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An experimental evaluation of the State Adult Attachment Measure:

The Influence of Attachment Primes on the Content of State Attachment Representations

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Abstract

Attachment theory predicts cross-contextual stability of attachment representations, but research findings are rather mixed. Recently, it has been suggested that these mixed findings reflect the existence of both state and trait attachment components. The development of the State Adult Attachment Measure (SAAM) has enabled an investigation of this hypothesis. The current study aimed to evaluate the extent to which the SAAM is a useful instrument for studying such state attachment hypotheses. For this purpose, a two-week longitudinal study investigated whether the manipulation of the temporal accessibility of different attachment contents activates different within-person attachment representations. The impact of attachment primes before re-administering the SAAM was investigated in 268 participants. Results showed that the SAAM was meaningfully related to evaluations of self and attachment figures. Moreover, activation of different attachment contexts influenced state attachment towards partners as primary attachment figures. The results provide support for the SAAM as a measure of state attachment towards partners, but data on parent attachment were less straightforward. In all, the current study provided support for contemporary models of attachment as comprising both trait-like stability and context-dependent variability in attachment state.

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According to attachment theory, attachment styles reflect stable mental representations about the availability and responsiveness of the primary attachment figure as well as about the self as worthy to be cared for (Bowlby, 1969). Mental representations of the attachment relationship, which are formed in childhood during interactions with the primary caregiver, are akin to representations of romantic relationships later in life (Bowlby, 1973). These representations comprise attachment security about the partner as a source for support, attachment anxiety about rejection by the partner, or attachment avoidance about the extent to which individuals desire closeness with the partner (Mikulincer & Shaver, 2007a). Traditionally, attachment representations were assumed to be global and trait-like in temporal and contextual stability (Brennan, Clark, & Shaver, 1998; Hazan & Shaver, 1987). However, considerable within-person variation in these representations has been demonstrated as well (e.g., Baldwin et al., 1996). This finding is little understood, because theory and instruments to investigate attachment-related within-person variation have long been missing. Only recently, researchers developed a theory and an instrument that could help to unravel the mechanisms that explain this phenomenon. To date, information is lacking about whether this instrument can be considered valid for the investigation of predictions derived from this theory.

Attachment-related Mental States

Attachment representations established during childhood are traditionally expected to become activated during distress and are considered as stable over the life span and across different activating contexts (Bowlby, 1969, 1973; Mikulincer & Shaver, 2007a). Bowlby (1969), in line with Piaget (1954), allowed for a bi-directional relationship between these attachment representations and different contexts, such that attachment representations would be shaped by the environment, but also that attachment representations may cause individuals to shape an environment in a way

that is congruent with the attachment representation's content. This idea suggests that attachment representations should be more trait-like than state-like and thus stable across different contexts.

Challenging this trait idea, priming attachment representations by asking individuals to visualize good or bad attachment relationships has been shown to alter the temporal accessibility of certain attachment-related information and, consequently, to alter associated relational behavior (Baldwin and Holmes, 1987; Baldwin et al., 1996). This finding suggested that attachment representations should be conceptualized as cognitive-affective structures that contain a network of memories, beliefs, and goals, which are automatically activated in response to attachment-relevant cues, but that differ depending on the activating contexts' characteristics (Baldwin, Fehr, Keedian, Seidel, & Thompson, 1993). Consequently, it was argued that within-person variations in the content of activated attachment representations might reflect state-like features as well.

Fraley (2007) recently addressed these context-related variations in a connectionist framework. This connectionist model suggests that knowledge is stored in units that require context-related activation. Central to Fraley's idea is that different patterns of activation lead to different attachment representations. A similar perspective on the (in)stability of personality characteristics was already proposed in Mischel and Shoda's (1995; 2008) Cognitive-Affective Personality Systems (CAPS) model. According to the CAPS model, individual differences in personality are best represented by *if…then…* situation-behavior profiles, approaching personality as behavioral patterns that vary, but vary consistently according to context or situation. This is an alternative to typical trait models of personality that tend to consider only aggregates of behaviors across situations, ignoring context-dependent within-person variability.

The CAPS model assumes that *if…then* situation-behavior profiles explain cross-contextual within-person variations at two different levels. Both levels will be illustrated with an imaginary example about two persons' confidence in their respective partner's support across three situations: while shopping together with the partner in a supermarket, while being comforted by the partner,

and while arguing with the partner (see Figure 1). Firstly, the CAPS model suggests contextual variability altering the mean level of individuals' confidence. In this example, the CAPS model assumes that, on average, shopping would not explicitly activate low or high levels of confidence, while comforting would elicit more confidence, and arguing less confidence. Figure 1 illustrates that both persons experience more confidence while being comforted and less while arguing. Secondly the CAPS model suggests contextual variability altering individuals' rank order position on confidence as well because not every situation will have the same activating effect for every individual. Figure 1 illustrates that being comforted increases confidence more strongly in Person 1 compared to Person 2, while arguing decreases confidence more strongly in Person 1 compared to Person 2. In line with these assumptions, the CAPS model has demonstrated that contextual differences are reflected in mean-level differences within subjects across contexts of personality features and in decreases of cross-contextual correlations between personality scores (Mischel, 2004; Mischel & Shoda, 1998)

Fraley (2007) argued that the CAPS model is important for understanding cross-contextual variability in attachment representations. Given that, as they mature, people are exposed to a variety of interpersonal experiences with more than one significant other, it is likely that individuals possess multiple mental models representing different ways of relating to others (Fraley, 2007). A detailed discussion of the context-specific processes involved in adult attachment dynamics was provided by Zayas, Ayduk and Shoda (2002). In their model, activated attachment representations result from a complex interplay of not just one cognitive-affective system, but, in a dyadic relationship, of the separate systems belonging to each individual. The notion that differences in dyadic situation constitute contextual variability allows for the testable hypothesis that attachment representations may fluctuate across contexts as a function of the context's interpersonal features.

