

## Activation of the attachment system and mentalization in depressive and healthy individuals – an experimental control study

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From a developmental and clinical point of view attachment theory and mentalization are closely connected and have become increasingly important to understand the origins of psychopathological development. However, very little is known about how exactly different inner working models of attachment are related to diverse mentalizing abilities and this is particularly true for adult populations – healthy as well as clinical populations. In the present study we investigated this relation with a sample of inpatients diagnosed with depression and a sample of healthy individuals. In an experimental setting the attachment system was activated using the Adult Attachment Projective Picture System (AAP). Mentalization was assessed during activation and in comparison to a control condition using a modified version of the Reading the Mind in the Eyes Test (RMET). We expected that an activation of the attachment system i) diminishes the capacity to take another’s perspective in individuals with unresolved state of mind, ii) has no impact in individuals with secure attachment representation and iii) is dependent of clinical status in individuals with insecure (but organized) working models of attachment. Overall, these hypotheses were confirmed. However, the impact of clinical status on mentalization in insecure attachment has to be further explored. We summarize that attachment state of mind has a mediating influence on mentalization basically in such situations where the attachment system is activated.

Keywords: *working model; mentalization; attachment*

Attachment theory (Bowlby, 1969) provides an important theoretical background for understanding psycho(patho)logical development (Dozier, Stovall-McClough, & Albus, 2008). The attachment system highly influences interpersonal perception and emotion regulation (Bretherton & Munholland, 2008). While secure attachment is considered to buffer from toxic levels of stress, insecure attachment representations in adulthood have been shown to be associated with the use of less adaptive strategies to regulate emotions in

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stressful situations (Mikulincer & Shaver, 2008). Consequently, attachment insecurity increases vulnerability whereas attachment disorganization constitutes high risk for psychopathologic development (e.g. Dozier, Stovall-McClough, & Albus, 2008; Fonagy et al., 1996; van IJzendoorn et al., 1997). Insecure, and in particular disorganized inner working models of attachment, are highly more prevalent in clinical samples. A meta-analysis by Bakermans-Kranenburg & van IJzendoorn (2009), investigating distribution of attachment classification in adults, revealed that in clinical samples a large majority (77%) of individuals had been classified insecure and almost half (43%) “unresolved with respect to trauma” (attachment disorganization). The authors summarize that in any clinical sample included in their meta-analysis, the unresolved attachment classification appears overrepresented compared to healthy control groups. This is true also in samples with depressed individuals but percentage of unresolved classifications is reported lower with ‘only’ 22%. With 52%, insecure classifications (dismissing as well as preoccupied attachment representations) are highly more prevalent in depressive patients. These insecure strategies vary primarily along the dimensions to minimize or maximize the expression of attachment needs. Whereas attachment disorganization is seen as a core concept to understand psychopathology in general (Solomon & George, 2011), mood disorders tend to show a complex combination of dismissing and preoccupied strategies (Dozier et al., 2008).

Strongly related to attachment theory, the concept of mentalization, described by Fonagy et al. (2002), provides an explanatory framework for the relationship between emotion regulation, perspective taking and psychopathology. Fonagy et al. (2002) have offered a profound developmental model associated with the quality of early attachment relationships for the explanation of origins and symptomatology, especially of Borderline Personality Disorder (BPD). It focuses on the ability of mentalization: to identify own and other mental states in order to understand behavior as meaningful (Fonagy, Gergely, Jurist, & Target, 2002). The development of mentalization in childhood is highly mediated by the internalization of early experiences with primary caregivers. Based on this developmental model, mentalization and attachment quality would be assumed to be still closely associated in adulthood. A more profound knowledge of the mechanisms underlying this linkage in adulthood could deepen our understanding of psychopathology and social functioning in general.

## DEVELOPMENT OF ATTACHMENT AND MENTALIZATION

Inner working models of attachment are mental representations based on internalized early attachment related experiences with caregivers. They represent the internal organization of the attachment system, when activated and serve to regulate, interpret and predict attachment related behavior, thoughts and feelings. The expectation that own affective states are changeable and can be regulated reliably and flexible, is the core of a secure inner working model. An

insecure but organized working model in contrast offers functional, but rather inflexible regulation strategies. When the inner working model of attachment becomes disorganized, no functional strategy to regulate emotions is available and self-efficacy is not given in order to reduce attachment distress. Any of these mental representations remain relatively stable throughout the life span and show strong resistance to change (Bretherton & Munholland, 2008) even in transgenerational transmission. Moreover, correspondence rates up to 75% have been reported between the child's behavioral attachment pattern and the caregiver's attachment representation when assessed prospectively during pregnancy (van IJzendoorn, 1995; Fonagy et al., 1991; Steele, Steele, & Fonagy, 1996; Ward & Carlson, 1995). The concept of mentalization, that, importantly, also involves the caregiver's capacity to treat the child as a mental agent, clearly shows a mediating function for understanding the mechanisms underlying this transmission (Grienenberger, Kelly, & Slade, 2005). Secure attachment is promoted by a caregiver, who is able to „hold the baby's mind in mind“ (who represents the infant as an autonomous psychological agent) (Fonagy et al., 1991; Grienenberger et al., 2005; Slade, 2005). A reflective caregiver adequately identifies the child's inner states, while mirroring and returning it in a “marked” way (to designate it as the child's and not her own). This “affect-mirroring” is seen as crucial in the child's acquisition of the ability to regulate emotions autonomously and flexible (Gergely & Watson, 1996; Bokhorst et al., 2003; Grienenberger, Kelly, & Slade, 2005).

