Activating the Attachment System: effect on Emotion Regulation and Prediction of Degree of Anxiety

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Abstract

Previous research revealed that both attachment style and emotion regulation are important contributors to anxiety symptoms**.** The aim of this study was to examine whether activation of the attachment system in threatening contexts affects the regulation of emotions, and to what extent degree of anxiety is predicted by this relationship.

In this experimental study, the attachment system was activated using a Stroop task, with RT as outcome variable. The main hypothesis was that individuals in threatening conditions, who are characterized by an anxious or avoidant attachment style, experience anxiety to a greater extent.

As expected, correlation analyses revealed that being insecurely attached is associated with a higher degree of anxiety. There appeared to be an association between making use of dysfunctional emotion regulation strategies and a higher degree of anxiety. Limited access to emotion regulation strategies appeared to be a predictor for anxiety. Individuals characterized by an insecure attachment style experience more difficulties in emotion regulation than individuals characterized by a secure attachment style. Both insecure attachment style and dysfunctional emotion regulation strategies are predictors for degree of anxiety.

The anxious attachment style appeared to be not only associated with a higher degree of anxiety, but is a positive predictor for degree of anxiety as well, which is consistent with the hypotheses and previous studies. We did not find support for the main hypothesis that individuals in threatening conditions, who are characterized by an anxious or avoidant attachment style, experience anxiety (or tension) to a greater extent. A possible explanation could be that, the individual, in a way, succeeds in finding proximity, resulting in a decline in degree of tension.

Introduction

When we are sad, or distressed, most of us tend to seek proximity to our parents, partner, or close friends. We search for consolation, advice, or a shoulder to cry on. Bowlby (1982) refers to this as activation of the so-called attachment system. Is there a difference in activation between differently attached individuals? What is the effect of activation of the attachment system on the regulation of our emotions? How is anxiety predicted by these concepts? This experimental study will investigate whether activation of the attachment system in threatening contexts affects the regulation of emotions and to what extent anxiety is predicted by this relationship.

Attachment

Attachment refers to the emotional bond between a child and its main caregivers. Bowlby suggested that the quality of the parent-child relationship affects individual and interpersonal functioning in adulthood (Bowlby 1969, 1973). Bowlby proposed that when parents are available and responsive and provide consistent, loving care in times of need, children turn to their caregivers when they are distressed and use their parents as a 'secure base'. This assumption also suggests that when there is a lack of responsiveness and availability, children are insecure about the caregiver-child relationship and are unable to use their caregiver as a secure base.

Mary Ainsworth and colleagues (Ainsworth, Blehar, Waters & Wall, 1978) 'strange situation' procedure supported this hypothesis. In this procedure a child is observed for 20 minutes while playing. During this time period, the caregiver leaves and returns several times. Then, the response of the child when being away from and being reunited with the caregiver is carefully observed. As a result, Mary Ainsworth developed a theory of three attachment patterns in infants. Firstly, secure attachment is characterized by children going towards their caregiver when he or she returns, being comforted by their caregiver and finally returning to

independent play. The second type of attachment is anxious or ambivalent attachment. Children protest and cry when their caregiver leaves them and when they are alone. When being reunited, the children want to be comforted, but are angry simultaneously when the caregiver is attempting to console the child. Consequently, these children are unable to be comforted. The third type is avoidant attachment. Avoidant attached children seem disinterested when being left alone and do not respond to reunion or avoid the caregiver and continue independent playing.

Hazan and Shaver (1987) proposed that these types of attachment play an important role in romantic relationships during adolescence and adulthood as well. Securely attached adults are able to get close to others, are comfortable depending on others and others depending on them, and do not often worry about being abandoned or about someone getting to close to them. Anxious/ambivalent attached adults find that others are unwilling to get as close as they would like. They worry that their partner does not love them enough or will not stay with them. They want to merge completely with other persons, which often scares people off.

Emotion regulation

Besides attachment, another important aspect for developing psychopathology, described in earlier research, is emotion regulation. Thompson (1991) describes emotion regulation as the extrinsic and intrinsic process responsible for monitoring, evaluating, and modifying emotional reactions. Gross (1998) defines emotion regulation as the attempt to influence which emotions we have, when we have them, and how these emotions are experienced and expressed. Previous research revealed that emotion regulation in an individual is partly a result of attachment style (Bowlby, 1969), and that secure attachment leads to the development of dealing with emotions in an adaptive manner (Cooper, Shaver & Collins, 1998).

It has been shown that differences in emotion regulation exist among the different attachment patterns. Securely attached individuals can experience, express and verbally self-disclose emotions, but they do not become lost in an accelerating spiral of negative memories and worries (Mikulincer & Orbach, 1995; Mikulincer & Nachshon, 1991). Hyperactivation and deactivation strategies of activating the attachment system are embodied in insecurely attached individuals (Cassidy & Kobak, 1988). Hyperactivation is characteristic for anxiety attached individuals and is typified by attempts to minimize distance from attachment figures and elicit their support and love through clinging and controlling responses. Furthermore, due to their reliance on hyperactivation strategies, anxious attached individuals are characterized by a hypervigilant, anxious attentional focus on attachment figures and relationships, hyperactivation of negative emotions and thoughts, and failure to detach from psychological pain. Avoidant attached individuals are characterized by the deactivation strategy, which means that they attempt to maximize the distance from attachment figures, avoid being dependent of others, strive to rely on themselves, suppress distressing thoughts, and repress painful memories. Mikulincer and Shaver (2003) proposed a model which integrates these recent findings with the earlier theoretical proposals of Bowlby and Ainsworth (Figure 1). As a result of these findings, it is hypothesized that an association between attachment and emotion regulation will be found, namely the higher the degree of insecure attachment, the higher the degree of dysfunctional emotion regulation.