Drawing on this CAPS model, Fraley (2007) found preliminary evidence with statistical simulations that context-dependent attachment representations can theoretically exist alongside more global representations, and that both might exert their influence on behavior in novel

situations (Fraley, 2007). Consistent with CAPS predictions, contextual activation of the attachment system can interact with certain personality features to differentially predict social information processing (e.g., Bowles & Meyer, 2008). The context dependency of attachment representations per se, however, has only received preliminary empirical attention courtesy of a newly developed attachment state measure, the State Adult Attachment Measure (SAAM, Gillath et al., 2009).

Gillath and colleagues (2009) designed a measure of state attachment that allows for the empirical testing of CAPS-related hypotheses, explicitly distinguishing attachment state and attachment trait. Gillath et al. (2009) proposed that whereas individuals might chronically differ along trait-like dimensions of attachment orientation – attachment styles – a person's immediate level of attachment security, anxiety, and avoidance – attachment state – depends on which attachment content is activated within the specific attachment context. The State Adult Attachment Measure (SAAM), therefore, was designed to examine momentary fluctuations in attachment security, anxiety, and avoidance. Unlike other attachment instruments, the SAAM explicitly asks participants to rate how they think *right now* about attachment relationships rather than their general thoughts.

Several studies demonstrated that the SAAM has promising psychometric qualities (Gillath et al., 2009). Exploratory and confirmatory factor analysis distinguished three scales (attachment security, anxiety and avoidance), with high three-month test-retest reliability (respectively .59, .51 and .53 , all *p*s < .01). The scales were meaningfully related to established adult attachment questionnaires. Moreover, priming secure attachment led to higher SAAM security, lower SAAM avoidance, and to a tendency towards lower SAAM Anxiety. Priming insecure attachment led to higher SAAM anxiety. These effects could not be attributed to mood-effects. However, the psychometric studies that thus far have been carried out provided little evidence about the convergent and divergent validity of the different SAAM scales. Moreover, the existing studies on the SAAM mainly focused on between-person variation after priming. Surprisingly, the validity of within-

person variation of attachment states as measured by the SAAM has not yet been investigated. Nevertheless, both tests are essential to evaluate whether the SAAM could be useful as a measure to further investigate innovative theories concerning state attachment.

The Current Study

The current study aims to examine the validity of the SAAM on three different levels: (1) convergent and divergent validity, (2) sensitivity to measure context-related within-person variation, (3) sensitivity to measure context-related variability in attachment-related rank orders. First, to test convergent and divergent validity, it was investigated whether the SAAM has the same pattern of correlations with evaluations of self and attachment figures that is typical for trait attachment representations. More specifically, the general attachment security dimension consists of positive-self and positive-attachment figure representations (Bowlby, 1969), attachment anxiety relates to negative evaluations of the self and an ambivalent evaluation of the attachment figure, and attachment avoidance relates to negative evaluations of the attachment figure (e.g., Ainsworth, Kaplan, & Cassidy, 1985). We, therefore, tested the hypothesis that at both measurement moments attachment security, anxiety, and avoidance should correlate with evaluations of the self and of the attachment figure. If these correlations are found at both time-points, one can be more confident that the SAAM measures characteristics of attachment representations.

The second research question examines the validity of the SAAM as a measure of within-person variation of attachment states. For this purpose, the SAAM was administered twice with a two-week interval. Before the second administration of the SAAM, participants were randomly assigned to a secure attachment, an insecure attachment, or a neutral prime condition. With the assumption that priming alters the content of activated (in)secure attachment representations, the current study investigated within-person cross-contextual fluctuations of attachment states at two levels. At a first level, we tested within-person change in attachment state across attachment contexts (non-primed versus primed). We hypothesized that participants in the neutral prime

condition should not vary significantly between the two measurement times, whereas participants who receive either the secure or insecure prime should show evidence of significant within-person variation in state attachment.

At a second level, and going beyond the previous studies by Gillath and colleagues (2009), the current study inquired whom the participants considered as their primary attachment figure. Both connectionist and process models of personality (e.g., Fraley, 2007; Mischel & Shoda, 1995, 2008) assume that representations are likely to become chronically activated if they have been overlearned over long periods of time. Consequently, representations reflecting older attachment relationships might be less susceptible to contextual variations than attachment representations that are learned more recently over short periods. Therefore, the second research question also examined whether the SAAM is sensitive to reveal differential context-dependent within-person variation in state attachment representations about more recent (partners) versus older (parents) attachment figures.

For the third research question, we investigated whether changes in attachment context altered individuals' rank order position in relation to others regarding their activated attachment state. We predicted greater rank order differences between Time 1 and Time 2 in the secure and insecure prime conditions, compared to the neutral condition. These fluctuations in attachment state were expected to be more pronounced for those who identified their partner as attachment figure.

All analyses were conducted while controlling for possible confounding effects of changes in negative or positive mood in response to the attachment primes. Finally, following the argument that women are generally more sensitive to relational information than men (e.g., Feldman Barrett, Robin, Pietromonaco, & Eyssell, 1998), the effect of gender as a control and as a moderating variable was considered in separate control analyses.

Summary

To further examine the validity of the SAAM as an instrument to investigate cross-contextual changes in the content of attachment representations, this study aims to test the following hypotheses. (1) Attachment states are characterized by evaluations of the self and the attachment figure. (2) Attachment states will fluctuate according to psychological context, but more strongly when representations refer to partner than parents. (3) Individuals' rank order position in relation to others regarding their activated attachment state will fluctuate as a function of attachment prime. Specifically, we predicted that there would be greater rank order differences between time 1 and time 2 in the secure and insecure prime conditions than in the neutral condition.

Method

Participants

At Time 1, 268 first year bachelor students studying Applied Psychology participated. At time two, 251 returned (response rate: 94%). This group consisted of 45 men and 212 women (11 participants did not answer the gender item) with a mean age of 19.08 (SD = 2.47).