Beside their importance for the emotional development these ‘reflective’ interaction patterns of affect mirroring also influence the infant's cognitive abilities. Securely attached children and also children of mothers classified as secure-autonomous in the Adult Attachment Interview (George et al., 1985) before birth can solve theory of mind tasks earlier than insecurely attached children (Meins et al., 2002). Theory of Mind abilities can be seen as the cognitive fundamentals of mentalization (Juen & Fizke, 2010), sometimes both terms are even used synonymously (Frith & Frith, 2003). Insecure and disorganized attachments in childhood on the other hand enhance the risk of psychopathological development (Lyons-Ruth & Jacobvitz, 2008). Mental illness is reported to be associated with disorganized attachment representations (Allen, Hauser, & Borman-Spurell, 1996, Dozier et al., 2008) and with reduced mentalizing abilities (Fonagy et al., 1996, 2002; Fonagy & Luyten, 2009) especially in patients with BPD. For depression, Fischer-Kern et al. (2008) report less capacity in patients with moderate to severe depression. This sample also included patients with substance dependency (20%) and psychosis (25%). Taubner et al. (2011) found no such general effect in patients with chronic depression, but the authors report lower mentalizing abilities concerning issues of loss, which is in line with our assumption concerning the link between attachment activation and mentalization (see below). Overall, it becomes obvious that attachment and mentalization are associated and influence each other within interactive relationships from early childhood and even across generations.

## ATTACHMENT REPRESENTATION, AFFECT REGULATION AND MENTALIZATION IN ADULTHOOD

Fonagy & Luyten (2009) discussed a neuronal decoupling mechanism, which leads to an inhibition of mentalizing processes during the activation of the attachment system (Fonagy & Luyten, 2009; Fonagy & Bateman, 2008). How, precisely, different working models of attachment are associated with mentalization and what mechanisms underlie this association yet remains rather unclear. Based on Bowlby's (1980) descriptions of different defenses and recent findings concerning attachment strategies (Mikulincer & Shaver, 2008), some assumptions about this association can be derived:

A secure inner working model in adulthood is characterized by a stable trust in the availability of others and of an "internalized secure base" (George & West, 2012). This includes a capacity to think about mental states and to actively and flexibly regulate attachment distress (Fonagy et al., 2002). Therefore, the threshold for an activation of the attachment system is high and mentalization is assumed to be rather unaffected by attachment activation.

Insecurely attached individuals are less confident regarding the availability of attachment figures and of an "internalized secure base" and described as less flexible and effective in their regulation abilities (Main, 2000, Quirin et al., 2008). Following Bowlby (1980), insecure-dismissing individuals often emphasize autonomy, independence and strength in reaction to attachment distress and try to restrain the expression of their attachment needs. Main (2000) supposes that these individuals make use of rather inflexible forms of mentalization. Insecure-preoccupied individuals in contrast are characterized by intensifying the expression of attachment needs seeking anxiously for support and reassurance. Because of a low threshold for an activation of the attachment system and the high intrapsychic effort to remain organized functional mentalizing capacities are expected to be restrained.

Finally a disorganized attachment, also described as "unresolved loss or trauma" leads to a breakdown of the intrapsychic organization in threatening situations, because the individual lacks any functional regulation strategy to reduce attachment distress. These individuals are described to oscillate between extreme de- and hyperactivation (Fonagy & Bateman, 2008) and mentalizing activities are assumed to be impaired because mental states of others are perceived as threatening (Fonagy et al., 2002, Fonagy & Luyten, 2009).

## MENTALIZATION AND THE ACTIVATION OF THE ATTACHMENT SYSTEM

The "Reflective Self Functioning Scale" (RF-Scale; Fonagy, Target, Steele & Steele, 1998) is a common measure to assess mentalizing abilities in adults. Respecting the close link between attachment and mentalization, the Scale is applied to narratives of attachment relevant themes during the Adult Attachment

Interview (AAI, George, Kaplan, & Main, 1984; 1985; 1996), which is assumed to gradually activate the attachment system. But because of this characteristic context of assessment, it remains unclear if a revealed deficit in mentalization manifests only under attachment activation (distress condition) or even when attachment system is deactivated and the individual is ready to explore. If the latter, this deficit might also be explained by other (eventually more general) cognitive impairments.

Our suggestion is that in neutral situations (virtually) all humans possess a basic and automatic ability of cognitive and emotional perspective taking (Apperly & Butterfill, 2009). Individual differences, however, become manifest when the situation is personally and emotionally affecting in terms of attachment needs and demanding for affect regulation abilities. This attachment related manifestation might also explain the results by Taubner et al. (2011), revealing lower RF-scores for chronically depressed patients than for controls only in statements concerning issues of loss, supporting the assumption that personally relevant attachment themes lead to affective arousal which is difficult to regulate, thereby causing a decrease in mentalizing abilities. To address this assumption it is necessary to activate the attachment system under experimental control and assess mentalization not only in attachment relevant but also in non-attachment situations. In a current study by Nolte et al. (2010) mentalization was assessed using an extended version of the “Reading the mind in the Eyes Test“ (RMET; Baron-Cohen, Wheelwright, & Hill, 2001) and fMRI, having stimulated attachment distress or normal distress (not associated with other persons) before. Attachment distress but not other distress led to a significant decrease in the number of correct answers, an increase in reaction time and a deactivation of brain areas that have been associated with mentalization.

