ASSESSING ATTACHMENT MODELS USING THE IMPLICIT ASSOCIATION TEST

Internal working models of attachment are claimed to be unconscious structures operating outside the conscious awareness. Existing measures of attachment are almost exclusively explicit, either self-reports or interviews and it is questionable whether these instruments are able to tap into unconscious attachment attitudes. The main purpose of the present study is to develop Implicit Association Test (IAT) tools for assessing adult attachment and to examine their construct validity. Two sets of implicit attachment measures, based on the two-dimensional attachment model (Bartholomew & Horowitz, 1991), were developed. Convergent validity was assessed by examining (1) the relationship between implicit model of self and implicit self-esteem and (2) the relationship between the implicit model of other and implicit sociability. Divergent validity of attachment IATs was assessed by examining the relationship between the explicit and implicit attachment. The results showed support for convergent validity of the IAT Model of Self and for divergent validity.

Key words: implicit attitude, attachment, construct validity, self-esteem, sociability.

Attachment theory aims to explore and explain a person's evolved adaptive tendency to maintain proximity to an attachment figure. Attachment is defined as an affectional bond that a person forms to another specific person, usually a parent (Ainsworth, Bell & Stayton, 1974) or a romantic partner.

The main purpose of the present study is to develop Implicit Association Tests (IAT) for measuring attachment dimensions according to the two-dimensional, four category model of attachment proposed by Bartholomew and Horowitz (1991) and to examine these tests' construct validity.

Attachment theory

Attachment theory was founded by the psychoanalyst John Bowlby (1969) and further developed, through empirical studies, by the psychologist Mary Ainsworth (1974). Bowlby studied how an early separation from parents influences a child and its personality development. Attachment can be seen as felt safety and "lasting psychological connectedness between human beings" (Bowlby, 1969, p. 194). Bowlby (1969) believed that there are four distinguishing characteristics of attachment: a) *proximity maintenance* – the child's desire to be near the people it is attached to, usually the parent or the caregiver, b) *safe haven* – the attachment figure acts as a safe haven to return to for comfort and safety when the child is faced with fear or threat, c) *secure base* - the attachment figure acts as a base of security from which the child can explore the surrounding environment and d) *separation distress* - anxiety that occurs when the attachment figure is absent.

Ainsworth, Blehar, Waters and Wall (1978) used a laboratory procedure called the *strange situation* to assess infants' attachment style by measuring separation distress. The strange situation consists of eight episodes presented in a standard order for all subjects (Ainsworth et al., 1978) with the situation expected to be the least stressful presented first. These various

episodes are expected to elicit behaviours from infants that can be used as the basis for classifying the infant into one of three attachment categories – secure, anxious-resistant and anxious-avoidant. The infant is first, after a short introduction, observed with its mother in an unfamiliar but unthreatening situation where the child is able to explore the new environment. While the mother is present a stranger enters the room and after a short conversation with the mother gradually approaches the child. The mother leaves the room unnoticed leaving the child faced with the first separation episode. After a couple of minutes mother returns and comforts the child and then leaves again together with the stranger. The infant is now left alone. After a few minutes the stranger enters alone and approaches the child. In the last episode the mother enters the room, greets the child and picks him up. The stranger leaves unnoticed. The infant's behaviour upon the mother's return into the room serves as the basis for classifying him/her into one of the three attachment categories. *Securely attached* infants explore the playroom and react positively to strangers. They are distressed when the mother leaves and happily greet her when she returns (Ainsworth et al., 1978). *Anxious-resistant* infants are fearful when the mother is present, demand her attention and are distressed when she leaves. These infants are not soothed when the mother comes back and can angrily respond to her attempts at contact (Ainsworth et al., 1978). *Anxious-avoidant* infants show very few signs of attachment, rarely cry when the mother leaves and do not seek contact when she returns.