Measures

State Attachment was measured using the SAAM (Gillath et al., 2009) which consists of 21 items evaluated on a 7 point Likert-scale, ranging from 1 (I don't agree at all) to 7 (I completely agree) measuring three dimensions: SAAM Security (Example item: "I feel like I have someone to rely on"), SAAM Anxiety (Example item: "I wish someone would tell me they really love me"), and SAAM Avoidance (Example item: "I feel alone and yet don't feel like getting close to others"). To measure state attachment, participants were asked to answer based on how they felt *right now.* The items were translated into Dutch. In line with Gillath et al.'s (2009) approach, we evaluated the value of the Dutch version of the $SAAM_{Time\ 1}$ analyzing correlations with the previously evaluated Dutch version of the Experiences in Close Relationships-Revised (ECR-R: Fraley, Waller, & Brennan, 2000; ECR-R-NL:

Buysse & Dewitte, 2004). The ECR-R was completed with the same attachment figure in mind as the

SAAM. In our sample the pattern of correlations was satisfactory and similar to that of Gillath's study

(see Table 1). The three SAAM scales are intercorrelated ($r_{secure – anxious}$ = .23 , p < .001 ; $r_{secure – avoidant}$ =-

.49 , p < .001 ; $r_{avoidant – anxious}$ = -.36 , p < .001), which is taken into account in the analyses reported

below. Finally, at both measurement moments the SAAM subscales reliably demonstrated good

internal consistency (SAAM Security: $\alpha_{Time 1}$ = .86; $\alpha_{Time 2}$ = .85; SAAM Anxiety: $\alpha_{Time 1}$ = .83; $\alpha_{Time 2}$ = .85;

SAAM Avoidance: $\alpha_{Time 1}$ = .78; $\alpha_{Time 2}$ = .79).

Primary Attachment Figure: Each participant's primary attachment figure was identified

using the WHOTO scale which consists of six questions referring to the three critical features that

distinguish attachment figures from non-attachment figures (proximity seeking and separation

distress, safe haven, and secure base; Hazan & Zeifman, 1994). For each question, participants had to

write the name of the person that best served each of these functions. The person who was listed

most frequently was labeled as the primary attachment figure. In case of an ex aequo, we asked

participants to choose one of them as preferred attachment figure (see Fraley & Davis, 1997).

Previous research has shown that the WHOTO scale is reliable and valid (Fraley & Davis, 1997;

Mikulincer, Gillath & Shaver, 2002; Trinke & Bartholomew, 1997). Even though the second research

question focuses on differences between representations of parents and partners on attachment

state variability, participants were not restricted to selecting mother, father, or partner as preferred

attachment figure, but also a friend or an important other. By not forcing attachment figure choice

we ensured a more reliable identification of parents or partners as preferred attachment figure.

Evaluation of the Self. The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) consists of

10 items that have to be rated on a 4-point Likert-scale ranging from 1 (I strongly disagree) to 4 (I

strongly agree). The RSE is a valid instrument showing the predicted pattern of correlations with a

wide variety of criterion measures (Robins, Hendin, Trzesniewski, 2001; Hagborg, 1993). The Self-

Esteem Scale is coded so that higher scores indicate higher levels of global self-esteem. In our sample

the scale was internally consistent at both measurement moments (Self-esteem: $\alpha_{Time\ 1}$ = .88; $\alpha_{Time\ 2}$ = .90).

Evaluation of the Attachment Figure. For the purpose of this study, we constructed a short questionnaire with two ten-item subscales: Positive Evaluation and Negative Evaluation. All items were adjectives referring to the (un)availability of the same attachment figure (e.g., positive: reliable, responsive, caring, available,…; negative: insensitive, uninterested, unreliable,…). Participants had to rate the extent to which these characteristics applied to their primary attachment figure on a 7-point Likert scale ranging from 1 (does not apply for my attachment figure) to 7 (completely applies to my attachment figure). In our sample, both scales were reliable at both measurement moments: Positive Evaluation towards Attachment Figure: $\alpha_{Time\ 1}$ = .81; $\alpha_{Time\ 2}$ = .88; Negative Evaluation towards Attachment Figure: $\alpha_{Time\ 1}$ = .77; $\alpha_{Time\ 2}$ = .82.

Because we constructed this scale for the purpose of this study, we also examined the correlations between the evaluations of the attachment figure at Time 1 and avoidance scale of the ECR-R, as this subscale is considered to be closely related to attachment figure evaluation (Bartholomew & Horowitz, 1991; Mikulincer et al., 2003). The correlation between Positive Evaluation towards the Attachment Figure and attachment avoidance was marginally significant (r = -.11 , p = .07), while the association with the Negative Evaluation towards the Attachment Figure was significant (r = .20 , p < .01).

Visual Analogue Scales for Mood Changes. Mood was assessed before and after priming using Visual Analogue Scales (VAS) with 5 positive (e.g., happy, satisfied) and 7 negative (e.g., tense, sad) items, in order to examine the possible confounding effect of mood changes. We summed the VAS scales to create a total Positive and a total Negative Mood Score.

Procedure

Students were invited to participate in a longitudinal experiment in return for extra course credits. At Time 1, students gathered in a classroom and were informed of the study procedure. After giving their informed consent, students were given an initial set of questionnaires: they first identified their primary attachment figure using the WHOTO and then they responded to all the other questionnaires focusing only on the relationship with the identified attachment figure. Two weeks later they were invited to participate in the second part of the experiment. After being randomly assigned to the secure attachment prime, insecure attachment prime, or neutral prime condition, they had to complete the WHOTO again together with the VAS mood scales. Then, they were asked in the secure attachment prime condition to recall and write in detail about an event in which they felt really loved or respected by this attachment figure. In the insecure attachment prime condition, they were asked to recall an event in which they did not feel loved or respected by this attachment figure. In the neutral prime condition, they had to write a detailed description of the road they had taken that day from their home to the classroom. After the prime, participants were asked to fill in the VAS mood scales, the SAAM, RSE and Evaluation of the Attachment Figure.

