attentional processing of attachment-related affect, despite the theoretical importance of this regulatory process. Therefore, the present study was designed to examine attachment-style differences in attentional inhibition of emotional information.

Attachment-Related Differences in Emotion Regulation

The attachment behavioural system is by definition an emotion regulation device. Perceived threats generate distress, which motivates people to seek proximity to protective others (or to evoke a mental representation of them) as a means to manage distress and restore emotional balance. Individual differences exist in the activation level and functioning of the attachment system and these differences are generally conceived in terms of two underlying dimensions, that is, attachment anxiety and avoidance, which are associated with distinct ways of regulating emotional distress (Brennan, Clark, & Shaver, 1998). According to the theory, attachment anxiety is marked by heightened emotional reactivity and intense distress reactions. Attachment avoidance, on the other hand, would be characterized by attenuated (negative) emotionality which is manifested in the inhibition, denial, and suppression of emotional states that are incongruent with their goal of down-regulating the attachment system (for a review, see Mikulincer & Shaver, 2003, 2007). Hence, the attachment system

includes multiple processes that are designed to increase, maintain, or decrease one or more components of an emotional response and these processes can act both before and after the emotion has been generated.

Inhibitory Processing of Attachment-Related Affect

Of particular importance for the activation and regulation of the attachment system are early information processing mechanisms that influence the encoding and storage of interpersonal and potentially threatening information. One of the cognitive processes that acts early on in the emotion regulation process and has the potential to magnify or reduce emotional distress is selective attention; a process that actually consists of two different interrelated mechanisms, namely allocating attention to goal-relevant information and active inhibition of goal-irrelevant information (Zacks & Hashler, 1994). Biases in both attentional components are assumed to play a crucial role in the intensification and denial of emotional experiences that are characteristic of attachment anxiety and avoidance, respectively.

Although theoretical accounts of the attachment-attention link are well elaborated, there is little extant research in this area. In particular, the role of inhibitory control has remained largely unexplored. This is remarkable because cognitive inhibition is basic to efficient emotion regulation and has high explanatory value for understanding the information processing characteristics of attachment avoidance. That is, the ability to inhibit the influence of goal-irrelevant information plays a key role in encoding, storing, and retrieving information from memory (e.g., Dempster & Brainerd, 1995; Hasher & Zacks, 1994). Hence, inhibitory mechanisms that prevent emotional experiences from being encoded may help to limit further processing of unwanted affect and as such serve avoidant individuals' goal of minimizing emotional reactivity. Despite the theoretical importance of the inhibition construct, little direct evidence has been obtained on attachment-style differences in inhibitory control. There are, however, several indications that disturbances in inhibitory processing of (negative) affective

material may be an important cognitive component of insecure attachment, especially in the case of attachment avoidance.

A first, though indirect, indication of inhibition stems from research on attention allocation. Using the dot-probe and exogenous task, it was shown that attachment anxiety and avoidance yield similar response patterns in attentional orienting, namely attentional avoidance of attachment threat (i.e., attachment-threat words and angry faces; Dewitte, Koster, & De Houwer, 2007; Dewitte & De Houwer, 2008). This does not fit with theoretical predictions. Yet, it might be the case that the emotion regulation strategies of anxious and avoidant individuals differ in more subtle ways, as it may not be the automatic orientation of attention, but rather the level of inhibitory control that differentiates between attachment anxiety and avoidance. That is, rigid or impaired inhibition of negative affective stimuli could possibly underlie the observed difficulties in emotional processing of insecure individuals. Other indirect evidence on attentional inhibition stems from research on memory, showing that avoidant individuals have difficulties in recalling negative emotional experiences (e.g., Edelstein, 2006; Fraley & Burmbaugh, 2007; Fraley, Garner & Shaver, 2000; Mikulincer & Orbach, 1995). Importantly, several studies have shown that those memory biases reflect an inhibitory mechanism operating at the level of encoding rather than at retrieval.

Another indication of the importance of inhibitory processes for regulating attachment-related affect stems from studies on the defensive nature of avoidant individuals' deactivating strategies. Using a thought-suppression paradigm, Fraley and Shaver (1997) found that avoidant individuals were effective in suppressing attachment beliefs, as indicated by less interference of separation-related thoughts following suppression instructions and lower skin conductance during suppression. Another study showed that avoidant individuals displayed heightened skin conductance reactivity, while reporting less subjective emotional distress, when discussing attachment-related issues. This discrepancy between physiological

and subjective responses was interpreted in terms of emotional inhibition (Diamond, Hicks, & Otter-Henderson, 2006). Although these studies did yield different results, they both have in common that individuals had to actively reflect on attachment-related content, leaving unexplored how the defensive strategies of avoidant individuals operate when (as often in daily life) people do not have the opportunity or motivation to engage in active reflection. In other words, more research is needed on the automatic components of emotion-regulation strategies using experimental paradigms that allow measuring inhibitory processes under conditions of automaticity.