## THE PRESENT STUDY

In the presented study we investigated the effect of an activation of the attachment system on mentalization comparing the accuracy of emotion ratings both during attachment activation and in a control condition in healthy and depressed individuals. Moreover the inclusion of a clinical sample is of interest: First, we know little about mentalizing abilities in clinical samples while experimentally controlling attachment activation. Second, we assume that a decrease in mentalizing ability during attachment activation is dependent of functional and effective affect regulation abilities, which are symptomatically impaired in clinical samples. To obtain information about the association of different inner working models and mentalization also in clinical samples, depressive patients are of interest because of the reported differentiated distribution of attachment including dismissing and preoccupied attachment. To activate the attachment system we applied the „Adult Attachment Projective Picture System“ (AAP) (George & West, 2012). This projective test reliably assesses internal working models of attachment. In the control condition we replaced the AAP

picture stimuli by other neutral stimuli. Emotion recognition, as one of the core features of mentalization, was assessed using a modified version of the Reading the mind in the Eyes Test (RMET; Baron-Cohen et al., 2001).

## Hypotheses

Following Fonagy's and Luyten's (2009) theory of a decoupling effect of attachment activation on mentalization, we expected that activation of the attachment system would lead to differential effects on mentalizing capacities, depending on the quality and organization of the inner working model of attachment. In particular, we expected activation of the attachment system to lead to (1) decreased mentalizing abilities in individuals with unresolved state of mind, (2) a stronger inhibition of mentalizing capacities in depressed patients rather than in healthy individuals in individuals with insecure but organized inner working models of attachment (dismissing and preoccupied) and (3) no effect on individuals with secure internal working model, at least in the healthy population. (2) was predicted because depressed patients show a clinically significant deficit in affect regulation combined with their insecure attachment strategies. Whereas in insecure but healthy individuals, those regulation strategies may still be functional, in depressive patients affect regulation is apparently dysfunctional. Regarding secure individuals (3), we supposed their threshold for activation of the attachment system to be higher and their affect regulation abilities to be efficient and flexible, eventually even independent of clinical status, enabling them to maintain mentalizing capacities.

## Method

**Participants.** 51 individuals participated in the study. 28 (54%) were diagnosed with a depressive episode following ICD-10 criteria and 23 were healthy individuals (14 females in each group). Inpatients were recruited in a Clinic for Psychosomatic Medicine and Psychotherapy. Individuals with personality disorders were excluded from the study. Healthy participants were recruited in university and (as surveyed by self-report) had never suffered from any mental illness nor have been in psychotherapeutic treatment. Mean age was 23 years ( $M = 23.13$ ,  $SD = 5.15$ ,  $range = 16-45$  years) in the clinical group and 30 years ( $M = 30.14$ ,  $SD = 8.32$ ,  $range = 18 - 43$  years) in healthy individuals.

**Design.** Each participant was tested in two analogous sessions by a single experimenter (one week interval, 30-50 minutes each session). Activation of the attachment system was manipulated in a within-subject design by administering the AAP procedure using either the eight AAP picture stimuli (George & West, 2012; see Figure 1 for examples) or (with parallelized instruction) eight neutral picture stimuli instead (see Figure 2 for examples). The warm-up picture was the same in both conditions. Additionally, in both sessions, participants were presented with a randomized selection of 32 photographed pairs of eyes of a modified version of the RMET to measure their emotion recognition ability (see Figure 4). The order of the AAP/Neutral pictures was fixed. Of the 64 eyes stimuli, 32 were randomly selected for the first session and then randomly divided into eight blocks of four photographs. Each block was presented after the participant had completed a narrative to a picture stimulus. The other 32 "pairs of eyes" were used the same way for the second session. Order of conditions

(attachment activation or control) in the two sessions was counterbalanced in each sample. Sessions were audiotaped and narratives to the AAP stimuli were transliterated in order to classify attachment. Informed consent was given by all participants. Ethical approval for the clinical patients was given by local committee.

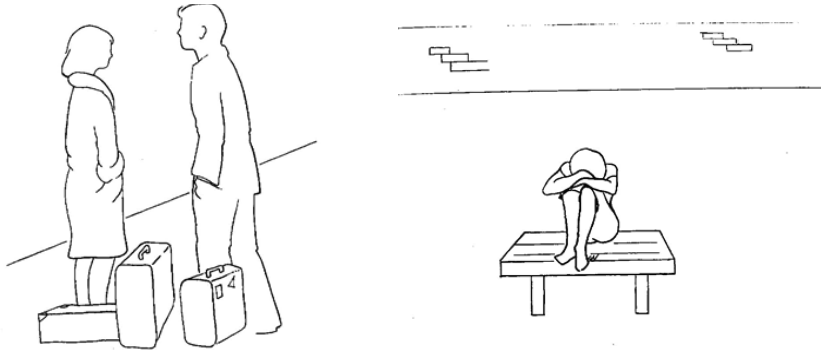


Figure 1. Examples of the picture stimuli used in the AAP condition.