Results

Preliminary Analyses

Overall, 5% of the data was missing and was deleted list-wise. In this sample, 47 participants (19%) had incomplete WHOTO data and 12 participants (5%) identified different attachment figures at both measurement moments. To avoid error variance effects, these individuals were excluded from the analyses. Fifty-two participants (20%) chose a peer, 45 participants chose a parent (37 mothers and 8 fathers, together representing 18% of the sample), and 95 participants (38%) chose their partner as primary attachment figure. We chose to exclude participants who selected peers as their primary attachment figure. While there is a clear shift in importance from parents to peers during adolescence, previous research has demonstrated that parents/partner remain the primary

attachment figure (Kobak, Rosenthal, Zajac & Madsen, 2007; Weiss, 1982, 1991). This means that in the case of a high attachment system activation, adolescents will still turn to their parents or partner as primary attachment figures for care and support. Moreover, the duration of relationships with peers can vary substantially, adding further error to the analyses. Therefore, to avoid possible confounding, we decided to exclude this group from further analysis. The excluded participants did not differ from the included participants on gender, age, and attachment anxiety. There was a significant difference on attachment avoidance, $F(1, 251) = 9.89$, $p < .01$, suggesting that the excluded participants were more avoidant compared to the included ($M_{excluded} = 2.40$, $SD_{excluded} = 1.00$; $M_{included} = 2.05$, $SD_{included} = .71$). This left us with 140 participants. These were evenly distributed across prime conditions ($\chi^2 = .97$; $p = .69$; see Table 2)

The effect of prime condition on current mood was evaluated using the VAS Positive and Negative Mood Scores. Prime condition affected both scales in a predictable way: the Positive Mood Scores significantly increased in the secure attachment condition and decreased in the insecure attachment condition. The Negative Mood Scores significantly increased in the insecure attachment priming condition. No mood changes were found in the neutral prime condition (Table 3). For this reason, all analyses for the second and third research question were conducted while controlling for changes in mood.

Attachment States and Evaluations of Self and Attachment Figures

For the first research question, partial correlations were calculated at both measurement moments to investigate links between SAAM Security, SAAM Anxiety, and SAAM Avoidance and Self-esteem and Attachment Figure Evaluations. In line with traditional adult state attachment literature (Mikulincer & Shaver, 2007a), links with SAAM scales were calculated controlling for the inter-correlations between the SAAM subscales, regardless of priming condition.

Table 4 indicates that (1) SAAM Security correlated significantly and positively with Self-esteem at Time 1, marginally significantly with Self-esteem at Time 2, and significantly with more

Positive and less Negative Evaluations towards the Attachment Figure at both times, (2) SAAM Anxious Attachment is negatively related to Self-esteem but not to Attachment Figure Evaluations at both times, and (3) SAAM Avoidant Attachment is related to more Negative and less Positive Evaluations towards the Attachment Figure, although the latter correlation was only significant at Time 2. Furthermore, negative associations with Self-esteem were found.

Attachment Primes and Within-person Attachment State Variability

Table 5 shows all SAAM means and standard deviations per measurement time, prime condition and preferred attachment figure. A 2 (measurement moment: Time 1 versus Time 2) X 3 (prime condition: secure, neutral, insecure attachment prime) X 2 (attachment figure: partner versus parent) mixed measure (ANOVA) analysis on all SAAM scales was carried out to test within-person secure attachment state fluctuations and their interactions with prime condition and attachment figure. The analyses were carried out controlling for both gender and for cross-contextual mood changes. To measure mood change, difference scores were calculated (Time 2 – Time 1) for the VAS Positive and Negative Mood Scores. Also a four-way interaction was tested with mood differences as control variable and gender as moderator of the three-way interaction effect. In the case of a significant three-way interaction, we planned to carry out a 2 (measurement moment) X 3 (priming condition) mixed measures analysis in order to investigate the effect of prime condition on secure attachment states for partners and parents separately. Paired-samples t-tests were planned to investigate the direction and significance of the simple effects.

When examining SAAM security, the crucial three-way interaction between measurement moment, prime condition, and attachment figure was, as predicted, significant ($F(1,125) = 3.26$; $p <$ .05 , $\eta^2_p = .05$). Also, change in negative affect appeared to be a significant control variable ($F(1, 125) = 4.92$; $p < .05$, $\eta^2_p = .04$). Gender had no effect as a control variable in the three-way ANOVA, nor did gender moderate the three way interaction ($F(1,120) = .73$; $p = .54$).

To interpret the significant three-way interaction, and to answer our second research question, the ANOVAs were carried out for the two attachment figures separately. Results showed that the interaction between measurement moment and prime condition was only significant when participants selected their partner as primary attachment figure ($F(2, 90) = 3.01$; $p = .05$, $\eta^2_p = .06$) and not when parents were selected ($F(2, 42) = 1.01$; $p = .34$, $\eta^2_p = .05$). As expected, the paired-samples t-tests showed a significant effect of the insecure prime ($M_{Time1}= 6.38$; $SD_{Time1}= .56$; $M_{Time2}= 6.01$; $SD_{Time2}= .55$; $t(34) = 3.93$, $p < .001$) and no effect of the neutral prime ($t(25) = .35$; $p = .73$). Unexpectedly, there was no effect of the secure prime ($t(31) = 1.36$; $p = .18$).