One of the most important presumptions of the attachment theory is that a person's early attachment experiences become gradually internalized through development of internal working models of attachment (Bowlby, 1969). People use these internal working models of attachment as mental representations of themselves and the others. Internal working models of attachment control a person's perception, regulations of feelings and processing of information in close relationships. They facilitate perception of present events and planning of future events. The most important feature of a working model of attachment is our conception about who our attachment figures are, where they can be found and how we can expect them to react in a certain situation (Pietromonaco & Barrett, 2000). Internal working models originate from our beliefs about how we are accepted by our attachment figures. The quality of our early relations shapes our self-esteem and its different forms, as ability and lovability, as well as our conception of other people's reliability and trustworthiness. According to Bowlby (1994), an attachment style formed in the childhood remains stable throughout the lifetime although recent research only partially confirms this hypothesis.

The four category attachment model. Hazan and Shaver (1987) examined the possibility that romantic love is an attachment bond formed between two adult lovers similar to the affectional attachment bonds formed early in life between parents and child. They translated the three styles of attachment in infancy - *secure, anxious* and *avoidant* - into terms appropriate to adult romantic love. An important starting point in Hazan and Shaver's (1987) research was the continuity of relationship style throughout life due to Internal Working Models of self and social life.

Bartholomew and Horowitz (1991) proposed a new four-category model of attachment styles in adulthood by defining a combination of two constructs: a person's model of self and model of other. This new model can be seen as a prototypic extension of the three-category model (Hazan & Shaver, 1987) into four new categories: *secure, fearful, preoccupied* and *dismissive*. Figure 1 shows the combination of self- and other-models into four new categories of attachment. People with a positive model of self and a positive model of other are categorized into the *secure* group. These individuals are supposed to have a high sense of worthiness and expect other people to be accepting, accessible and responsive. People who have a positive model of self combined with a negative model of other correspond to the

category *dismissive*. Dismissive individuals are characterized by a positive sense of love-worthiness combined with a negative sense of other-regard. When a negative model of self is combined with a positive model of other the individual will be categorized as *preoccupied* which corresponds to high sense of unworthiness and positive image of others. The *fearful* group is characterized by negative self and other models. This group indicates high sense of unlovability and an expectation that others will be untrustworthy and rejecting.

Bartholomew and Horowitz (1991) showed that their four-category model can be reproduced in three types of data – interview, self-report and friend-report. In the same study Bartholomew and Horowitz (1991) showed that measures of self-concept (self-esteem, self acceptance and distress) differentiated the attachment groups along the model of self continuum and that sociability measure differentiated the attachment categories on the model of other scale. The secure and dismissive categories were positively correlated with the measures of self-concept whereas the fearful and preoccupied categories were negatively correlated with measures of self-concept. On the other hand, the secure and preoccupied categories were positively correlated with sociability whereas the fearful and dismissive categories were negatively correlated with sociability.

MODEL OF SELF

	Positive	Negative
Positive	SECURE	PREOCCUPIED
Negative	DISMISSING	FEARFUL

MODEL OF OTHERS

Figure 1. The four-category model of adult attachment (Bartholomew & Horowitz, 1991)

Automaticity of internal working models of attachment. According to Bowlby (1973), several IWMs exist within the same individual and differ in their degree of automaticity. Internal working models of attachment are claimed to be unconscious structures operating outside the conscious awareness (Bowlby, 1973; Bretherton & Mullholland, 1999). At the same time, the existing attachment measures are almost exclusively explicit; either self-report or interviews. Most of these various measures of adult attachment have, so far, not only shown low mutual convergence (Bartholomew & Shaver, 1998; Cromwell & Treboux, 1996) but also inability to measure automatic attachment processes (Maier, Bernier, Pekrun & Zimmerman, 2004). Proponents of AAI (Adult Attachment Interview; George, Kaplan & Main, 1985) claim that this instrument is the only measure able to tap into unconscious attachment models (Furman & Wehner, 1994, Main, Kaplan & Cassidy, 1985).