Such automatic processes were measured in a recent study in which an emotional Stroop task was used to investigate cognitive interference of attachment-related threat words (Edelstein & Gillath, 2008). Results showed that attachment avoidance was associated with a reduced Stroop interference effect for negative emotional words, which was interpreted in terms of avoidant individuals' tendency to inhibit attentional processing of potentially threatening information. Although this study did provide a more direct investigation of the attachment-attention link, there are several interpretative difficulties with the Stroop task as a measure of attentional processes. Most importantly, this task does not allow us to differentiate between activation and inhibition accounts of selective attention because the task-relevant (colour of the word) and task-irrelevant (semantic content) information are presented *and* measured within the same stimulus presentation (Mogg & Bradley, 2005). Hence, it is not entirely clear whether the reaction times on the Stroop task reflect activation, inhibition, or both. Recently, other paradigms have been developed to further decompose the process of selective attention such that attentional inhibition can be measured separately.

In the case of attachment anxiety, the evidence on inhibitory functioning is even less conclusive. Some studies suggest that anxious individuals display impaired inhibition of emotional stimuli as indicated by heightened accessibility of attachment-related thoughts and

heightened emotional reactivity after suppression instructions (Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005; Fraley & Shaver, 1997). Another study on rejection contingencies, as learned through a conditioning procedure, showed that attachment anxiety was related to faster reaction times to signaled rejection words, indicating impaired inhibition of rejection expectancies (Baldwin & Kay, 2003). In addition, there are theoretical and empirical indications that attachment anxiety relates to ruminative thinking (e.g., Saffrey & Ehrenberg, 2007). Impaired inhibitory control has been suggested as one of the crucial mechanisms underlying this cognitive process (e.g., Joormann, 2004). On the other hand, there are also studies showing no significant associations between attachment anxiety and heightened autonomic stress reactivity (Diamond et al., 2006), no specific memory biases (e.g., Gentzler & Kerns, 2006), and no enhanced processing of negative emotional stimuli (Edelstein & Gillath, 2008).

In sum, although the above reported studies indicate that inhibitory mechanisms play an important role in regulating attachment-related affect, they do not allow us to draw definite conclusions on *attentional inhibition* as a function of attachment style. That is, most of these studies (1) focused on related aspects of attention (such as memory biases) rather than measuring attentional processes directly; (2) investigated inhibition as a response-focused strategy (i.e., after emotional distress has been triggered) and did not measure inhibition at the automatic level; (3) or relied on methods that cannot provide a rigorous test of inhibitory control. Hence, to gain clearer insight into the regulatory strategies associated with attachment insecurity, more research is needed that systematically investigates the relation between attachment style and inhibitory processing of affective information, using methods that tap more directly into the inhibition component of selective attention.

The Present Study

Recent research on attentional biases in the context of emotional disorders has increasingly, and with success, relied on the negative affective priming task (NAP) to measure inhibition of emotional information (e.g., Goeleven, De Raedt, Baert, & Koster, 2006; Joormann, 2004; Frings, Wentura, & Holtz, 2008). This task is basically a combination of the negative priming paradigm (for a review, see Tipper, 2001) and the affective priming task (for a review, see Klauer & Musch, 2003) and has specifically been developed to measure the inhibition component of selective attention. The NAP design involves a double-stimulus presentation task in which participants have to categorize the valence of a target, while ignoring a distracter. If the distracter on one trial is affectively similar to the target of the next trial, responses to the target will be faster because of priming. Inhibition can thus be inferred from slowness in responding to the affectively similar target because something has interfered with the expected facilitation of responding due to priming. It has been argued that negative priming tasks measure an automatic type of 'cognitive' inhibition that functions to prevent distracting information from entering working memory (Logan, 1994; see also Friedman & Miyake, 2004; Miyake et al., 2000), suggesting that the NAP task allows measuring pre-emptive processing of emotional stimuli.