A significant three-way interaction between measurement moment, prime condition and attachment figure was also found for SAAM Anxiety ($F(2,134) = 3.18$; $p < .05$, $\eta^2_p = .05$). After controlling for gender and mood changes, the three-way interaction remained only marginally significant ($F(2,127) = 2.67$; $p = .07$, $\eta^2_p = .04$). To interpret this effect, separate ANOVAs were conducted for parents and partners. Results did not reveal the expected difference between attachment figures. The interaction between measurement moment and prime condition did not reach significance when participants selected their parents as attachment figures ($F(2,42) = 1.91$; $p = .16$, $\eta^2_p = .08$), nor did it reach significance when partners were the primary attachment figure ($F(2,92) = 1.61$; $p = .21$, $\eta^2_p = .03$). Further examination revealed that the significant three-way interaction was mainly due to the secure prime's effect, which led to a decrease of state attachment anxiety when parents were the primary attachment figures ($F(1,16) = 5.00$; $p < .05$, $\eta^2_p = .24$).

The three-way interaction between measurement moment, prime condition and attachment figure did not turn out significant when studying SAAM Avoidance ($F(2,132) = .18$; $p = .83$, $\eta^2_p = .00$), and remained non-significant after controlling for mood and gender ($F(2,125) = .17$; $p = .84$, $\eta^2_p = .00$). These results warranted no further examination.

Attachment Primes and Rank Order Variability

For the third research question, separate Multiple Regression Analyses (MRA) were calculated per SAAM subscale. For each analysis, a SAAM Time 2 scale was entered as dependent variable, the corresponding SAAM Time 1 scale was entered as predictor, and gender and both VAS mood change scores were entered as control variables. These MRAs were calculated for the different prime conditions and both primary attachment figures separately. First, to investigate the effect of the attachment primes on fluctuations in individuals' secure attachment state rank order position, regression weights of the SAAM Time 1 scale predictor were calculated for each prime condition separately. Second, to investigate differences in strength of the regression weights between prime conditions, two MRAs were conducted comparing respectively secure attachment prime with neutral prime, and insecure attachment prime with neutral prime. For this purpose a dummy prime condition variable (-1, 1) was calculated per MRA, the SAAM scale score was centered, and the product of these variables was calculated. These variables were used as predictors in an MRA with gender and both VAS mood change scores as control variables. A significant effect of the interaction between the dummy prime condition variable and a SAAM scale indicates that priming attachment content affects the strength of that SAAM Time 1 scale's regression weight on SAAM Time 2 security (UCLA: Statistical Consulting Group, 2007). The analyses were again conducted separately according to nominated attachment figure (parent vs. partner).

First, the MRAs showed that the SAAM Time 1 on SAAM Time 2 regression weights were high in all but one MRA (see Table 6). Gender was not significant as control variable.

Second, when examining SAAM Security in individuals who nominated partner as primary attachment figure, interaction analyses showed significant differences in rank order variability when participants selected in the secure versus neutral prime conditions ($t(54) = 3.28$, $p < .01$) and a trend towards significance when examining the insecure prime versus neutral prime conditions ($t(59) =$

1.84, *p* = .07). This pattern was not found in those who nominated parents (insecure and secure *t*(30) = -.05, *p* = .96 and *t*(30) = .39, *p* = .70 respectively).

When examining SAAM Anxiety, interaction analyses did not reveal differences in rank order variability (*t*(56) = -.49, *p* = .63), nor in the insecure versus neutral prime condition (*t*(59) = .48, *p* = .64) with partners as primary attachment figures. With parents as primary attachment figures, a trend towards significant differences in rank order variability was found for the secure versus neutral prime conditions (*t*(30)=-1.72, *p* = .10) but not for the insecure versus neutral conditions (*t*(27) = -.49, *p* = .63).

When examining SAAM Avoidance in individuals who nominated partners as attachment figure, significant differences in rank order variability were found for SAAM in the secure versus neutral prime conditions (*t*(56) = -2.68, *p* = .01), but not in the insecure versus neutral prime condition (*t*(58) = 1.02, *p* = .31). Among participants who nominated parents as primary attachment figure, no differences in rank order variability were found in either the secure versus neutral prime (*t*(29) = -.21, *p* = .84) or the insecure versus neutral priming conditions (*t*(26) = -.39, *p* = .70).

Discussion

The current study examined the validity of the SAAM as a measure of state attachment. Therefore, this study tested (1) the convergent and divergent validity of the SAAM by examining whether attachment states are characterized by evaluations of the self and the attachment figure; (2) whether the SAAM scales fluctuate in response to differently activated psychological context; and (3) whether individuals' secure SAAM rank order in relation to others also fluctuates in response to psychological context. Results confirmed the predicted links between attachment states and evaluations of the self and the attachment figure in different contexts. Furthermore, attachment primes altered secure state attachment representations regarding partner, but not regarding parents as attachment figure. No clear prime effects were found on anxious and avoidant attachment states.

Attachment primes also altered the rank order of individuals' state attachment regarding partner, but not regarding parents as attachment figure.

Attachment States and Evaluations of Self and Attachment Figures

Results showed that state attachment security is characterized by positive self-evaluations and positive evaluations of the attachment figure, which is in line with traditional assumptions regarding trait attachment security (Bowlby, 1969). Furthermore, in line with more recent attachment models (e.g., Bartholomew & Horowitz, 1991; Brennan et al., 1998; Mikulincer & Shaver, 2007a) state attachment anxiety is characterized by more negative self-evaluations and only weakly by negative evaluations of the attachment figure, while state attachment avoidance is characterized by more negative and less positive evaluations of the attachment figure. Drawing on a motivational account, it can be speculated that both anxious and avoidant individuals harbor negative feelings about themselves and others (determined in part by their history of negative attachment experiences), but that motivational tendencies distort these appraisals in the service of affect regulation. Anxiously attached individuals primarily rely on others for help with affect regulation, which may cause them to suppress negative features of the attachment figure in order to make him/her approach-friendly. Avoidant individuals, in contrast, may be more likely to focus on negative features of the attachment figure, because they value independence and primarily rely on themselves to regulate emotions.