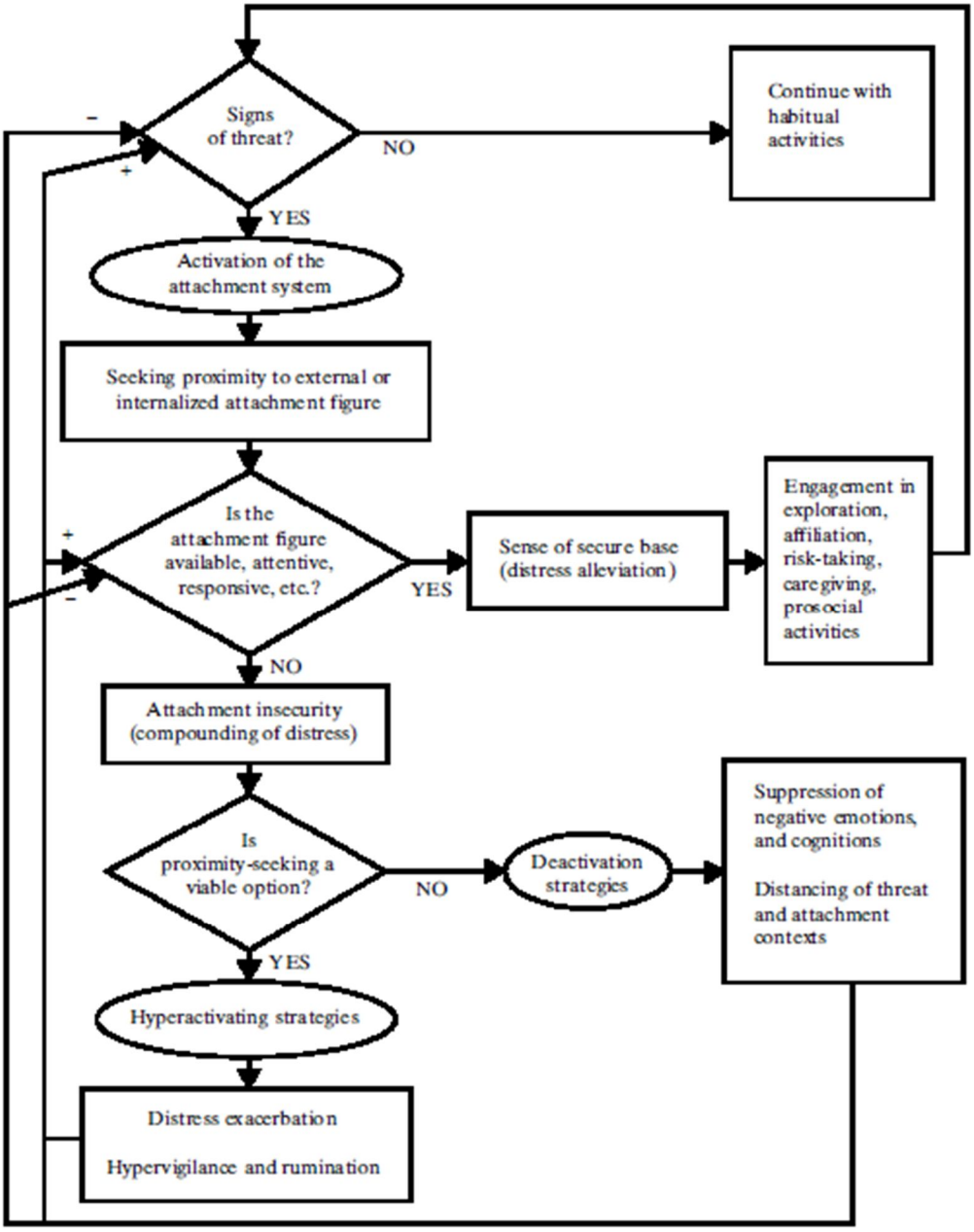


Figure 1; A model of attachment-system activation, hyperactivation, and deactivation (Mikulincer & Shaver, 2003).

Attachment, emotion regulation and anxiety

Bowlby (1980) proposed that the anxiety level of children relates to parent-child attachment, and that common anxiety disorders in youngsters and adolescents (for instance, school phobia and separation anxiety) are rooted in worries about the availability of their

caregiver. This aroused interest in the relationship between pathological anxiety and patterns of attachment. Previous research found an association between one of the two patterns of insecure attachment and anxiety (e.g., Cassidy, Lichtenstein-Phelps, Sibrava, Thomas & Borkoves, 2009; McLewin & Muller, 2006). Research revealed an association between secure attachment and a lesser degree of anxiety. In addition, research revealed that a pattern of insecure attachment can contribute to psychological problems, including anxiety disorders (McLewin & Muller, 2006). Cassidy et al. (2009) suggested that individuals with generalized anxiety disorder (GAD) are to a greater extent insecurely attached compared to non-anxious people. Furthermore, it appeared that being insecurely attached is associated with several anxiety disorders, namely panic disorder, agoraphobia, social phobia, specific phobia, posttraumatic stress disorder and generalized anxiety disorder (Mickelson, Kessler & Shaver, 1997), and an association has been found between attachment and obsessive-compulsive disorder (Doron, Moulding, Kyrios, Nedeljkovic, & Mikulincer, 2009; Myhr, Sookman, & Pinard, 2004). As a result, we hypothesized that we will find a relationship between attachment style and degree of anxiety, namely the more an individual is typified by anxious or avoidant attachment, the greater the degree of anxiety.

With regard to emotion regulation, it has been shown that using maladaptive emotion regulation strategies, for instance avoidance and rumination, predicts an increase in anxiety symptoms (Nolen-Hoeksema, 2000; Blalock & Joiner, 2000), and that using adaptive emotion regulation strategies, such as positive thinking, has a positive effect on psychopathology. Positive thinking results in positive emotional and physical responses to stimuli that arouse emotions (Gross, 1998). Both theory and research suggests that individuals with an anxiety disorder are characterized by dysfunctional emotion regulation strategies (Cisler, Olatunji, Feldner & Forsyth, 2010). Other studies examined the relationship of emotion regulation in relation to specific anxiety disorders. Mennin, McLaughlin and Flanagan (2009) found that

emotion regulation difficulties are associated with generalized anxiety disorder (GAD) and social phobia. It has been shown that emotion regulation plays an important role in posttraumatic stress disorder recovery (Roemer, Litz, Orsillo & Wagner, 2001; Tull & Roemer, 2007). We hypothesized that when individuals make use of maladaptive emotion regulation strategies to a greater extent, they are characterized by a higher degree of anxiety.

Study of Mikulincer, Gillath & Shaver

According to Bowlby's (1982) attachment theory, exposure to physical or psychological threats leads automatically to activation of the attachment system and children tend to seek proximity to attachment figures. When these attachment figures are not available for some reason and the actual seeking is not successful, thoughts of the attachment figures are possibly still active in the cognitive system and may influence behaviour. This idea has been broadly supported in previous studies of children (Ainsworth et al, 1978, Brooks & Lewis, 1974; Fraley & Shaver, 1998). However, the assumption that this cognitive system is similarly activated in adults has remained untested in most studies. Several studies have shown that separation from romantic partners or imaginations of one's partner leaving (Fraley & Shaver, 1997, 1998) are an important source of distress. Nevertheless, these studies cannot validate attachment system activation, as they did not expose participants to real threats nor did they examine the actual seeking of proximity.