As stimulus material, we selected pictures that are emotionally significant and potentially relevant to attachment concerns, namely facial expressions. Note that such stimuli have already been used successfully in previous research on emotional processing biases in the context of attachment (e.g., Dewitte & De Houwer, 2008; Fraley, Niedenthal, Marks, Brumbaugh, & Vicary, 2006). Although the attachment system is primarily involved in regulating negative affect, we included both positive and negative stimuli to explore whether the inhibitory deficits associated with attachment insecurity are valence-specific. In Study 1, we used pictures of happy and angry faces, which can be interpreted as signaling acceptance and attachment figure availability versus social rejection and unavailability. In Study 2, we

presented sad faces instead of angry faces to explore the generalizibility of attachment-style differences in inhibitory functioning.

Study 1

Method

Participants. Sixty-nine students (52 women, 17 men with a mean age of 19.7 years) from various faculties at Ghent University participated in the experiment. Each participant received 5 euros for their participation.

Material. To investigate inhibition of emotional information, we used a NAP task (Joormann, 2004). For the pictorial stimuli, we selected 88 coloured pictures of emotional faces without hairline from the Karolinska Directed Emotional Faces (KDEF) Database (Lundqvist et al., 1998). The selected pictures displayed happy (*n*=33), angry (*n*=33), and neutral (*n*=22) face expressions. The neutral faces were used as distracters in the probe trials. All were adjusted to the same size (326 pixels x 326 pixels) and were presented in a random order. Targets and distracters were presented in a black or gray frame such that a target with a black frame was combined with a distracter with a grey frame and vice versa (the response cue was counterbalanced across participants). All frames consisted of lines that were 3 mm wide. The NAP task was programmed using the INQUISIT Millisecond software Package (Inquisit 2.01, 2005) and presented on a Pentium II computer with a 15-inch colour monitor. Participants were seated at a distance of approximately 60 cm from the screen and responded by pressing the q or m key of an AZERTY keyboard.

As a measure of individual differences in attachment style, we used a Dutch translation of the ECR-revised (Experiences in Close Relationships scale, Fraley, Waller, & Brennan, 2000; ECR-R-NL, Buysse & Dewitte, 2004). Eighteen items tap attachment anxiety (i.e., fear of abandonment and strong desires of interpersonal merger) and 18 items tap attachment avoidance (i.e., discomfort with closeness, dependence, and intimate self-

disclosure). The reliability and validity of these scales are well documented (e.g., Fraley et al., 2000; Sibley, & Liu, 2004). Also in the current sample, Cronbach alphas were high for the Anxiety (α = .92) as well as for the Avoidance subscale (α = .91).

Procedure. The task began with 14 practice trial-sequences, followed by 256 test trial-sequences. As can be seen in Figure 1, each trial-sequence in the NAP includes a succession of two separate trials: a prime and a probe trial, in which two stimuli are presented simultaneously, a target and a distracter. Each trial within a sequence started with the presentation of a fixation cross that was displayed for 1000 ms in the middle of the screen. Next, two pictures (one surrounded by a black frame, the other by a grey frame) were presented in the upper and lower half of the screen. Participants were instructed to ignore the distracter (e.g., picture with the grey frame) and to focus on and evaluate the valence (positive or negative) of the target picture (e.g., picture with the black frame) as accurately as possible by pressing one of two corresponding keys. The response cue (grey or black frame) and the key assignment were counterbalanced across participants. Furthermore, the spatial position of the target and the distracter in both the prime and probe trials were randomly assigned from trial to trial, with an equal number of presentations for each condition. Both facial expressions remained on the screen until a response was given. The inter-trial interval was 1000 ms. The precise timing of the events on a trial-sequence is depicted in Figure 1.

In experimental trial-sequences, the distracter of the prime trial and the target of the probe trial share the same valence, whereas in control trial-sequences prime distracters and probe targets are unrelated. Inhibition is indexed by the degree to which suppressing a reaction to the prime distracter in one trial causes a delay in responding to the probe target of the same valence in a next trial. Reaction times on control sequences are subtracted from reaction times on experimental sequences such that a positive NAP score indicates stronger inhibition of the prime distracter, whereas a negative NAP score indicates weaker inhibition.