Maier et al. (2004) based their experiments on the widely claimed assumption that internal working models of attachment are unconscious representations of childhood attachment experiences. The goal of their study was to investigate the capacity of two popular measures of IWM – AAI and IPPA (Inventory of Parent and Peer Attachment; Armdsen & Greenberg, 1987) – to assess unconscious attachment models. Together with IPPA and AAI, Maier et al. (2004) incorporated in their study activation of unconscious processes by means of priming. The priming technique used was the very controversial Subliminal Psychodynamic

Activation (SPA; Silverman & Silverman, 1964) based on subliminal presentation of sentences expected to activate unconscious processes. Behavioural effects of this subliminal activation were then observed by measuring response latency. Maier et al. (2004) study showed that attachment organisation assessed by the AAI correlates with priming effects whereas the IPPA scores were negatively or not related to priming. These results were supportive for the researchers' assumption that the AAI assesses unconscious working models of attachment and that automatic processes exist and are measurable.

Implicit attitudes

Implicit attitudes are evaluations and preferences that are automatically activated and exist outside of conscious awareness or conscious control (Nosek & Bananji, 2001; Geer & Robertson, 2005). Various implicit measures of attitudes claim to assess attitudes that respondents may not be willing to report directly in self-report tests or may not even be aware of themselves (Wittenbrink & Schwartz, 2007). Implicit measures can be defined as "measurement outcomes that reflect the to-be-measured construct by virtue of processes that are uncontrolled, unintentional, goal independent, purely stimulus driven, autonomous, unconscious, efficient or fast" (De Houwer & Moors, 2007, p.181).

Limitations of explicit self-reports. The vast majority of attitude tests today use explicit self-reporting methods (Egloff & Schmukle, 2002). When researchers want to know people's attitudes they simply ask people to rate themselves on a scale which represents a number of possible alternatives. There are some important problems related to self-report measures. Due the participants' *introspective limits*, i.e. their inability to give adequate answers on the intended content domain because of the lack of awareness, the participants are unable to accurately indicate their preference on a scale (Egloff & Schmukle, 2002). The *response factors* which refer to participants' willingness to report accurately on themselves can also influence the accuracy of self-reports. Factors as *demand characteristics, evaluation apprehension* and *faking* have strong influence on self-report measures. Another problem is that respondents may give answers that are highly context loaded and may vary depending on who asks and how they ask. Context effects reflect strategic responding as well as communicative and cognitive processes involved in question comprehension and judgement formation (Witterbrink & Schwartz, 2007).

Implicit Association Test (IAT). Ever since the 19th century and Donders' (1868) important discovery that the time to perform a simple mental task is directly related to the nature of the task performed and that the response latency tells us a great deal about the task itself and about our relation between the mental process and the task, researchers have used latency based instruments to assess various psychological processes. By variation in simple stimuli and subjects' choices and by computing the delay between stimulus presentation and correct response, it is possible to understand thought processes (Lane, Banaji, Nosek & Greenwald, 2007). The harder the mental task the longer the time for making decision and the more errors that the task may end in. It is also known that the association is easier when the response is to be performed on the same side of the body where the stimulus is presented. If the stimulus is presented on the left side of the screen the response will be faster when the movement of the left hand is required for response.

   Greenwald, McGee and Schwartz (1998) presented a new technique called Implicit Association Test (IAT) in which participants read concepts and attributes on a computer screen and are supposed to press a computer key as soon as possible after reading. This is usually done for seven trials and the method provides an estimate of the strength of

association between the *concepts* and the *attributes*. An assumption of the test is that strongly associated attribute-concept pairs should be easier to classify together than weakly associated or opposed pairs.

Lane et al. (2007) presented a schematic overview of the structure of the IAT procedure with an example of assessing implicit attitudes towards flowers relative to insects (see Table 1).