The study of Mikulincer, Gillath and Shaver (2002) was one of the first studies that attempted to examine the triggers and individual differences underlying the activation of the attachment system in adulthood. The study of Mikulincer, Gillath and Shaver consisted of two components. The aim of the first component was to obtain a list of names, divided into four categories, namely names of attachment figure, names of close persons, names of known persons and names of unknown persons. In the second component of the study, these names were used in a 128-item Stroop colour-naming task. During this task, participants were

subliminally exposed to a prime word. According to this prime word, participants were divided into three conditions, including two threat related conditions, namely the word 'failure' or 'separation', and one neutral condition, in which the word 'hat' was shown. The same prime word was used in all 16 trials. Attachment style was measured using a self-report questionnaire. Previous research indicates that the activation of a specific mental representation increases attention to representation-congruent elements (Mathews & McLeod, 1985; Warren, 1972). In the case of the Stroop task, these findings would suggest that this results in slower colour naming, because of the increased attention to attachment figures after activating attachment.

The aim of this study was to examine the effects of subliminal threat on the activation of representations of attachment figures. The study found a heightened accessibility of representations of attachment figures, thereby interfering with the colour naming of the names in the Stroop task. This indicates that representations of people who are a source of comfort may be neurologically active and may preconsciously influence mental processes during the encounter with a treat. Attachment styles differences in attachment activation were found. That is, attachment anxiety heightened the accessibility of representations of attachment figures even in non-threatening contexts, attachment avoidance inhibited this accessibility in an attachment-related threat context.

Present study

The present study was based on the study of Mikulincer and colleagues (2002), as mentioned before. However, an expansion was made. We examined whether activation of the attachment system in threatening contexts affects the regulation of emotions as well, but we also examined to what extent this relationship predicts degree of anxiety. Moreover, the way in which the attachment system is activated was compared within the mentioned three attachment styles. Since the study of Mikulincer et al. (2002) was the first study which

examined actual attachment activation in adulthood and found significant differences in attachment activation between the different attachment styles, it was interesting to link these findings to psychopathology, namely degree of anxiety. This way, we tried to obtain more insight into possible aspects contributing to anxiety symptoms.

The first research question was how attachment style, dysfunctional emotion regulation styles and degree of anxiety are related. We hypothesized that anxious or avoidant attachment and dysfunctional emotion regulation strategies are associated with a higher degree of anxiety. Furthermore, it was hypothesized that anxious or avoidant attachment is associated with dysfunctional emotion regulation strategies.

The second research question was how state and trait anxiety can be predicted by attachment style and dysfunctional emotion regulation strategies. It was hypothesized that a higher degree of anxious or avoidant attachment and a higher degree of dysfunctional emotion regulation strategies predict a higher degree of anxiety.

The third research question was if there is a difference in time of colour naming (reaction time) in the Stroop task for names of attachment figures compared to names of the other three categories. We expected that attachment names would bring on a slower RT than names from the other three categories, namely close persons, known persons and unknown persons.

The fourth research question was how the time of the colour naming of attachment figures differs among the conditions the participants were divided into, with regard to the subliminally presented prime word. We hypothesized that individuals who are exposed to a threatening word and whose attachment system is expected to be activated, name the colours of the attachment figures names slower than individuals who are not exposed to a threatening word.

At last, the fifth research question was how degree of anxiety can be predicted by activating attachment style. It is hypothesized that individuals in the threatening conditions (which is expected to result in slower colour naming), who are characterized by an anxious or avoidant attachment style, experience anxiety to a greater extent.

Method

Participants

The total population (n = 92) consisted of both patients (n = 7) and non-patients (n = 85). The patients were recruited from a Dutch Mental Health Institution and were all diagnosed with one or more anxiety disorders. One part of the non-patients (n = 30) were recruited from acquaintances of the research assistants, and filled in all the questionnaires. The other part of the non-patient group filled in a part of the questionnaires, because the completed questionnaires were part of a different study. For this reason, the population size varies per analysis. All participants had to be between 18-65 years of age. Participants who met at least one of the following criteria were excluded from the study: (1) low intelligence (IQ < 80); (2) the presence of psychotic symptoms or schizophrenia; (3) drug or alcohol dependence; (4) bipolar disorder; (5) serious neurological impairment (e.g. dementia, deafness, blindness); (6) autistic spectrum disorder; and (7) suicide risk.

In total, 7 patients, 2 males and 5 females, and 85 non-patient individuals were recruited, 19 males and 73 females, ranging in age from 18 to 58 years, with a mean age of 28.88 years (SD = 17.06). Of the seven patients, five of them were suffering from a panic disorder, and two of them were suffering from a social phobia, diagnosed by a psychologist working at the mental health institution, using the Dutch translation of the Structural Clinical Interview for DSM-IV Axis I Disorders (SCID I) (van Groenestijn, Akkerhuis, Kupka, Schneider, & Nolen, 1999). In all trials of the Stroop task, the participants were randomly

assigned to one of three conditions with regard to exposure to the Dutch translation of one of the following subliminal messages: failure (n = 32), separation (n = 30), or hat (n = 30).

Measures

Questionnaires. Firstly, the participants filled in three questionnaires. The first questionnaire used is the Attachment Style Questionnaire (ASQ). The ASQ (Feeney, Noller, & Hanrahan, 1994) is a self-report questionnaire which is designed to assess attachment style. The 40 items were assigned to five subscales, namely: Confidence, Discomfort with Closeness, Need for Approval, Preoccupation with Relationships, and Relationships as Secondary. Three attachment styles were created from these subscales: Secure attachment (Confidence), Anxious attachment (Need for Approval and Preoccupation with Relationships) and Avoidant attachment (Discomfort with Closeness and Relationships as Secondary). The items are rated on a six-point scale from (1) totally disagree to (6) totally agree (e.g. 'It's important for me that other people like me'). The ASQ appeared to have a high internal consistency, with a Cronbach's alpha of .81.