Hence, the crucial manipulation in the NAP task is (1) the difference in reaction times between experimental and control conditions and (2) the valence of the distracter in the prime trial, which differs from the valence of the probe target in the control condition, but not in experimental NAP sequences. Table 1 provides an overview of the different trial-sequences in the NAP task. It is important to note that participants are not aware of the difference between prime and probe trials, which makes it less likely that they can consciously control the magnitude of the NAP effects. Furthermore, although inhibition of the prime distracter may be a conscious and intentional process in itself, the *effect* of inhibition of the prime distracter on responses to the probe target is likely to occur in a fast and uncontrollable way. Accordingly, it can be argued that this task measures inhibitory processes at a relatively automatic level (see Moors & De Houwer, 2006, for an overview of the automaticity features).

Because the items of the ECR-R include emotional content and thus might affect performance on the NAP-task, this questionnaire was administered after the reaction time task.

Results

We analysed responses on probe trials only. Latencies below 300 ms and above 2000 ms (reflecting anticipatory and delayed responding respectively) were treated as outliers and removed from statistical analyses. Moreover, because prime and probe trials are mutually related, only trial-sequences in which a correct response was given on both the prime and probe trial were taken into account (see Fazio, 1990). In total, 8.61 % of the data were removed for these reasons, which is comparable to previous studies (e.g., Goeleven et al., 2006).

To examine inhibitory processing of affective information, we conducted a repeated measures ANOVA with valence (happy, angry) and type of trial-sequence (experimental,

control) as within-subjects variables. This analysis revealed a significant main effect of trial-sequence, $F(1,69) = 6.80$, $p = .01$. The mean reaction times show that participants were slower to react at experimental trials compared to control trials (see Table 2), which indicates a standard negative priming effect. Neither the main effect of valence, $F(1,68) = 1.84$, $p > .10$, nor the interaction effect between valence and trial-sequence, $F(1,68) = .38$, $p > .10$, were statistically significant.

The relation between attachment style, as measured by the ECR-R, and the negative affective priming effect was analysed using regression analyses, entering the NAP score as a dependent variable and the ECR-R anxiety and avoidance scores as predictors. In a first step, attachment anxiety and avoidance were entered as predictors. In a second step, the two-way interaction between anxiety and avoidance was added. To reduce possible problems of multicollinearity when analysing the interaction term, the anxiety and avoidance scores were centered (Aiken & West, 1991). Separate analyses were conducted on the inhibition score for angry and happy faces. The regression analysis on the NAP score for *angry faces* revealed a significant main effect of attachment avoidance, $\beta = .26$, $p < .05$, showing that higher scores on attachment avoidance were associated with a stronger inhibition of angry faces. The main effect of attachment anxiety, as well as the interaction term between anxiety and avoidance were not significant, p's $> .10$.

The analysis on the NAP score for *happy faces* revealed a significant main effect of attachment anxiety, $\beta = -.31$, $p < .05$, indicating a facilitation of positive information in the more anxiously attached individuals. The main effect of attachment avoidance was not significant, $\beta = .02$, $p > .10$, neither was the interaction effect between attachment anxiety and avoidance, $\beta = -.12$, $p > .10$.

Discussion

As expected, our results showed that attachment avoidance was associated with a stronger inhibition of negative interpersonal information, suggesting that the more avoidantly attached individuals are better able to inhibit cognitive processing of negative emotional stimuli. This inhibitory effect appeared to be valence-specific. That is, the more avoidant individuals did not display increased inhibitory processing of positive faces. In the case of attachment anxiety, no association was found between attachment anxiety and inhibitory responding to angry faces. Hence, we did not find support for the assumption that the heightened stress responses of anxious individuals (Mikulincer & Shaver, 2007) result from impaired inhibitory processing of attachment-relevant threat stimuli. Finally, although we did not make specific predictions regarding inhibitory processing of positive stimuli as a function of attachment style, our results did show that attachment anxiety was associated with reduced inhibition of positive faces, which could possibly be interpreted in terms of their underlying proximity goals (see Gillath, Mikulincer, Fitzsimons, Shaver, Schachner, & Bargh, 2006). That is, their compulsive desire for closeness may facilitate the processing of cues that signal acceptance and willingness to provide care and support.

Study 2

In a second study, we wanted to explore whether the inhibitory responses of avoidant individuals are specific to interpersonal stimuli that signal a threat to the self (such as an angry face) or can also be directed at negative emotions that do not require a self-preservative, withdrawal response. According to the theory, attachment strategies would not only interfere with the processing of emotion-eliciting cues that trigger safety-regulation goals (e.g., separation, rejection and attachment figure unavailability), but would also influence the processing of cues that express another's needs and thus require a caregiving response. Given that attachment is a dyadic process that often operates in a bidirectional way, it has been argued that caregiving responses are shaped by previous attachment experiences and vice

versa (e.g., Collins, & Feeney, 2000; Feeney & Collins, 2001). Hence, anxious and avoidant individuals would experience difficulties with providing effective care because they are preoccupied with their own insecurities and therefore lack the mental resources necessary to attend compassionately to others' need for comfort and care (Collins & Feeney, 2000; Mikulincer & Shaver, 2007). Particularly avoidantly attached individuals would be reluctant to provide sensitive care because this interferes with their need for interpersonal distance and independence.