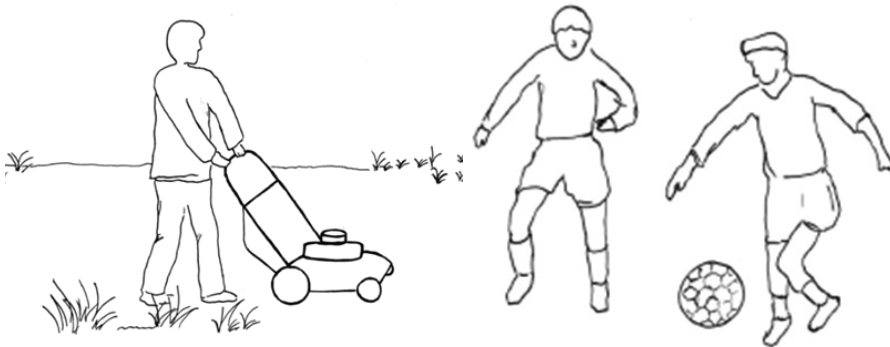


Figure 2. Examples of the picture stimuli used in the neutral control condition.

### Measures

*Attachment representation.* The Adult Attachment Projective Picture System (AAP, George et al., 1999; George & West, 2012) is a reliable and valid measure of attachment representations for adults. The measure consists of eight drawings, presenting one neutral scene for warm-up (ball playing children) and seven attachment related scenes (for example illness, separation, solitude, death or threat) as determined by attachment theory (Bowlby, 1973). The interviewee is asked to describe what is happening in each picture, what led up to the scene, what the depicted persons are thinking or feeling, and what might happen next. The AAP coding system evaluates content and process elements of the narrated attachment stimuli responses (see George & West, 2001; 2012 for a comprehensive description of the AAP coding and classification system). Transcripts are classified into one of the four standard adult attachment categories: secure (F), insecure-dismissing (Ds), insecure-preoccupied (E) and unresolved (U). Secure attachment is characterized by integrated agency of self, connectedness and synchrony combined with the capacity to contain dysregulated fear. Dismissing attachment

is identified by representations of the self in terms of functional attachment and relationships with little or no evidence of the capacity for integration, combined with a prevalence of deactivating defense. Preoccupied attachment is characterized by functional attachment with little or no evidence of the capacity for integration, combined with a prevalence of cognitive disconnecting defense associated with heightened emotional arousal. Unresolved attachment is identified by attachment dysregulation produced by the failure of integrated and functional representations of the self to contain or reorganize segregated system material. Psychometric properties of the AAP are excellent (George & West 2001, 2004, 2012). The accordance with the Adult Attachment Interview (George et al., 1985, Main & Goldwyn 1985–1996), an established measure to assess attachment representation (see George & West, 2012, Buchheim & George, 2012) show convergent validity for the four major attachment groups of 90% ( $\kappa = .84, p < .000$ ). Convergent agreement for two group classifications was 97% ( $\kappa = .88, p < .000$ ). AAP transcripts in the present study were rated by a certified and reliable judge. A second independent judge rated 24% random selection of 12 transcripts for reliability, which was 91.7% ( $\kappa = .88$ ).

*The neutral interview procedure.* Neutral drawings were parallelized to the AAP pictures regarding number and details of the depicted characters and style of drawing (e.g. no visible facial expressions, see Figure 2). Situations were chosen that are theoretically not expected to activate the attachment system (flying a kite, riding the bicycle, mowing the lawn, sailing, soccer match, painting, drinking coffee, playing a model railway). In a preliminary validity check, 20 individuals independently rated the (randomly presented) 16 pictures (eight AAP and eight neutral pictures). Participants were asked to rate how emotionally draining they evaluate each picture on a scale from 1 = “little” to 5 = “very much”. One neutral picture was thereafter excluded from the study because it seemed to elicit attachment distress. The evaluation confirmed that AAP pictures (except the warm-up picture) were perceived as significantly more emotionally draining than the designed neutral drawings (Wilcoxon test,  $Z = 3.83, p < .001$ , see Figure 3).

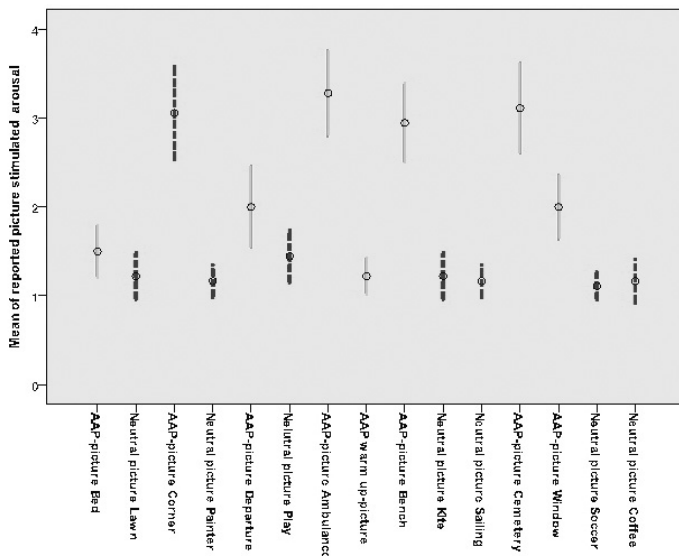


Figure 3. Means and standard deviations of subjective picture stimulated arousal by AAP and neutral stimuli. Taken together AAP pictures (excluding warm-up) were rated as significantly more emotionally draining than neutral stimuli (Wilcoxon–test,  $Z(20) = 3.83, p < .001$ ).