The second questionnaire is the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004; Neumann, van Lier, Gratz, & Koot, 2010). The DERS assesses difficulties in emotion regulation in adults. The 36 items measure six scales: Lack of emotional clarity, Lack of emotional awareness, Impulsivity, Non-acceptance of emotional responses, Limited access to emotion regulation strategies, and Difficulties engaging in goal-directed behavior. The items are rated on a five-point Likert scale ranging from 1 (almost never) to 5 (almost always). (e.g. 'when I am upset, I have difficulties controlling my behavior'). Reliability analyses for the items (n = 92) of the DERS showed a high internal consistency as well, with a Cronbach's alpha of .91.

To measure degree of anxiety, the State-Trait Anxiety Inventory (STAI; van der Ploeg, Defares, & Spielberger, 1980) was used, which assesses both state anxiety and trait anxiety.

Both types of anxiety are measured by 20 items rated on a 4-point scale ranging from ‘ not at all’ (1) to ‘to a high degree’ (4) (e.g. I am nervous). Reliability analyses were performed in this sample (n = 92) for the items of the STAI-state subscale as the items of the STAI-trait subscale. The STAI-state showed an internal consistency of .89, and the STAI-trait showed an internal consistency of .89.

The mood of each participant is measured using the Profile of Mood States (POMS; Wald & Mellenbergh, 1990). The POMS measures transient mood states, by means of asking how one feels at a particular time. The 32 items are rated on a five-point Likert scale from (0) not at all to (4) extremely (e.g. sad). The five emotions that are assessed are: Depression, Anger, Fatigue, Vigor, and Tension. Reliability analyses for the items (n = 92) of the POMS showed a high internal consistency as well, with a Cronbach’s alpha of .86.

Furthermore, the participants were asked to fill in a questionnaire consisting of general questions. By means of this questionnaire, age, marital status, education, profession, and special life events are assessed.

Computerized tasks. The second part of the study consisted of several computerized tasks, designed by Mikulincer, Gillath, and Shaver (2002). The participants completed three preliminary computer tasks for identifying attachment figures, close, known, and unknown persons. The participants received a list of 100 names, and were asked to indicate whether they knew someone personally with that name or not. They were asked to mark the persons they knew with a 3, and persons they did not know with a 1. The second measure is a computerized version of the WHOTO-scale (Fraley & Davis, 1997), consisting of six items which asked the participants to provide the first names of close persons who serve as attachment figures. They were asked to write the first names and the relational role (e.g. mother, romantic partner) of people whom they sought proximity (e.g. ‘Who is the person you prefer to spend your time with?’), and whom they used as a safe haven and/or secure base

(e.g. ‘Who is the person you would go to for advice?’). The third measure asked participants to write down the names of close persons. Specifically, the names of parents, siblings, best friend, current romantic partner, and grandparents, without making any reference to the attachment functions they did or did not serve. They also provided names of other friends, famous actors, and politicians as distractor or filler items.

Subsequently, a computerized 16-trial Stroop (1938) color-naming task was used. First names, collected in the above described three measures, were the target stimuli and were shown in one of four colors: red, blue, green or yellow on a white background in the middle of the monitor. Each of the colors was used in 4 trials. First, they were given 20 practice trials, after which 16 experimental trials followed. The target stimuli in the practice trials were neutral words, namely furniture. Each trial began with an X in the middle of the monitor, followed by a 20-ms subliminal presentation of a prime word, and then by an XXX pattern. The XXX pattern was shown to prevent that the subliminal presented stimuli remains active in the peripheral parts of the visual system in the brain. Immediately after the XXX pattern, one of the sixteen target stimuli (first names) were shown in one of the four colors. By means of a box with four buttons (each button serving one color), the participants could decide as quickly as possible in which color the target word was shown. The sixteen names consisted of four names of attachment figures, four names of close persons, four names of known persons, and four names of unknown persons. The order of presentation and the color of the target stimuli were randomly determined for each participant. As mentioned above, during the Stroop task the participants were randomly divided into three conditions with regard to the subliminally presented prime word, namely ‘failure’, ‘separation’, or ‘hat’.

Procedure

Each participant, both patients and non-patients, was asked to participate, after being informed. The patients were informed by their therapist, the non-patients were informed by

the research assistants. The participants reviewed and signed an informed consent form as sign of being informed and of approval to participate. The participants were randomly assigned to one of the three prime words in the Stroop task.

The study consisted of two components. Firstly, the participants were given the three questionnaires described above. They were asked to return the completed questionnaires one week later. After that week, the participants were asked to perform the computerized tasks. First, the participants completed the three preliminary computerized tasks for identifying the sixteen names for the Stroop task. Prior to these three tasks, the mood of each participant is measured using the POMS. After completing the three measures, the participants were asked to fill in the questionnaire consisting of general questions. This questionnaire was used as a distractor and time filler. This way, the research assistant could prepare the Stroop task. Moreover, the questionnaire should also have reduced any remained activation of attachment figures' and non-attachment figures' names. Subsequently, the 16-trial Stroop (1938) color-naming task is performed. Following the Stroop task, the mood of each participant is measured once more using the POMS. The duration of filling in the questionnaires is approximately 30 minutes and the duration of the computerized task including the Stroop task is approximately 5 minutes.

Statistical analyses

Pearson correlations were performed to examine the relations between each attachment style score and state and trait anxiety, for all emotion regulation difficulties with both anxiety scores and for each attachment style with difficulties in emotion regulation.

To examine to what extent degree of anxiety is predicted by attachment style and emotion regulation, a hierarchical regression analysis was performed. Two regression analyses were performed to answer the question. In the first analysis is state anxiety the dependent variable, in the second analysis is trait anxiety the dependent variable. In both

analyses were the three attachment styles (secure, anxious and avoidant) and the six emotion regulation difficulties the independent variables. The attachment styles were entered in the first step and the emotion regulation difficulties were entered in the second step.

To study whether a significant difference exists between the mean RTs of names of attachment figures and names of the other three categories of target stimuli, three separate paired sample t-tests were performed.

Furthermore, for examining whether a significant difference in RTs on attachment figures names exists between the three conditions ('failure', 'separation', or 'hat'), an ANOVA was performed.

At last, to examine how degree of anxiety can be predicted by activating attachment styles, two separate hierarchical regression analyses were performed as well, namely for anxious attachment and avoidant attachment. Degree of anxiety was only assessed in 37 participants and the POMS was completed by 92 participants. Therefore, instead of degree of anxiety, tension measured by the POMS after the Stroop task was chosen as dependent variable. The main variables were entered in the first step, namely anxious/avoidant attachment, the RT on attachment figure names, and two dummy variables to code for the three conditions. The four interaction variables were entered in the second step. Interactions were created by multiplying standardized scores of the RT on attachment figure names and the dummy variables for condition and by multiplying standardized scores of anxious and avoidant attachment and the dummy variables for condition.