These theoretically predicted associations were found at both measurement times in spite of the manipulation of attachment states. Therefore, the current study provides further evidence for the convergent and divergent validity of the SAAM. Furthermore, the current findings suggest that state-like representations can indeed be a part of the attachment system's dynamics and should be considered to understand cross-contextual attachment (in)stability in addition to trait-like characteristics.

Attachment Primes and Within-person Attachment State Variability

Results with the SAAM Security scale could partly be interpreted in line with the connectionist model. The insecure attachment prime decreased self-reported state attachment security. This prime effect did not merely reflect a change in mood states. The current findings expand previous studies, which mainly focused on the effects of attachment primes on information processing and social functioning (for an overview, see Mikulincer & Shaver, 2007b) but not on attachment representations. In fact, Mikulincer and Shaver (2007b) argued that the effect of attachment primes cannot alter longstanding mental representations. Therefore, it was important to demonstrate that insecure attachment primes modulate at least state attachment representations.

The secure attachment prime did not increase self-reported state attachment security. This finding is in line with previous research showing that the content of activated attachment representations is more strongly affected by insecure compared to secure attachment primes. This was explained by Baldwin and colleagues (1996) as resulting from individuals' general tendency to disproportionately weight negative information when making judgments.

This effect was only found when participants selected their current partner as attachment figure but not when they selected a parent. On the one hand, this supports the connectionist model hypothesis that representations regarding older relationships are less susceptible to contextual variability than more recent relationship representations. On the other hand, this result might also indicate that the SAAM could be more appropriate to investigate within-person variation in attachment-related expectations concerning recent attachment relationships compared to older attachment relationships.

All but one analysis revealed that the primes had no effect on within-subject variation of state attachment anxiety and avoidance. The one significant effect showed that state attachment anxiety towards parents was lower after a secure prime. Although this finding is in line with the connectionist predictions, it is surprising that the secure prime effect was found on parent

attachment and not on partner attachment. This seemingly contradicts the prediction that representations of older relationships are less affected by attachment primes. Nevertheless, it could be that this finding is still in line with the connectionist model. More specifically, it is often assumed that attachment anxiety typically reflects inconsistent parenting practices (Brenning, Soenens, Braet, & Bosmans, 2011). This means that anxious attachment should represent not only negative parenting experiences, but also a substantial amount of positive parenting experiences. Therefore, it seems reasonable to assume that the secure prime activated more and/or more accessible secure attachment experiences in individuals that, initially, were high on state attachment anxiety towards parents. Moreover, if this hypothesis is correct, it might help explain why we only found the prime effect for parent relationships and not for partner relationships. Considering that parent relationships are much older, more variety in positive and negative experiences is possible, allowing more secure experiences to be recalled. This is an intriguing finding and warrants further research as this effect could provide new insight in the cross-contextual attachment stability discussion.

On the one hand, the absence of robust prime effects on the SAAM Avoidance and Anxiety scales might be explained by the nature of the current study's prime. Previous research showed that the content of the prime determines whether changes are found on attachment security, attachment anxiety, or attachment avoidance (Baldwin et al., 1996; Rowe & Carnelley, 2003). The current prime focused explicitly on secure versus insecure attachment. Consequently, this prime might have had a less robust effect on the SAAM Anxiety and Avoidance scales. On the other hand, the current results might also suggest that both SAAM scales are less sensitive to change after priming. Post-hoc item content analysis revealed that the SAAM Anxiety scale might not have fully assessed all aspects of attachment anxiety. The items focus more on a strong need to be close to the attachment figure, neglecting the fact that attachment anxiety typically also reflects a strong fear of rejection (Mikulincer & Shaver, 2007). It is possible that the fear of rejection component would have been more influenced by the currently used prime. Consequently, items reflecting fear of rejection should be included in the SAAM and the current study should be repeated before final conclusions can be

drawn about the impact of primes on state attachment anxiety. Close inspection of the avoidance items suggests that these items seem to better reflect the complete attachment avoidance construct. Therefore, the current study can be interpreted as a first indication that avoidant attachment is less likely to be influenced by contextual factors. Using the current results to question the validity of the SAAM Anxiety and Avoidance scales might be premature. For example, Gillath et al.'s (2009) study did find prime effects on these scales. Nevertheless, Gillath et al.'s (2009) study differed from the current study in two respects. First, Gillath's study did not compare changes in state attachment pre versus post administration of the prime. Second, Gillath's study did not use a longitudinal design. More research is needed to see whether other priming procedures or priming different contents (see, e.g., Baldwin et al., 199; Rowe & Carnelley, 2003) might yield stronger effects.

Attachment Primes and Rank Order Variability

For SAAM Security towards partners, results suggested that state attachment security rank order was significantly altered by the secure prime and marginally significantly altered by the insecure prime. This is in line with the connectionist model assumption that when individuals are exposed to specific contexts, the content of their attachment representations will be differentially activated. Nevertheless, although correlations dropped significantly or marginally significantly after context manipulation, all correlations remained high and significant. These results suggest the co-existence of attachment states and attachment traits.

For SAAM Security towards parents, no prime effects were found. This seems to indicate again that representations regarding older relationships are less susceptible to contextual variability than more recent relationship representations. However, when looking at the neutral prime condition, the test-retest regression was high for the SAAM Security towards partner scores, but low for the SAAM Security towards parents scores. The latter regression was clearly below the .80 threshold that indicates quality of test-retest reliability (Aiken, 1994). This result could be interpreted as contradicting the hypothesis that recent relationships are more susceptible to prime effects, but,

most importantly, this seems to further corroborate the conclusion that the SAAM might be more appropriate as a measure of partner-related state attachment. The current findings seem to suggest that fluctuations in parent SAAM Security not only reflect changes in attachment states, but also measurement error.