*Mentalization/Emotion Recognition* (see Figure 4). By measuring the ability of individuals to recognize emotions, we intended to investigate one of the core elements of mentalization (while being aware that we only catch some of its aspects) which is testable in a controlled experimental setting. The emotion recognition task used was an extended and modified version of the Reading the Mind in the Eyes Test – RMET (Baron-Cohen et al., 2001). The RMET is a measure for the capacity to deflect the mental state of others from expressions in the eye region of the face. This measure is widely used in Theory of Mind research and is sensitive to slight impairments in social intelligence as in Asperger syndrome or “high functioning autism (Baron-Cohen et al., 2001). In our application each participant received 64 different black-and-white photograph cards (12x15cm) in total: in each condition 4 after the warm-up picture, that were not included in the measure and 4 after each of the 7 AAP/Neutral pictures (28 in each session). Participants were asked to choose the right wording for a description of the expressed emotion out of four alternatives (Figure 4). For the 28 resulting trials correct answers were accumulated in order to create an accuracy score for each condition. Of the 64 photograph stimuli, 36 originated from the German Version of the RMET (Baron-Cohen et al., 2001). The remaining 28 stemmed from a study of Nolte et al. (2010) and displayed the correct word and three distractors. One distractor was translated into German and 2 additional distractor adjectives were added. In a preliminary analysis with 16 individuals item difficulty of all stimuli was assessed. Only items with an accuracy rate of 50–90% were included in the main study. The number of original and additional RMET stimuli was parallelized in both sessions, as was the number of male and female eyes stimuli.

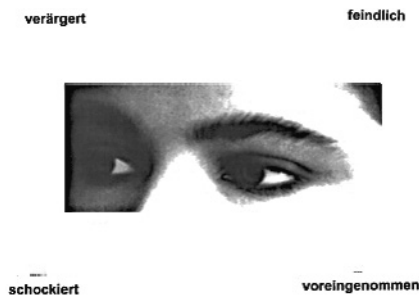


Figure 4. Example of the used photograph cards for assessment of emotion recognition.

## Results

*Attachment classification, gender and age.* For distribution of attachment representations in both samples see Table 1. Samples did not differ in distribution of attachment classifications ( $\chi^2(3) = 4.44, p = .23$ ). Analyses revealed no gender differences between the two samples ( $\chi^2(1) = .603, p = .44$ ) and no gender differences in the 4 different attachment groups ( $\chi^2(3) = 3.43, p > .35$ ). Overall, the samples differed significantly in age (Mann-Whitney-U test,  $Z(51) = 3.09, p < .01$ ). In the different attachment subgroups age differences between patients and controls occurred only in the composite insecure-organized group (Ds and E; Mann-Whitney-U test,  $Z(27) = 2.49, p < .013$ ) and in the dismissing and preoccupied group alone on a significance level of  $\alpha = .20$ . No age differences were found between the different attachment subgroups in the clinical nor in the healthy sample (Kruskal-Wallis test,  $H < .709, p > .69$ ).

Table 1. *Distribution of attachment classification in in-patient and control sample*

Group <sup>1</sup>	Secure (F)	Insecure-dismissing (Ds)	Insecure-preoccupied (E)	Unresolved (U)
Controls (23)	7 (30,4%)	9 (39,1%)	1 (4,3%)	6 (26,1%)
In-patients (28)	5 (17,9%)	10 (35,7%)	7 (25,0%)	6 (21,4%)

<sup>1</sup> samples do not differ significantly in distribution of attachment classifications ( $\chi^2(3) = 4.44, p > .23$ ).

*Measurement points.* To proof independency of the emotion recognition accuracy scores and time a t-test between measurement points was conducted and revealed no difference in emotion recognition accuracy scores between t1 and t2 ( $t(50) = .41, p = .69$ ). This also held for all subgroups (Wilcoxon tests,  $p > .40$ ).

*Main analysis*<sup>1</sup>. Because of small sample sizes in the subgroups non-parametric Wilcoxon- and Mann-Whitney-U tests were conducted. Table 2 shows means and standard deviations of accuracy scores in the modified RMET for each subgroup. Emotion recognition accuracy score between Control group and Clinical group only differed significantly in the attachment activation condition (Mann-Whitney-U test,  $Z(51) = -2.53, p < .05$ ) but not in the neutral condition ( $Z(51) = -.83, p = .41$ ).