Table 1. Schematic overview of examples of categories and attributes in an Implicit Association Test (Lane et al., 2007)

BLOCK	LEFT KEY	RIGHT KEY
1	FLOWER	INSECT
2	GOOD	BAD
3	FLOWER GOOD	INSECT BAD
4	FLOWER GOOD	INSECT BAD
5	BAD	GOOD
6	FLOWER BAD	INSECT GOOD
7	FLOWER BAD	INSECT GOOD

This was a simple task where, in the first stage subjects quickly classified words into categories *flowers* (e.g. rose), by pressing an assigned key on the left side of the computer keyboard and *insects* (e.g. bee) by pressing an assigned key on the right side of the computer keyboard. In stage 2 the same task was repeated, this time for categories "good" and "bad". In stage 3 the categories *flower* and *good* were paired with one another on the left side while the categories *insect* and *bad* were paired on the right side. Pressing the left key was used as a response to any word corresponding to either category *flower* or category *good* appearing on the screen. In the similar fashion, pressing the right key was used as a response to an item from either category *insect* or *bad*. Stage 4 repeats stage 3 introducing some additional trials. In stage 5 the position of items in stage 2 is reversed. In the similar manner items in stages 6 and 7 are reversed pairings of stages 3 and 4.

If a participant's attitudes towards flowers are more positive than her/his attitudes toward insects, the response is expected to be more rapid in stages 3 and 4 where the paired combinations are "flower + good" and "insects + bad" then in stages 6 and 7 where the paired combinations are "flower + bad" and "insects + good". The opposite can be expected when the attitudes are more positive towards insects than the attitudes towards flowers. The relative strength of association between the first versus the second pairings is provided by measuring the difference in latency to respond and by calculating the effect of the response difference between the pairings. This value is known as *D measure* (Lane et al., 2007) and will be described in detail later in this paper. One of the first IAT measures was the IAT for self-esteem developed by Farnham, Greenwald and Banaji (1999). This IAT will be used in this study.

Reliability and validity of IAT. How can we know that implicit cognitions are distinct from explicit ones and if they are, how can we know that they represent true attitudes, identities or beliefs? Constructs measured by implicit tests differ from those assessed by the explicit ones and it is not easy to know whether these two really show two different underlying representations. What is true is that participants are often surprised by their scores on IAT which suggests that IAT unmasks attitudes that are not accessible by self-reports (Lane et al., 2007).

Lane et al. (2007) discuss the reliability and the validity of IAT measures. Main threats to reliability of implicit instruments are errors due to environmental disturbances of different kinds – a participant's cough or sneeze, a car horn, an eye blink. In general, the internal consistency of measures based on response latency is lower than the internal consistency of measures based on self report (Buchner & Wippich, 2000; Perruchet & Bauveux, 1989). Compared to other implicit measures of self-esteem IAT has shown higher test-retest reliability (Bosson, Swann & Pennebaker, 2000).

The relationship between multiple IATs assessing different constructs follows a theoretically predicted manner which suggests that the *nomological validity* of IAT is high (Lane et al., 2007). Greenwald et al. (2002) showed for example that the higher a person's self esteem, as measured with IAT, the stronger the in-group-bias. Some groups showed reduced in-group preference as predicted by the System justification theory (SJT; Jost & Banaji, 1994). One specific prediction of SJT is that people belonging to lower-status groups should show lower implicit in-group bias. Indeed, Black Americans (Ashburn-Nardo, Knowles, & Monteith, 2003; Livingston, 2002; Nosek et al., 2002), overweight and poor people (Rudman, Feinberg, & Fairchild, 2002) showed outgroup preference.

An interesting and important question answered by Lane et al. (2007) is whether IAT correlates with explicit measures. A meta-analysis (Hoffmann, Gawronski, Gschwender, Le & Schmitt, 2005) across 126 studies found that correlations between implicit and explicit measures range from r=-.25 to r=.60 with average of r=0.19. Across 17 IATs once available on the Internet, correlations between implicit and explicit measures ranged between r=.13 to r=.75 with median value r=.22. It is important to emphasize that implicit and explicit attitudes are different constructs and even when their measures correlate they actually measure different constructs (Greenwald & Banaji, 1995; Wilson, Lindsey and Schooler, 2000). One important support for distinction between implicit and explicit attitudes comes from Nosek, Banaji & Greenwald (2002) research where implicit and explicit attitudes predicted unique variance in meaningful criterion variables.