For SAAM Anxiety towards partners, no priming effects were found on rank order. For SAAM Anxiety towards parents, the insecure prime had no effect and the secure prime only had a marginally significant effect. For SAAM Avoidance towards partner, a secure, but not an insecure prime effect was found. For SAAM Avoidance towards parents, no prime effects were found. Again, the SAAM scales focusing on partners had low test-retest reliability, arguing against strong interpretations of the findings with these scales.

In sum, similar to answers to the first research question, the primes had a more consistent effect on partner than on parent attachment. Again, this could mean that more recent relationships are more susceptible to state attachment change, at least as far as security is concerned. The SAAM anxiety and avoidance scales were less robustly affected by the primes. This most likely reflects the content specificity of the prime (Baldwin et al., 1996; Rowe & Carnelley, 2003). Therefore, future research should include anxiety and avoidance specific primes. However, the current analyses also showed that, at least in in the current sample, the test-retest reliability of the SAAM scales is not adequate when completed by participants who focus on parents as attachment figure.

Like other studies focusing on gender effects on social information processing (e.g., Feldman Barrett, Robin, Pietromonaco, & Eysell, 1998; Schmitt et al., 2003), gender did not influence any of the effects reported in this study. These results confirm Fraley's (2007) connectionist model hypothesis suggesting that attachment state variability might result from context-related differential activation of knowledge structures that should be comparable for both men and women.

Limitations

Although these findings are intriguing and shed a more nuanced and innovative perspective on the nature of attachment representations, they call for more research. First, the current study's effect sizes were not large. This could result from the priming procedure that we used. In the current priming procedure, participants were only asked to recall an event during which they felt or did not feel loved and respected. This approach yielded similar effect sizes in previous attachment prime research (e.g., Carnalley & Rowe, 2003). In real life, the activation of attachment schemas occurs in more complex contexts eliciting more intense emotions and meanings. Therefore, one might argue that the small effect sizes in this study are realistic instead of disappointing, as large effect sizes with this prime procedure would imply little stability in individuals' relational experiences across time.

Another limitation in the current study is that of the choice of primary attachment figure. Allowing participants to freely choose their preferred attachment figure ensured a more reliable identification of parents or partners as preferred attachment figure. However, because of this approach, a considerable number of participants could not be included to study the second and third research question. Excluding these participants could only have had a limited effect on the results. The excluded participants did not differ from the included participants on gender, age, and attachment anxiety but did score higher on avoidant attachment. However, this difference will probably not have affected the results. In previous attachment priming studies, little evidence is found for a prime X trait attachment orientation interaction effect. These previous studies suggested that, across the dimensions, it is the prime and not the trait attachment orientation that drives the effects (e.g., Mikulincer et al., 2001; Rowe & Carnelley 2003). Nevertheless, it remains important to investigate whether the current findings replicate in a research design where the targeted attachment figure is predetermined. This would reduce the risk that the results are contaminated by drop-out or by an uneven distribution of participants over targeted attachment figures.

Unfortunately, we did not administer the ECR-R at both measurement moments. This decision was based on theoretical grounds, as trait attachment is theoretically a stable construct. However, due to this decision, it was not possible to evaluate whether the SAAM is more appropriate than the ECR-R to measure attachment states. Future research should include both measures before and after administering attachment primes.

Theoretical Implications

These findings are important because they not only acknowledge the traditional view of attachment as a stable trait-like construct that reflects person-related characteristics, but also go beyond this traditional perspective. They suggest that attachment stability or instability depends on contextual features as well. The context in which attachment representations are activated partly determines individuals' current attachment state. Therefore, future longitudinal research should take context variability into account when trying to establish long-term causal pathways between attachment and developmental outcomes. For example, studies investigating earned security (Roisman, Padron, Sroufe & Egeland, 2002), the phenomenon of individuals who report a secure attachment despite aversive childhood experiences, could be informed by the current findings. Previous research has demonstrated that this phenomenon can be partly explained by current mood (e.g., Roisman, Fortuna, & Holland, 2006; Roisman et al., 2002). However, the current study's finding that activating context influences attachment states independent of changes in current mood suggests that this influence should be taken into account as well.

Clinical Implications

Research on attachment states might have critical clinical relevance. Insecure attachment increases the risk for psychopathology and many therapies suggest that altering attachment representations is an important mechanism of change (e.g., Diamond et al., 2010). However, the current study suggests that investigating attachment-based treatment effectiveness requires evaluating the extent to which treatments have an effect on state or trait attachment level.

Moreover, the current results warn for the possible role of context-related attachment state variation in relapse. For example, it could be that psychopathology linked with insecure attachment relationships resurges in spite of successful therapy when an insecure attachment context activates insecure attachment states. Although many of these clinical implications require further research on the connectionist attachment perspective and research on the clinical application of these insights, they might introduce a new and more nuanced view on insecure attachment, psychopathology, and treatment from which many clients could benefit.

Conclusion

The current study provides further support for the validity of the SAAM devised by Gillath and colleagues (2009) as a measure to study hypotheses concerning cross-contextual within-subject variation in state attachment. Results show that the SAAM scales are related to evaluations of the self and of attachment figures as predicted by attachment theory. Moreover, the SAAM security scale scores demonstrated sensitivity to variations in the attachment context when focusing on attachment representations about the partner. Results for the SAAM anxiety and avoidance scale were less clear. These results could not be explained by changes in mood states. All these findings add to the evidence suggesting the value of the SAAM as a valid measure of state attachment. Moreover, these findings advocate a move towards a more nuanced view on attachment representations as not only a trait-like, but also a state-like phenomenon.