Results

Descriptives

Means and standard deviations of attachment style, difficulties in emotion regulation and degree of anxiety subscale scores can be found in Table 1, as well as the mean RTs on the Stroop task. The 'attachment' category had the slowest RT, the 'close' category had the

second slowest mean RT, followed by the mean RT of the 'known' category. The 'unknown' condition had the fastest RT.

Associations between Attachment Style and Degree of Anxiety

Pearson correlations between attachment style and degree of anxiety are shown in Table 2**.** Individuals with a higher degree of secure attachment, showed less STAI trait anxiety (r = -.41, p <.05). No significant correlation was found between STAI state anxiety and secure attachment. Anxious attached individuals appeared to have a higher degree of both STAI state anxiety (r = .61, p < .01) and STAI trait anxiety (r= .73, p < .01). Avoidant attached individuals appeared to have a higher degree in both STAI state anxiety (r = .37, p < .05) and STAI trait anxiety (r = .36, p < .05) as well.

Associations between Difficulties in Emotion Regulation and Degree of Anxiety

Pearson correlations between difficulties in emotion regulation and degree of anxiety are shown in Table 2. The more individuals are characterized by lack of emotional clarity, the higher their STAI state anxiety (r = .65, p < .01) and STAI trait anxiety (r = .69, p < .01) is. For lack of emotional awareness, only a significant correlation was found with STAI state anxiety (r = .34, p < .05). The more impulsive an individual is, the higher both STAI state anxiety (r = .44, p < .01) and STAI trait anxiety (r = .56, p < .01) is. Non-acceptance of emotional responses was significant correlated with STAI state anxiety (r = .35, p < .05) and with STAI trait anxiety (r = .63, p < .01). Limited access to emotion regulation strategies is related to higher STAI state anxiety (r = .57, p < .01) and higher STAI trait anxiety (r = .78, p < .01). At last, difficulties engaging in goal-directed behavior was only significant correlated with STAI trait anxiety (r = .72, p < .01).

Associations between Difficulties in Emotion Regulation and Attachment Style

Pearson correlations between difficulties in emotion regulation and attachment style are shown in Table 2**.** A lower degree of lack of emotional clarity (r = -.35, p < .01), lack of

emotional awareness (r = -.27, p < .05), non-acceptance of emotional responses (r = -.40, p < .01), and limited access to emotion regulation strategies (r = -.34, p < .01) is characterizing for individuals with a secure attachment style. A higher degree of lack of emotional clarity (r = .41, p < .01), impulsivity (r = .*38*, p < .01), non-acceptance of emotional responses (r = .41, p < .01), limited access to emotion regulation strategies (r = .38, p < .01), and difficulties engaging in goal-directed behavior (r = .27, p < .01) is related to anxious attachment. At last, significant correlations were found between lack of emotional clarity (r = .25, p < .05), lack of emotional awareness (r = .39, p < .01), non-acceptance of emotional responses (r = .31, p < .01) and avoidant attachment.

Prediction of anxiety by attachment style and emotion regulation strategies

First, a hierarchical regression analysis was performed to examine the prediction of state anxiety. The analysis showed the first model, consisting of the three attachment styles, to be a significant predictor for degree of state anxiety (R^2 = .38, p <.01). Being anxious attached appeared to be a significant predictor for state anxiety (β = .61, p <.01). The second model, consisting of the six emotion regulation strategies, appeared to be significant for predicting degree of state anxiety (R^2 = .26, p <.05). Individuals with a higher degree of limited access to emotion regulation strategies, showed more state anxiety (β = .56, p <.05). Lack of emotional awareness (β = .31, p <.1) appeared to be a predictor for state anxiety at a marginally significant level. The results are shown in Table 3.

Second, a hierarchical regression analysis was performed to examine the prediction of trait anxiety. 54 % of the variance in trait anxiety was explained by attachment style (p <.01), and 21 % of the variance in trait anxiety was explained by dysfunctional emotion regulation strategies (p <.01). Anxious attached individuals are characterized by a significant higher degree of trait anxiety (β = .76, p <.01). Individuals with a higher degree of limited access to

emotion regulation strategies, appeared to be characterized by a higher degree of trait anxiety as well (β = .61, p <.01). The results are shown in Table 4.

Differences between RTs

Paired Sample t-tests were performed to examine whether attachment names bring on a slower RT than names from the other three categories, namely close persons, known persons and unknown persons. No significant differences in the mean RTs of names of attachment figures and the mean RTs of names of the other three categories of target stimuli were found. The mean difference of RT on attachment figure names and RT on close persons names is 7.16 ms, t(88) = .22, p = .82, the mean difference of RT on attachment figure names and RT on known persons names is 13.76 ms t(90) = -.53, p = .60, and at last, the mean difference of RT on attachment figure names and RT on unknown persons names is 19.44 ms, t(90) = -.74, p = .46.

Effect of condition

ANOVA showed no significant differences in RTs on attachment figures names between the three conditions (‘failure’, ‘separation’, or ‘hat’). The mean difference of mean RT on attachment figure names between the ‘failure’ and ‘separation’ condition is -25.09 ms, F(2) = .32, p = .73, the mean difference of mean RT on attachment figure names between the ‘failure’ and ‘neutral’ condition is 32.62 ms, F(2) = .32, p = .65, and the mean difference of mean RT on attachment figure names between the ‘separation’ and ‘neutral’ condition is 57.71 ms, F(2) = .32, p = .43.

Prediction of anxiety/tension by activating attachment style

In the first hierarchical regression analysis, the first model, consisting of the main effects, appeared to be a marginally significant predictor for degree of tension (R^2 = .25, p <.05). The second model, in which the interaction variables are included, is not a significant predictor for tension (R^2 = .17, p = >.05). Looking at the separate variables in model 1, being classified in

the ‘separation’ condition appeared to be a significant predictor for degree of tension (β = .45, p < 0.05). Anxious attachment is marginally significant (β = .28, p = <.1), as well as the interaction between the ‘failure’ condition and RT on attachment figure names in model 2 (β = -1.29, p = <.1) (Table 5). To examine the marginally significant interaction effect more closely, a post hoc analysis was performed. Two separate univariate regression analyses were performed, with RT on attachment figure names and condition (for both ‘failure’ condition and ‘neutral’ condition) as independent variables, and tension measured after the Stroop task as dependent variable (Figure 3). The interaction shows that in the ‘failure’ condition, when the RT is slower, the degree of tension appeared to be lower.