Table 2. *Means and standard deviations of accuracy scores in emotion recognition*

Group <sup>1</sup>	Control Condition (C)	AAP Condition (A)	Difference  C - A	Z	P
Controls (23)	19,17 (2,62)	19,39 (2,21)	0,22 (-2,63)	-.43	.67
F (7)	20,14 (1,07)	19,71 (1,25)	0,43 (1,90)	.41	.68
Ds + E (10)	17,40 (2,72)	19,50 (3,06)	-2,10 (2,02)	-2.40	.016*
U (6)	21,00 (2,00)	18,83 (1,47)	2,17 (2,04)	1.89	.029*
In-patients (28)	18,57 (2,90)	17,50 (2,94)	1,07 (3,29)	1.48	.14
F (5)	19,20 (1,79)	18,60 (3,71)	1,07 (3,29)	-.37	.71
Ds + E (17)	17,65 (3,20)	16,82 (2,63)	0,82 (3,23)	1.01	.166
U (6)	20,67 (1,21)	18,50 (3,08)	2,17 (2,93)	1.58	.057+
All (51)	18,57 (2,90)	17,50 (2,94)	1,07 (3,29)	-.98	.33
F (12)	19,75 (1,42)	19,25 (2,49)	0,50 (2,94)	.06	.95
F, Ds, E (39)	18,23 (2,78)	18,26 (2,93)	-0,03 (3,07)	-.34	.74
U (12)	20,83 (1,59)	18,67 (2,31)	2,17 (2,41) <sup>2</sup>	2.41	.008**

\*\*p < .01 \* p < .05 + p < .10

*Disorganized versus organized attachment representation* (see Figure 5). Concerning the first hypotheses – the impact of attachment activation on emotion recognition in individuals with attachment (dis)organization – one tailed Wilcoxon tests revealed significantly less accurate emotion ratings in the attachment activation condition compared to the control condition of individuals classified unresolved

<sup>1</sup> p values reported are two tailed, unless stated otherwise; p values were calculated one tailed only when testing directional hypotheses

( $Z(12) = 2.41, p < .01, one\ tailed$ ). This decrease held both for controls ( $Z(6) = 1.89, p < .05, one\ tailed$ ) and in-patients ( $Z(6) = 1.58, p = .057, one\ tailed$ ) separately. Moreover, this decreasing effect of attachment activation was significantly higher for disorganized than for organized (F, Ds and E) individuals ( $Z(51) = 2.40, p < .01, one\ tailed$ ). Additional analyses revealed the interesting result that in the neutral condition emotion recognition accuracy score of individuals classified as disorganized is significantly higher than in organized individuals (Mann-Whitney-U test,  $Z(51) = 3.11, p < .01$ ) decreasing to a similar level as the score of organized individuals in the attachment activation condition:  $Z(51) = .37, p = .71$ .

*Insecure-organized attachment representation (Ds and E).* As hypothesized, for the insecure organized subgroups an interaction effect of in-patient (N = 17) vs. control (N = 10) and condition (AAP vs. control) was observed: In-patients with insecure but organized attachment representation show a non significant difference in emotion recognition between conditions (Wilcoxon test,  $Z(17) = 1.01, p = .16, one\ tailed$ ). Unexpectedly, insecure organized controls made more accurate emotion ratings in the AAP condition (Wilcoxon test,  $Z(10) = -2.40, p < .05$ ) (Note that in this group nine out of ten individuals were classified dismissing). Calculating the difference between control and AAP condition as a dependent variable, this interaction effect was confirmed (Mann-Whitney-U test,  $Z(27) = -2.18, p < .05, one\ tailed$ ). In other words: as expected, only in the attachment activation condition insecure organized in-patients made less accurate emotion ratings than controls (Mann-Whitney-U test,  $Z(27) = -2.63, p < .01, one\ tailed$ ), whereas in the control condition no significant difference was found ( $Z(27) = .08, p = .94$ ).

*Secure attachment representation.* Individuals with a secure inner working model of attachment did not show any significant difference in the emotion recognition accuracy scores between conditions (Wilcoxon test,  $Z(12) = .06, p = .95$ ). This held separately for both secure controls and in-patients ( $p > .68$ ). No difference was found between secure controls and secure in-patients in neither condition ( $p > .36$ ).

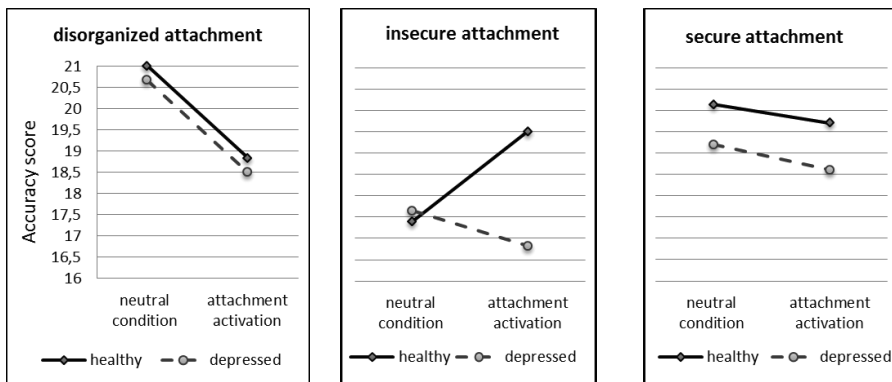


Figure 5. Accuracy scores of emotion recognition in all subgroups

## DISCUSSION

This study explored the (decoupling) effects of attachment activation on emotion recognition in healthy and depressed individuals with different inner working models of attachment. In summary, it was shown that an activation of the attachment system significantly affects the ability to recognize emotions dependently of attachment status.