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Table 1

Correlations between SAAM and ECR-R-NL

	SAAM Security	SAAM Anxiety	SAAM Avoidance
ECR-R-NL Anxiety	-.29***	.44***	.11
ECR-R-NL Avoidance	-.59***	-.37***	.65***

Note: SAAM = State Adult Attachment Measure; ECR-R-NL = Experiences in Close Relationships-Revised-Nederlandseversie (Dutch Version)

*** *p*< .001

Table 2

Number of participants per priming condition per chosen attachment figure (AF)

	Secure Prime	Insecure Prime	Neutral Prime
Parents as AF	17	13	15
Partner as AF	34	35	26

Table 3

Means (and Standard Deviations) for VAS scales on both measurement moment per priming condition for participants who chose parents or partner as primary attachment figure

		Secure Prime				Insecure Prime				Neutral Prime			
		Time 1	Time 2	Paired *t*-test	*df*	Time 1	Time 2	Paired *t*-test	*df*	Time 1	Time 2	Paired *t*-test	*df*
VAS Positive	*M*	129.06	134.52	-2.57*	79	134.37	127.33	2.78**	80	129.16	128.98	.09	82
	SD	(37.49)	(36.03)			(36.32)	(40.38)			(38.45)	(39.28)		
VAS Negative	*M*	103.83	95.55	1.83	82	92.67	103.95	-2.42*	81	102.95	98.55	1.52	81
	SD	(77.68)	(70.99)			(75.18)	(82.14)			(74.87)	(78.56)		

Note: Difference is calculated by subtracting Time 1 from Time 2.

* : p < .05 ; ** : p < .01

Table 4

Partial correlations between SAAM, Self-esteem, and Attachment Figure Evaluation (after controlling for the other two SAAM scales)

	SAAM Security		SAAM Anxiety		SAAM Avoidance	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Self-esteem	.14*	.12†	-.33***	-.21***	-.26***	-.24***
Pos Attach Fig	.46***	.52***	.00	-.08	-.09	-.14*
Neg Attach Fig	-.31***	-.42***	-.00	.11	.24***	.35***

SAAM = State Adult Attachment Measure; Pos Attach Figure = Positive Evaluation of the Attachment Figure;Neg Attach Figure = Negative Evaluation of the Attachment Figure

$^{\dagger}p< .07$; *$p< .05$;**$p< .05$; *** $p< .001$

Table 5

Means (and Standard Deviations) for SAAM scales on both measurement moment per priming condition per chosen attachment figure

|	Partners as attachment figures					
	Secure Prime		Insecure Prime		Neutral Prime	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
SAAM Security	6.41 (1.04)	6.29 (.50)	6.38 (.56)	6.01 (.65)	6.28 (1.04)	6.24 (.77)
SAAM Anxiety	5.51 (1.01)	5.58 (1.00)	5.38 (.97)	5.15 (.86)	5.80 (.99)	5.75 (.90)
SAAM Avoidance	1.67 (.61)	1.67 (.56)	1.87 (.87)	1.89 (.84)	1.54 (.67)	1.74 (.72)
	Parents as attachment figures					
	Secure Prime		Insecure Prime		Neutral Prime	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
SAAM Security	6.47 (.58)	6.38 (.55)	6.43 (.69)	6.44 (.52)	6.44 (.44)	6.17 (.44)
SAAM Anxiety	4.74 (1.22)	4.38 (1.23)	4.43 (1.09)	4.50 (1.33)	4.33 (1.49)	4.60 (1.05)
SAAM Avoidance	2.40 (1.10)	2.49 (1.02)	2.20 (.77)	2.10 (.85)	2.06 (.69)	2.21 (.70)

Table 6

Standardized regression weights of SAAM Time 1 Scales predicting SAAM Time 2 Scales

	SAAM Time 2 Security		
	Secure Prime	Neutral Prime	Insecure Prime
Partner	.63**	.95***	.61***
Parent	.75***	.61*	.68*
	SAAM Time 2 Anxiety		
Partner	.76***	.82***	.77***
Parent	.80***	.74**	.46
	SAAM Time 2 Avoidance		
Partner	.64***	.89***	.81***
Parent	.80***	.67*	.71*

Note: SAAM = State Adult Attachment Measure; Partner = sample of participants that selected partner as primary attachment figure. Parent = sample of participants that selected a parent as primary attachment figure.

*p< .05;**p< .01; *** p< .001
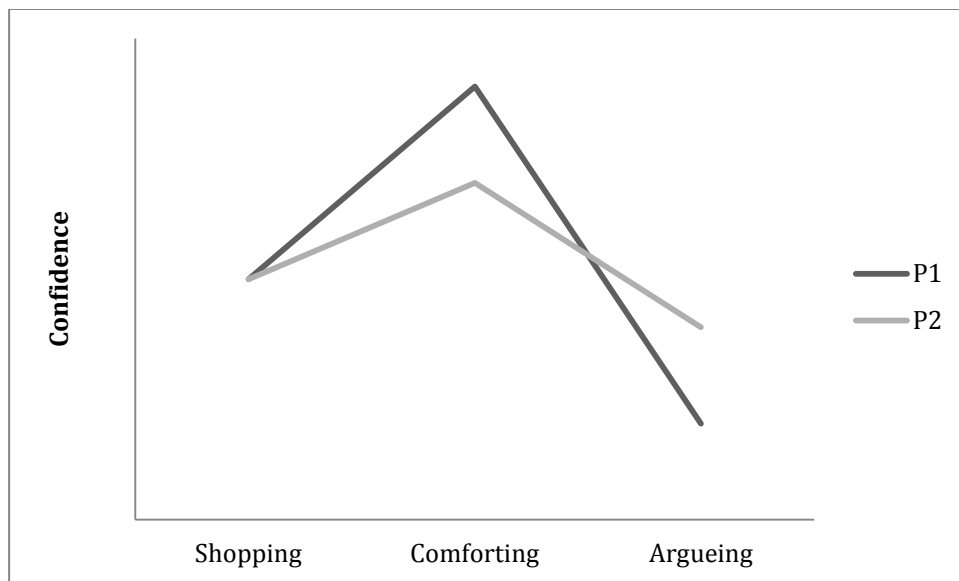
Note: P1 = Person one; P2 = Person two

Figure 1. Example of cross-contextual mean differences and rank-order position differences