Relating this to inhibitory functioning, we postulate that avoidant individuals' lack of interpersonal sensitivity and responsiveness may result from a heightened tendency to inhibit the encoding of other's distress. In the case of attachment anxiety, one could expect both increased or impaired inhibitory processing of distress expressions (e.g., sadness). Research has suggested that anxious individuals experience high levels of negative affect while witnessing other's distress, which may draw their attention inward rather than outward (Collins, Guichard, Ford, & Feeney, 2006). On the one hand, such self-focused attention may interfere with the processing of another's request for support, resulting in increased inhibition of sad expressions. On the other hand, anxious individuals may also identify with the careseeker's negative emotions, resulting in difficulties to inhibit such mood-congruent emotional signals. To test these hypotheses, we conducted a second study in which we used an adapted version of the NAP task to measure inhibition of sad faces. Again, happy faces were included to explore the valence-specificity of the inhibitory responses.

Method

Participants. Seventy-three students (58 women, 15 men with a mean age of 19.3 years) from various faculties at Ghent University participated in the experiment in return for a monetary reward (5 euros). None of them had participated in the first experiment.

Procedure and Materials. The only difference with the previous study was the use of sad faces instead of angry faces in the NAP task. The sad faces were selected carefully from the KDEF database and have already been used successfully in previous research with the NAP task (e.g., Goeleven et al., 2006). The happy and neutral faces were the same as in Study 1. Hence, in the present task, 33 happy, 33 sad, and 22 neutral faces were presented in a random order. Exclusion of incorrect responses and outliers resulted in 7.34 % data loss.

Results

A Valence (sad, happy) x Trial-sequence (experimental, control) repeated measures ANOVA yielded a significant main effect of trial-sequence, $F(1, 72) = 8{,}47$, $p < .01$, indicating that reaction times were slower in the experimental trials compared to the control trials (Table 2). In addition, a significant interaction effect between valence and trial-sequence was found, $F(1, 72) = 4.19$, $p < .05$. To further explore this interaction, contrast analyses were conducted on the negative and positive trials. These analyses revealed significantly slower reaction times in the experimental trial-sequences compared to the control trial-sequences for positive trials, $F(1, 72) = 16.57$, $p < .01$, indicating successful inhibition of happy faces. Overall, no significant difference was observed between trial-sequences for sad faces, $F(1, 72) = .49$, $p > .10$.

To explore the contribution of attachment style on the inhibition of emotional information, we conducted regression analyses on the inhibition score for happy and sad faces, entering attachment anxiety, attachment avoidance and their interaction term as predictors. The analysis on *sad faces* revealed a significant main effect of attachment avoidance, $\beta = .25$, $p < .05$, indicating that an increase in attachment avoidance was associated with heightened inhibition of sad faces. The main effect of attachment anxiety, $\beta = -.15$, $p > .10$, as well as the interaction effect of anxiety and avoidance, $\beta = -.07$, $p > .10$, did not reach

significance. The analysis on the NAP score for *happy faces* revealed no significant unique or interactive effects of attachment anxiety and avoidance, all β's < .10, p's >.10.

Discussion

The pattern of results in the present study was highly similar to that observed in the previous study, especially in relation to attachment avoidance. Most importantly, we found that the NAP-effect for emotional information was dependent on the valence of the presented stimuli and the attachment style of the individual. That is, the more avoidantly attached individuals showed increased inhibitory responding only with regard to faces signaling sadness. No such increase in inhibitory control could be observed for the happy faces. These results fit with the idea that the inhibitory biases associated with attachment avoidance impair the detection of other's distress as a means to keep emotional material out of awareness. Again, no relationship was found between attachment anxiety and inhibitory processing of negative affective stimuli. Furthermore, contrary to the previous study, attachment anxiety did not relate to attentional inhibition of happy faces.