Individuals with an “unresolved attachment state of mind” showed a significant decrease in this mentalizing ability when the attachment system was activated compared to their ability when no emotional arousal was elicited. This was true for both depressive and healthy individuals. In contrast, individuals with an organized inner working model of attachment showed no such decrease. Interestingly, in a neutral context, emotion recognition ability was even higher in individuals with disorganized attachment. This result supports the assumption that these individuals possess the necessary mental (cognitive) abilities, but cannot maintain them in an (emotional arousing) attachment context. The activation of the attachment system in these individuals leads to emotions of fear and threat. Moreover, no regulating strategies are available to contain this arousal. In this emotionally threatening and arousing state normally present cognitive capacities might be blocked or at least distorted. This seems to be a core element of attachment dysregulation independent of the clinical status and may explain why emotional dysregulation is characterized by an inappropriate recognition of potentially threatening stimuli. The fact that in the neutral condition individuals with unresolved state of mind regarding attachment showed even higher emotion recognition abilities might be a sign of exceptionally high cognitive skills of perspective taking and a sensitivity for such social stimuli that are indicative for the behavior of others and may have signaled threat or danger during an earlier life span.

In individuals with insecure but organized inner working models of attachment effects on emotion recognition in the attachment activation condition were different for depressive patients and healthy individuals. The healthy control group even showed a significant increase in emotion recognition ability, whereas the clinical group showed a slight decrease. This supports the assumption that attachment insecurity in healthy individuals is a rather inflexible but still functional framework for affect regulation. Only when accompanied by other affect regulation deficits – as indicated by symptoms of depression in the clinical sample of this study – mentalizing capacities seem to become affected by activation of the attachment system. This is also indicated by the study of Taubner et al. (2011) where reflective functioning was impaired in depressive patients compared to controls but only regarding (personally arousing) statements of loss. The result that healthy individuals with deactivating attachment strategy increased their emotion recognition ability under activation of the attachment system, is not easy to interpret and has to be further explored and replicated in

future studies. It might be possible that deactivating individuals tend to avoid emotionally relevant stimuli, but engage in perspective taking processes when the context becomes more emotionally relevant.

In securely attached individuals – as expected – no significant effect on emotion recognition ability was found while the attachment system was activated. This supports the claim that in these individuals the threshold for an activation of the attachment system is higher and that secure attached individuals possess effective and flexible abilities to recognize and regulate their own and other affect.

The present study thus contributes to clarifying the nature of the relation between inner working models of attachment and mentalization. At the same time, however, the study faces several limitations and fundamental questions remain for future research:

There are several limitations regarding the comparableness of the samples, as they differ in age and size, however, it seems highly implausible that these overall differences between healthy and clinical subjects can account for the differentiated effects of attachment classifications, which were quite parallel for patients and controls except in the insecure attachment group. Here, of course age differences and also the fact that control subjects were all university students might have played a role and should be matched more carefully in future studies. First, the healthy control group showed a particularly high amount of deactivating insecure attachment strategies compared to other healthy individuals. This overrepresentation of deactivating strategies has been found before in other student samples and has not yet been systematically explored. Because of this overrepresentation, results concerning insecure strategies and emotion recognition ability under activation of the attachment system cannot be differentiated for the two insecure groups. In future studies, sample size would have to be increased in order to differentiate both types of insecure organized attachment representations (deactivation and preoccupied state of mind).

Second, future studies will have to differentiate between different psychic disorders. Depression – in contrast to Borderline or PTSD disorder – is not primarily characterized by attachment dysregulation (see introduction), but rather by entangled insecure strategies. Thus, the revealed decreasing effect on emotion recognition can be expected to be even stronger in BPD or PTSD patients and might be linked to personally significant attachment themes (e.g. loss in depressive patients).

Third, in this study we assessed only one – particular – mentalizing ability – the ability to recognize emotions in photographs. Even if we assume that this is one of the core elements of mentalization – many other perspective taking abilities remain to be explored in individuals with different inner working models of attachment and under activation of the attachment system. This concerns rather cognitive theory of mind abilities as well as emotional

perspective taking skills and also the capacity to recognize and differentiate own mental states – an ability that has been absolutely neglected in theory of mind research to date.

Finally, we know little about the precise mechanisms behind the observed effects. One open question concerns the specificity of attachment related arousal in contrast to other kinds of emotional arousal. It is far from clear if not all kinds of emotional arousal would lead to the inhibition of different kinds of mentalizing or even to the inhibition of many kinds of mental processes more generally. The observed effects in this study might be rather unspecific and due to limited processing capacities. Desirable for future research would be studies investigating the inner psychic and somatic (endocrine, neuronal etc.) effects of an activation of the attachment system in contrast to other emotion arousing situations, which might differentiate between different types of emotional arousal (attachment related and other types of arousal). Such studies would then have to be combined with the investigation of different mental abilities under emotional (attachment related) arousal.