In the second hierarchical regression analysis, the first model, consisting of the main effects, appeared to be a marginally significant predictor for degree of tension (R^2 = .24, p <.1). The second model, in which the interaction variables are included, is not a significant predictor for tension (R^2 = .08, p = >.05). Being classified in the ‘separation’ condition appeared to be a significant predictor for degree of tension (β = .38, p < 0.05). Avoidant attachment is not a significant predictor for degree of tension (β = .25, p = >.05). No significant interaction effect has been found (Table 6).

Discussion

The objective of this study was to examine whether activation of the attachment system in threatening contexts affects the regulation of emotions, and to what extent degree of anxiety is predicted by this relationship. Additionally, the way in which the attachment system is activated was compared within the three attachment styles, namely secure attachment, anxious attachment and avoidant attachment.

The first question addressed how attachment style, dysfunctional emotion regulation styles and degree of anxiety are related to each other. Correlation analyses showed significant associations between both the insecure attachment styles (anxious and avoidant attachment)

and a higher degree of both trait and state anxiety. Additionally, we found that anxious attachment is a positive predictor for degree of both state and trait anxiety. Avoidant attachment did not appear to be a predictor for degree of anxiety. These findings are partly consistent with the first and the second hypotheses. Previous studies provide support for these findings. With regard to anxiety symptoms, previous studies suggest that insecure attachment is associated with anxiety symptoms. (Cassidy et al. 2009; McLewin & Muller, 2006). Rosenstein and Horowitz (1996) found that individuals with an anxious attachment style were much more likely to have anxiety problems than those with an avoidant attachment style. Looking at the characteristics of the attachment styles, this seems a logical result. Anxious attached individuals tend to have less positive views about themselves, tend to worry about their partner leaving them and seem dependent on others. On the other hand, avoidant attached individuals desire a high level of independence. Their feeling of self-sufficiency could be an explanation for the lower degree of anxiety, compared to anxious attached individuals (Cassidy & Shaver, 2008).

Individuals who experience difficulties in emotion regulation, appeared to be anxious to a greater extent. The emotion regulation difficulty 'limited access to emotion regulation strategies', appeared to be a predictor for state anxiety as well as for trait anxiety. These findings are partly consistent with the first two hypotheses as well. According to earlier research, the way in which we regulate our emotions is associated with anxiety symptoms. Making use of dysfunctional emotion regulation strategies predicts an increase in anxiety symptoms (Nolen-Hoeksema, 2000; Blalock & Joiner, 2000). This could probably be explained by the fact that successful emotion regulation is associated with good health outcomes and improved relationships (John & Gross, 2004), and that difficulties with emotion regulation, on the contrary, are associated with anxiety disorders (Mennin, Holoway, Fresco, Moore & Heimberg, 2007; Kashdan & Breen, 2008). Having access to emotion regulation

strategies in general, is the basis for regulating emotions in an adaptive way. When this access to emotion regulation strategies is limited it seems obvious that they cannot regulate their emotions in a functional way.

Correlation analyses showed that individuals characterized by an insecure attachment style experience more difficulties in emotion regulation than individuals characterized by a secure attachment style. Both insecure attachment style and dysfunctional emotion regulation strategies are predictors for degree of anxiety, and having an insecure attachment style is associated with a dysfunctional emotion regulation. These outcomes are consistent with the first hypothesis. An individuals' emotion regulation is partly a result of attachment style (Bowlby, 1969), and previous research revealed that being securely attached leads to developing an adaptive emotion regulation (Cooper, Shaver & Collings, 1998). These findings suggest that individuals characterized by both an insecure attachment and a dysfunctional emotion regulation, are most at risk of developing anxiety symptoms. Both attachment style and dysfunctional emotion regulation contribute to degree of anxiety.

With regard to activating attachment style, we expected that individuals who are exposed to a threatening word during the Stroop task and consequently, whose attachment system is activated, show a slower colour naming on attachment figure names than individuals who are not exposed to a threatening word. No significant differences in RTs were found. As mentioned before, according to Bolwby's (1982) attachment theory, exposure to physical or psychological threats leads to activation of the attachment system and people tend to seek proximity to attachment figures. This would imply that threatening contexts lead to attachment activation. A possible explanation for not finding any differences in RTs could be that this was measured in a group consisting of both insecure and secure attached individuals. We expected that securely attached individuals do not show a slower RT on attachment figures names, because if their 'secure attachment system' is activated, we would expect that

activation of their ‘secure attachment system’ does not upset the individuals, but when an ‘insecure attachment system’ is activated, it is expected that the individual becomes distressed. The securely attached individuals could have influenced the mean RTs. Furthermore, if there would have been a larger sample, these results possibly might have been significant.

The final hypothesis addressed the question how degree of anxiety (or tension) can be predicted by activating attachment style. Again, we found anxious attachment style to be a predictor for degree of tension, which can serve as support for the above described hypothesis as well. Being divided into the ‘separation’ condition is a significant predictor for degree of tension as well. There appeared to exist an interaction between being divided into the ‘failure’ condition and RT on attachment figure names. In the ‘failure’ condition, when the RT is slower, the degree of tension appeared to be lower. This is not consistent with the hypothesis that individuals in the threatening conditions, who are characterized by an anxious or avoidant attachment style, experience anxiety (or tension) to a greater extent. A possible explanation could be that, although the mean RT is slower, the individual, in a way, succeeds in finding proximity in mind, which results in a decline in degree of tension. Previous studies provided supportive evidence for this explanation. Mawson (2005) proposed that the presence of attachment figures has a calming effect, while their absence has a negative effect, and Bowlby (1982) suggested that proximity maintenance to attachment figures provides comfort and relief. Another explanation could be again that both securely as insecurely attached individuals were taken into account in these analyses.

The fact that a lot of results were not found to be significant, could be the result of the small sample size. A small sample reduces the validity of the study and, moreover, the results are difficult to generalize. Consequently, the data must be interpreted very carefully. The small sample size is partly a result of the time-consuming procedure of the study, because the

firsts months a Stroop task with 128 items was used. It is difficult to find individuals willing to participate, which brings us to the next limitation. Because of this limitation, eventually we could use only the first 16 trials of the Stroop task, because the other 55 participants were given a short version of the original Stroop task, consisting of 16 trials.