General Discussion

The primary aim of the present research was to examine the role of cognitive inhibition of emotional stimuli as a function of attachment style. For this purpose, we used a NAP task presenting negative and positive face expressions, allowing us to measure inhibitory processing as an early attentional mechanism that operates in a relatively automatic way. Across two studies, we found that attachment avoidance was associated with a stronger inhibition of negative emotional material. Attachment anxiety, on the other hand, showed no association with inhibitory responding to negative stimuli, although we did find indications of impaired inhibition of happy faces in Study 1.

The observed association between attachment avoidance and inhibition of negative stimuli supports the theoretical claim that attentional inhibition plays an important role in the

avoidant approach to emotion regulation. That is, by keeping emotional signals out of their focus of attention, avoidant individuals make it less likely that emotional experiences will become integrated into their memory. Such rigid inhibition may enable them to reduce the emotional impact of a triggering stimulus and as such limit further processing of negative emotional stimuli (Fraley & Burmbaugh, 2007; Fraley et al., 2000). This may prevent activation of attachment needs, thereby serving avoidant individuals' wish for independence, self-reliance and interpersonal distance (Diamond et al., 2006; Fraley & Shaver, 1997; Fraley et al., 2000). Using an attentional paradigm to investigate these inhibitory processes under conditions of automaticity, our results indicate that avoidant deactivating strategies operate at a relatively automatic level and thus early in the emotion-generative process, most likely before emotion-response tendencies have become fully activated (Fraley et al., 2000). Further research is needed to substantiate these claims by examining the predictive value of inhibitory functioning in relation to emotional responding and to explore the physiological correlates of cognitive inhibition.

Also noteworthy is that, whereas previous research has focused mainly on interpersonal *threat* signals as object of inhibition, the present results demonstrated that avoidant inhibitory responses are oriented towards different types of negative emotions. That is, avoidant individuals were found to inhibit not only the encoding of distress-eliciting information, but also signals of other's distress, which influences the nature and quality of their caregiving responses. Because any appeal for comfort and reassurance invites the kind of intimacy they wish to avert, avoidant individuals may be inclined to inhibit the processing of cues that signal a need to be taken care of (i.e., sadness). Such deficiencies in the processing of other's emotions, coupled with a strong need for independence and autonomy, may interfere with their ability to show empathic and compassionate reactions (e.g., Mikulincer, Shaver, Gillath, & Nitzberg, 2005; Mikulincer et al., 2001). This may have deleterious effects

on the emotional climate of their relationship because negative reactions on the part of their relationship partners may confirm avoidant individuals' negative beliefs about social interactions.

Another interesting result on attachment avoidance is that the regulatory strategies of avoidant individuals were found to be specifically oriented towards inhibiting cues of rejection and distress. This, however, does not fit well with other research showing that deactivating strategies limit the processing of any emotional material, both positive and negative, that makes salient attachment needs (Edelstein, 2006; Edelstein & Gillath, 2008; Niedenthal, Brauer, Robin, & Innes-Ker, 2002). Yet, this divergence in results may partially be explained by the methodological differences between our study and previous studies examining emotional processing biases in the context of attachment. That is, other studies relied on other types of tasks (emotional Stroop, morph movie paradigm) and stimuli (words versus pictures), which impairs a direct comparison across studies.

The pattern of results on inhibitory functioning was notably different for attachment anxiety. Unexpectedly, we did not find a relationship between attachment anxiety and inhibition of negative facial expressions, not even in interaction with attachment avoidance. On the one hand, these results oppose the theoretical claim that anxious individuals lack the regulatory capacities necessary to inhibit negative emotional information, which was assumed to underlie their heightened emotionality and tendency to ruminate on negative thoughts and feelings (Brennan & Shaver, 1995; Mikulincer & Shaver, 2007). On the other hand, our results do seem in line with other research failing to find a relationship between inhibition-related functions and attachment anxiety (e.g., Edelstein, 2006; Edelstein & Gillath, 2008; Fraley et al., 2000; Gentzler & Kerns, 2006). In relation to this, it is noteworthy that, so far, no support has been found for the important theoretical prediction that anxious individuals are hypervigilant towards negative emotional stimuli. Instead, research has shown that, especially