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### REFERENCES

- Allen, J. P., Hauser, S. T., & Borman-Spurrell, E. (1996). Attachment theory as a framework for understanding sequelae of severe adolescent psychopathology: An 11-year-follow-up study. *Journal of Consulting and Clinical Psychology, 64*, 254–263.
- Apperly, I. A., & Butterfill, S. A. (2009). Do humans have two systems to track beliefs and belief-like states? *Psychological Review, 116*(4), 953–970.
- Bakermans-Kranenburg, M. J., & van IJzendoorn, M. (2009). The first 10,000 Adult Attachment Interviews: distributions of adult attachment representations in clinical and non-clinical groups *Attachment & Human Development, 11*(3), 223 – 263.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The “Reading the Mind in the Eyes” test revised version: A study with normal adults, and adults with Asperger syndrome or High functioning autism. *Journal of Child Psychology and Psychiatry, 42*, 241–252.
- Bokhorst, C. L., Bakermans-Kranenburg, M. J., Fearon, P., Van IJzendoorn, M. H., Fonagy, P., & Schuengel, C. (2003). The importance of shared environment in mother-infant attachment: A behavioral genetic study. *Child Development, 74*, 1769–1782.
- Bowlby, J. (1980). *Attachment and Loss*. Bd.3: *Loss, Sadness and Depression*. New York: Basic Books.
- Bretherton, I., & Munholland, K. A. (2008). Internal Working Models in Attachment Relationships: Elaborating a Central Construct in Attachment Theory. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2<sup>nd</sup> ed., pp. xxx-xxx). New York: Guilford Press.

- Dozier, M., Stovall-McClough, K. C., & Albus, K. E. (2008). Attachment and Psychopathology in Adulthood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2<sup>nd</sup> ed., pp. 718–744). New York: Guilford Press.
- Fischer-Kern, M., Tmej, A., Kapusta, N. D., Naderer, A., Leithner-Dziubas, K., Löffler-Stastka, H., & Springer-Kremser, M. (2008). *The capacity for mentalization in depressive patients: a pilot study. Z Psychosom Med Psychother*, 54(4), 368–80.
- Fonagy, P., & Bateman, A.W. (2008). The development of borderline personality disorder – a mentalizing model. *Journal of Personality Disorder*, 22(1), 4–21.
- Fonagy, P., & Luyten, P. (2009). A developmental, mentalization-based approach to the understanding and treatment of borderline personality disorder. *Developmental Psychopathology*, 21(4), 1355–1381.
- Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (2002). *Affect regulation, Mentalization and the Development of the Self*. Stuttgart: Klett-Cotta.
- Fonagy, P., Leigh, T., Steele, H., Steele, M., Kennedy, R., Mattoon, G., et al. (1996). The relation of attachment status, psychiatric classification and response to psychotherapy. *Journal of Consult Clinical Psychology*, 64(22–31).
- Fonagy, P., Steele, M., Steele, H., Moran, G., & Higgitt, A. (1991). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant Mental Health Journal*, 12, 201 – 217.
- Fonagy, P., Target, M., Steele, H., & Steele, M. (1998). *Reflective-Functioning Manual, version 5.0, for Application to Adult Attachment Interviews*. London: University College London.
- Frith, U., & Frith, C. D. (2003). Development and neurophysiology of mentalizing. *Philosophical Transactions of the Royal Society B*, 358, 459–473.
- George, C., & West, M. (2012). *The Adult Attachment Projective Picture System. Attachment Theory and Assessment in Adults*. New York: Guilford.
- George, C., Kaplan, N., & Main, M. (1984; 1985; 1996). Adult Attachment Interview protocol – unpublished manuscript. University of California.
- Grienenberger, J., Kelly, K., & Slade, A. (2005). Maternal reflective functioning, mother-infant affective communication, and infant attachment: exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment and Human Development*, 7(3), 299–311.
- Juen, F., & Fizke, E. (2010). Mentalisierung in der Kindheit – Entwicklung und klinische Erfassung in frühen Lebensjahren. *Psychodynamische Psychotherapie*, 9(4), 223–234.
- Lyons-Ruth, K., & Jacobvitz, D. (2008). Disorganized Attachment: Genetic factors, parenting contexts, and developmental transformation from infancy to adulthood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2<sup>nd</sup> ed., pp. 666–697). New York: Guilford Press.
- Main, M. (2000). The organized categories of infant, child and adult attachment: Flexible versus inflexible attention under attachment-related stress. *Journal of the American Psychoanalytic Association*, 48, 1055–1096.
- Meins, E., Fernyhough, C., Wainwright, R., Das Gupta, M., Fradley, E., & Tuckey, M. (2002). Maternal Mind-Mindedness and Attachment Security as Predictors of Theory of Mind Understanding. *Child Development*, 73(6), 1715–1726.
- Mikulincer, M., & Shaver, P. R. (2008). Adult attachment and emotion regulation. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2<sup>nd</sup> ed., pp. 503–531). New York: Guilford Press.
- Nolte, T., Hudac, C., Mayes, L. C., Fonagy, P., Blatt, S. J., & Pelphrey, K. (2010). The Effect of Attachment-Related Stress on the Capacity to Mentalize: An Fmri Investigation of the

- Biobehavioral Switch Model. *Journal of the American Psychoanalytic Association* 58, 566–573.
- Quirin, M., Pruessner, J. C., & Kuhl, J. (2008). HPA system regulation and adult attachment anxiety: Individual differences in reactive and awakening cortisol. *Psychoneuroendocrinology*, 33, 581–590.
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment and Human Development*, 4, 133–161.
- Solomon, J., & George, C. (2011). *Disorganization of Attachment and Caregiving (Vol. 2)*. New York: Guilford Press.
- Taubner, S., Kessler, H., Buchheim, A., Kächele, H., & Staun, L. (2011). The role of mentalization in the psychoanalytic treatment of chronic depression. *Psychiatry*, 74(1), 49–57.