One of the strengths of this study is the fact that the results are based on an experimental study, which increases the control the researchers have over variables. Furthermore, this study is, next to the study of Mikulincer et al. (2002), one of the first studies to examine the triggers underlying attachment system activation in adulthood. Another important aspect, compared to previous studies, is that attachment style was measured not directly before the computerized tasks and Stroop task. This way, the items of the questionnaire did not affect the results of the Stroop task.

All that said, the results of the current study give some indications that further research of the attachment system activation could be of use in clinical practice. It is important to gain insight into the underlying attachment system in adults, for instance to have more knowledge of the protective function of attachment relationships. Furthermore, it is important to obtain more insight into possible aspects contributing to anxiety symptoms. In future research, it is important to reconsider the procedure of this study, so that it might be less time-consuming for the participants and as a results, it is easier to recruit a greater sample.

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Table 1

Descriptives

	M	*SD*	Min	Max
Attachment style scores N = 92				
Secure attachment	4.08	.79	1.75	6.00
Anxious attachment	3.15	1.01	1.28	8.95
Avoidant attachment	2.71	.73	1.25	4.66
Difficulties in Emotion Regulation N = 92				
Lack of emotional clarity	2.20	.91	1.00	5.00
Lack of emotional awareness	2.71	.77	1.00	5.00
Impulsivity	1.89	.81	1.00	5.00
Non-acceptance of emotional responses	2.21	.90	1.00	4.83
Limited access to emotion regulation strategies	2.01	.86	1.00	5.00
Difficulties engaging in goal-directed behavior	3.23	.95	1.00	5.00
Degree of anxiety N = 37				
State anxiety	1.66	.41	1.05	2.58
Trait anxiety	1.82	.47	1.11	3.11
Mean Reaction Time (ms) N = 91				

Attachment figure names	1150.30	279.69	664.00	2261.00
Close persons names	1142.11	295.51	468.00	1931.00
Known persons names	1135.53	306.25	640.75	2444.67
Unknown persons names	1130.85	277.77	667.25	1738.50

Table 2

Results Pearson correlations

	1	2	3	4	5	6	7	8	9	10	11
1 State anxiety	-										
2 Trait anxiety	.73**	-									
3 Secure attachment	-.29	-.41**	-								
4 Anxious attachment	.61**	.73**	.37**	-							
5 Avoidant attachment	.37*	.36*	-.50**	.50**	-						
6 Lack of emotional clarity	.65**	.69**	.35**	.41**	.25*	-					
7 Lack of emotional awareness	.34*	.17	.27*	.04	.39**	.25*	-				
8 Impulsivity	.44**	.56**	-.14	.38**	.15	.41**	-.11	-			
9 Non-acceptance of emotional responses	.35*	.63*	-.40**	.41**	.31**	.60**	-.03	.41**	-		
10 Limited access to emotion regulation strategies	.57**	.78**	-.34**	.37**	.19	.43**	-.15	.67**	.50**	-	
11 Difficulties engaging in goal-directed behavior	.30	.44**	-.13	.27**	-.10	.32**	-.29**	.48**	.30**.	.61**	-

* $p < .05$

** $p < .01$

Table 3

Results regression analyses. The prediction of anxiety by attachment style and emotion regulation strategies

The prediction of state anxiety

Model		B	SE	β	t	Sig.
1	Secure attachment	.04	.10	.08	.42	.68
	Anxious attachment	.30	.09	.61**	3.5	.001
	Avoidant attachment	.04	.10	.07	.36	.72
2	Secure attachment	.12	.09	.22	1.31	.20
	Anxious attachment	.17	.12	.35	1.45	.16
	Avoidant attachment	.06	.09	.11	.60	.55
	Lack of emotional clarity	.11	.09	.26	1.30	.21
	Lack of emotional awareness	.14	.08	.31+	1.82	.08
	Impulsivity	-.04	.12	-.07	-.36	.73
	Non-acceptance of emotional responses	-.16	.08	-.36+	-.187	.07
	Limited access to emotion regulation strategies	.35	.14	.56*	2.52	.02
	Difficulties engaging in goal-directed behaviour	.02	.08	.04	.25	.81

* $p < .05$

** $p < .01$

+ $p < .1$

Table 4

The prediction of trait anxiety

Model		B	SE	β	t	Sig.
1	Secure attachment	-.05	.10	-.08	-.51	.61
	Anxious attachment	.42	.08	.76**	5.04	.000
	Avoidant attachment	-.08	.10	-.13	-.79	.44
2	Secure attachment	.12	.09	.03	.19	.85
	Anxious attachment	.17	.11	.30	1.52	.14
	Avoidant attachment	-.01	.09	-.02	-.13	.90
	Lack of emotional clarity	.03	.08	.06	.38	.71
	Lack of emotional awareness	.11	.07	.21	1.48	.15
	Impulsivity	-.06	.12	-.08	-.50	.62
	Non-acceptance of emotional responses	-.00	.08	-.00	-.02	.98
	Limited access to emotion regulation strategies	.43	.13	.61**	3.32	.00
	Difficulties engaging in goal-directed behaviour	.05	.08	.09	.62	.54

* $p < .05$

** $p < .01$

+ $p < .1$

Table 5

Results hierarchical regression analyses. The prediction of anxiety by activating attachment styles and emotion regulation strategies

The prediction of anxiety/tension in anxious attached individuals

Model		B	SE	β	t	Sig.
1	Anxious attachment	.10	.06	.28+	1.78	.09
	Mean RT on attachment figure names	.00	.00	-.01	-.04	.97
	Failure condition	-.01	.11	-.02	-.12	.91
	Separation condition	.28	.11	.45*	2.46	.02
2	Anxious attachment	.12	.13	.34	.89	.38
	Mean RT on attachment figure names	.00	.00	.10	.49	.63
	Failure condition	.21	.72	.34	.29	.78
	Separation condition	.13	.72	.21	.18	.86
	Failure condition x Mean RT on attachment Figure names	-.00	.00	-1.29+	-1.81	.08
	Separation condition x Mean RT on attachment Figure names	.00	.00	.69	.86	.40
	Failure condition x anxious attachment	.19	.18	.93	1.06	.30
	Separation condition x anxious attachment	-.09	.15	-.46	-.63	.54