in combination with high scores on attachment avoidance, anxious individuals tend to redirect their attention away from negative emotional stimuli (Dewitte & De Houwer, 2008; Dewitte et al., 2007). The fact that anxious individuals show no indication of increased vigilance or impaired inhibition towards negative emotional information seems difficult to reconcile with the common finding that they do report heightened distress responses (e.g., Brennan & Shaver, 1995; Pietromonaco & Feldman Barrett, 1997). One possible explanation could be that anxious individuals are not characterised by facilitated processing at the level of selective attention, but rather by biases in more strategic, elaborative processes. That is, motivational tendencies may likely influence their expression and reports of distress in the service of affect regulation. Because of their negative self-view, anxious individuals are highly dependent on others for help with regulating distress, which may cause them to exaggerate emotions that emphasize their neediness and vulnerability (Mikulincer & Shaver, 2007). Reaction time tasks, such as the one used in the present study, are less sensitive to such strategic processes. Furthermore, based on the semantic content of the items measuring attachment anxiety - which focus on worrying and negative emotional events - there could be a bias toward linking attachment anxiety to reports of negative affect. In any case, it will be important for future research to explore how attentional mechanisms relate to higher-order cognitive processes, such as interpretation, memory, and ruminative thinking, in order to gain clearer insight into the emotion regulation strategies of anxious individuals.

The results on attachment anxiety in Study 1 also indicated difficulties with inhibiting positive emotional information. This result could, however, not be replicated in the second study and, therefore, no firm conclusions can be drawn based on this finding. One could, however, argue that the difference in results between Studies 1 and 2 can partially be explained by contrast effects. That is, research has shown that facial expressions are judged with respect to the context of other emotions (e.g., Manstead, Wagner & MacDonald, 1983).

Hence, given that happy faces were contrasted against different emotions in Studies 1 (angry) and 2 (sad), the effects of both studies may not be comparable. In any case, given that attachment strategies have been developed in the context of distress and thus mainly serve distress-alleviating functions, most research has thus far focused on regulatory processing of negative affect. As a result, much less is known about the regulation of positive affect as a function of attachment style. Because positive emotions are likely to assist in mood regulation and in shaping or enhancing attachment bonds, more work is needed on the moderating role of attachment strategies in the processing of positive emotional stimuli.

Although this study did further our knowledge on the role of attentional inhibition as a function of attachment style, there are a few issues that may complicate the interpretation of our findings. First, we need to be careful in drawing firm conclusions on the interrelation between attentional inhibition and attachment avoidance, because such conclusions are based on a correlation. Hence, we cannot make inferences about the causal role of attentional inhibition in determining avoidant defensive reactions. Secondly, researchers have pointed to several confounds in the design of the NAP task that may cause difficulties in interpreting the overall NAP-effect (e.g., Joormann, 2004; for a more detailed overview of possible confounds in the NAP task, see Frings & Wentura, 2008). Yet, in our study, we focused on interindividual differences in NAP-effects and the way in which these are correlated with interindividual differences in attachment style. These correlations fit with theoretical expectations, but defy a reasonable interpretation in terms of general confounds that, in fact, can bias only the direction and magnitude of the NAP-effect as averaged over a group of participants. Finally, we need to acknowledge the current debate on the processes underlying negative priming, and thus also negative affective priming. In addition to the inhibition account of Tipper (1985, 2001), the NAP effect could also be explained in terms of the prime distracter causing interference in response to the probe target through retrieval processes

(Neill, Valdes, & Terry, 1995). Although both accounts are well-evidenced, the present results seem most consistent with an inhibition perspective, because the memory account would predict a smaller NAP effect in the case of attachment avoidance, instead of a larger NAP effect as we observed. That is, drawing on the idea that avoidant individuals exclude negative affect from memory (e.g., Edelstein, 2006; Mikulincer & Orbach, 1995), it could be assumed that the negative prime distracters would cause less interference on the probe trials, resulting in a smaller delay or NAP effect compared to control trials, which was not the case in the present study.

In conclusion, our findings consistently demonstrated that attachment avoidance is characterized by a stronger inhibition of negative emotional stimuli. Rigid inhibitory mechanisms of selective attention may provide an explanation for a range of emotional-cognitive symptoms associated with attachment avoidance (e.g., attenuated emotionality, fewer recall of attachment experiences). This avoidant strategy may be reinforcing in the short run, but it is maladaptive in the long run, because it interferes with habituation to threat, has negative consequences for social interactions, and eventually maintains anxiety and insecurity. That is, attentional biases influence higher-order cognitive processes, which has consequences for biases in beliefs and expectations which, in turn, influence attention. Accordingly, attentional biases can function as positive feedback loops, becoming increasingly resistant to change and associated with increasingly dysfunctional emotions and behaviour. Because attachment theory puts great emphasis on attentional processes for developing and maintaining attachment insecurity, further experimental research into the functional role of inhibitory mechanisms is necessary to better understand the source of emotional dysregulation in insecure individuals.