* $p < .05$

** $p < .01$

+ $p < .1$

Table 6

The prediction of anxiety/tension in avoidant attached individuals

Model		B	SE	β	t	Sig.
1	Avoidant attachment	.09	.06	.25	1.59	.12
	Mean RT on attachment figure names	.00	.00	.03	.16	.88
	Failure condition	-.03	.11	-.05	-.26	.80
	Separation condition	.24	.11	.38+	2.07	.05
2	Avoidant attachment	.06	.15	.17	.41	.68
	Mean RT on attachment figure names	.00	.00	.07	.28	.79
	Failure condition	.24	.80	.39	.30	.79
	Separation condition	-.08	.80	.39	.30	.77
	Failure condition x Mean RT on attachment Figure names	.00	.00	-.76	-.98	.34
	Separation condition x Mean RT on attachment Figure names	.00	.00	.81	.90	.38
	Failure condition x anxious attachment	.07	.18	.33	.39	.70
	Separation condition x anxious attachment	-.06	.19	-.29	-.31	.76

* $p < .05$

** $p < .01$

+ $p < .1$

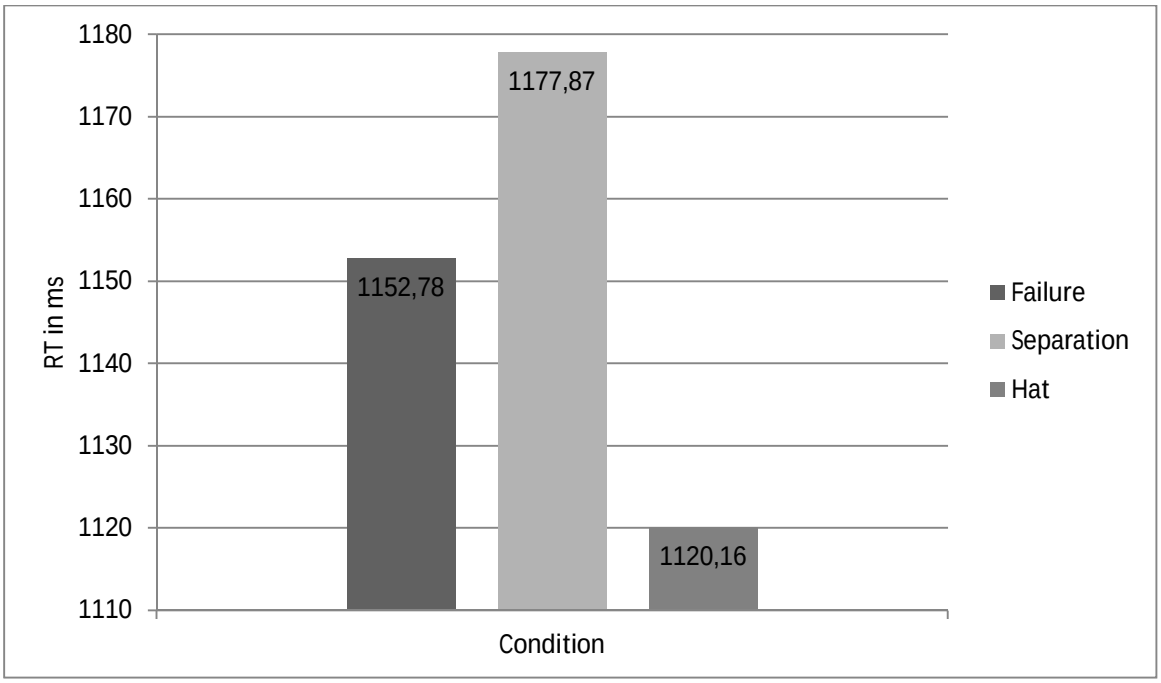


Figure 2

Mean RTs on names of attachment figures, in the three conditions

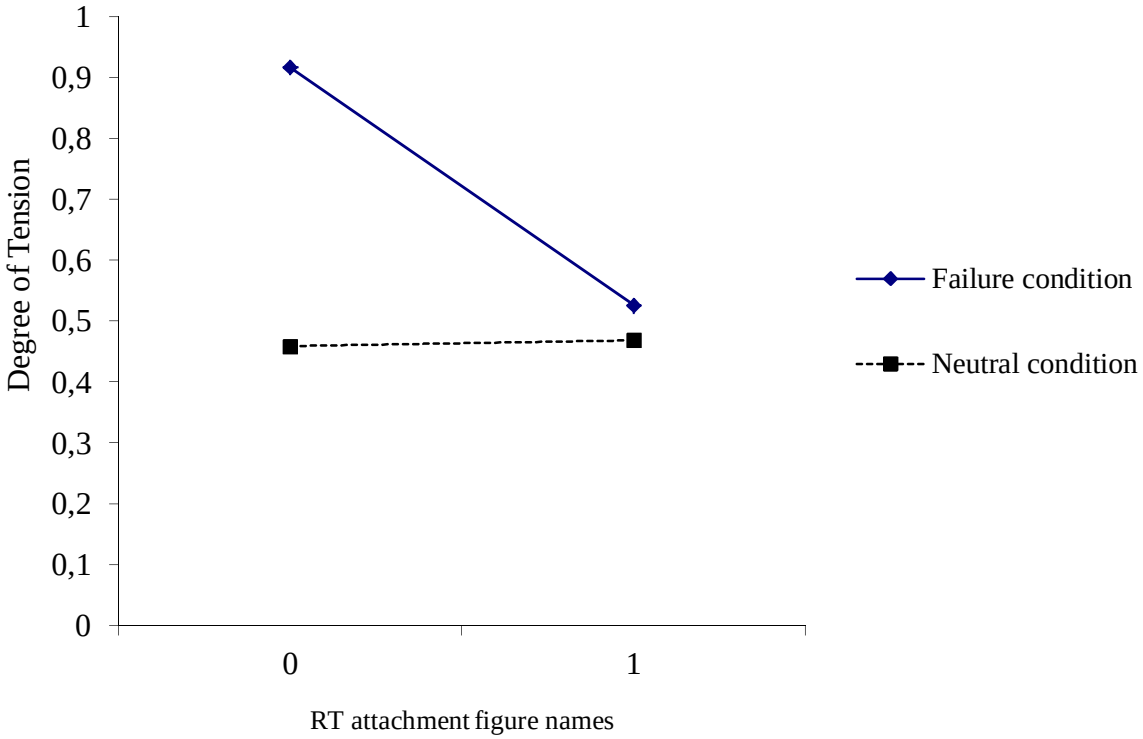


Figure 3

Interaction effect between RT on attachment figure names and condition