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Table 1

Control and experimental trial-sequences for negative and positive trials in the NAP task

	Negative trials		Positive trials	
	Control	Experimental	Control	Experimental
Prime Trial				
Distracter	+	-	-	+
Target	+	+	-	-
Probe Trial				
Distracter	N	N	N	N
Target	-	-	+	+

+ happy facial expression, **-** angry (Study 1) or sad (Study 2) facial expression, **N** neutral facial expression.

Table 2

Mean reaction times (in ms) and standard deviations of target responses in the NAP task as a function of the type of trial-sequence in Studies 1 and 2

Type of Trial Sequence	*M*	*SD*
Study 1		
Negative control	802.63	127.31
Negative experimental	817.32	137.03
Positive control	814.86	143.72
Positive experimental	823.25	140.25
Study 2		
Negative control	845.41	132.28
Negative experimental	850.28	124.98
Positive control	831.86	124.31
Positive experimental	853.94	131.77

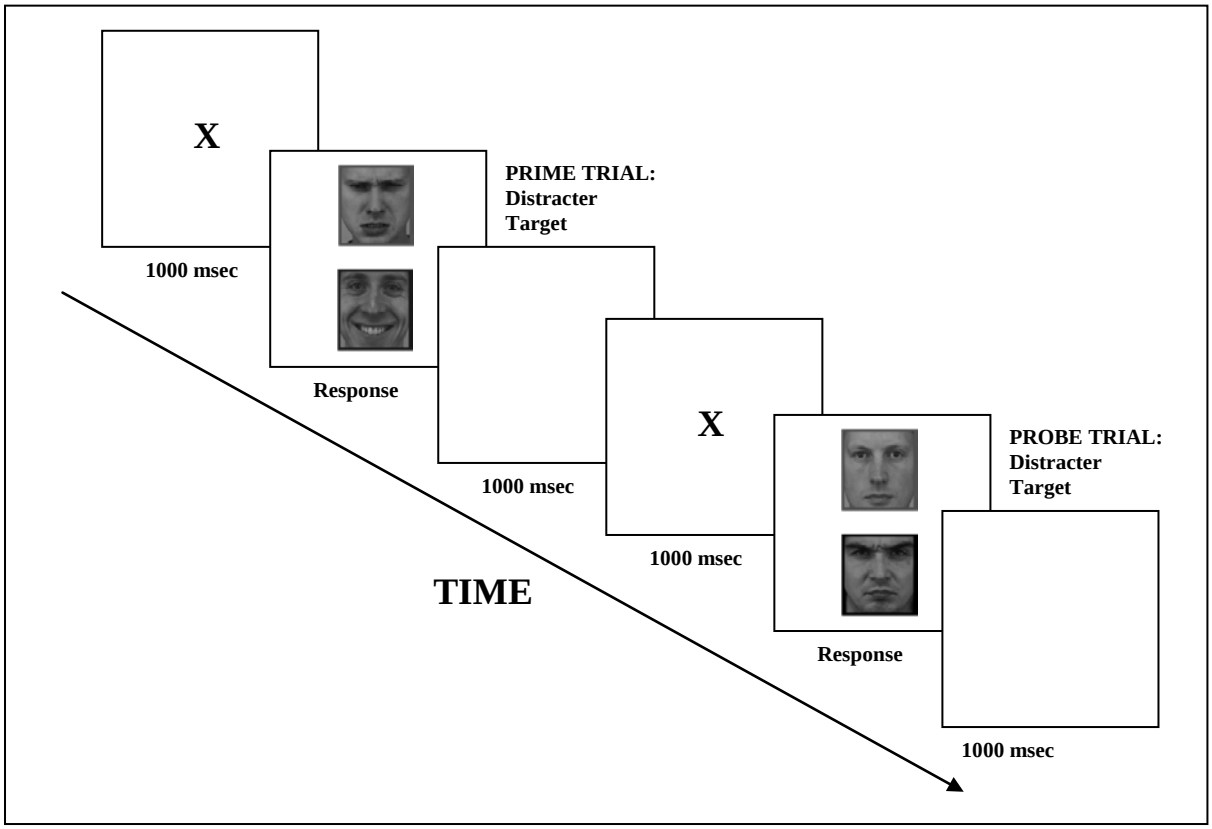

Fig. 1. Negative Affective Priming Design: Succession of a Prime and Probe Trial.