Poehlman, Uhlmann, Greenwald and Banaji (2005) performed a meta-analysis of 86 samples and found that IAT is a good predictor of social judgements, psychological responses and social action. Egloff and Schmukle (2002) examined predictive validity of IAT-anxiety by testing prediction of behavioural anxiety indicators during stressful speech. IAT significantly predicted three behavioural indicators of anxiety - speech dysfluency, hand position and movements and nervous mouth movements.

Egloff and Schmukle (2002) examined the internal consistency and stability of IAT. They administrated IAT-Anxiety twice with a time distance of one week. The internal consistency found after calculating Cronbach's alpha was high (0.77 and 0.8). Test stability (test-retest correlation) was r=0.57. IAT-anxiety was neither significantly correlated with explicit measures of anxiety nor explicit measures of social reliability.

In their second study Egloff and Schmukle (2002) inspected fakability of IAT by assigning participants randomly to a faking condition and to a control condition. The subjects displayed lower explicit anxiety in the faking condition whereas IAT scores were not significantly affected by the treatment.

De Houwer, Beckers and Moors (in press) measured newly formed attitudes in two groups of participants. De Houwer et al. (in press) observed that faking instructions can influence the direction of the IAT effect and that IAT should be used with caution when measuring development of implicit attitudes.

Limitations of IAT. According to Schmukle and Egloff (2006) there is a growing amount of literature that points out limitations connected with IAT. There is research showing that IAT might measure something else than only implicit associations. Studies conducted by

Rothermund and Wentura (2004) showed that IAT might measure *salience asymmetries*. Other studies found relationships between IAT measures and *task-switching abilities* (Mierke & Klauer, 2003). The main limitation of IAT is its complying on a comparison of responses between two different blocks of trials which leads to further limitations. Sensitivity to order in which the two different critical blocks are presented (Greenwald et al., 1998) is one of these limitations. Another important limitation is that the IAT is restricted to assessment of only one personality dimension per test. In order to measure several personality dimensions several separate IATs are needed.

Using idiographic stimuli in IAT. There is a possibility for test developers of IAT to use idiographically generated stimuli for target concept terms. The ideographical stimuli are the words, pictures or objects personally related to the target person (personal name, family name, city of birth etc.). Before performing the actual IAT categorization tasks participants are prompted to generate a list of uniquely descriptive words (e.g. target person's first name, last name, city of birth, city of residence etc.) and a list of non-descriptive words (e.g. first name and city that cannot be associated with the target person). Researchers in several studies have used ideographic IATs (see Greenwald & Farnham, 2000; Aidman & Carroll; Zayas & Shoda, 2005). Greenwald and Farnham (2000) observed that idiographic IAT measures correlate more highly with explicit measures.

Attachment IAT

IAT measures have shown good reliability and validity across several studies and seem to be a good instrument for assessing automatic associations and implicit effects (Lane et al, 2007). There is an increasing need for measuring automatic and unconscious attachment processes that can be activated in real-life situations. The theoretical base used in this study is the two-dimensional four-category model of attachment structured around two axes, one corresponding to the *model of self* and the other corresponding to the *model of other* (Bartholomew & Horowitz, 1991). An implicit attachment model can be constructed around two IAT measures, one of them measuring model of self and the other one measuring model of other.

Attachment models used in attachment IAT. For the purpose of this study, an adapted model of attachment, based on Bartholomew and Horowitz (1991) model (see Figure 2 for illustration), was used. As stated before, there is a limitation in IAT which only allows measuring along one single construct continuum at a time. Due to this limitation to the IAT it was necessary to make some adaptations to the attachment model. In the new model, the two main dimensions were intact but it was necessary to limit the measurement to only one characteristic per dimension. Therefore, one IAT per attachment dimension was needed. The attachment dimension of *model of self* is represented by *felt lovability* while the dimension of *model of other* is represented by *felt partner availability*. These two characteristics are chosen because they seem to represent the core of the respective attachment dimension (Bartholomew & Horowitz, 1991). Two versions of this model were developed in the present study, the first one using one idiographic stimulus per dimension, the second one using general stimuli alone. The stimuli used to represent the attribute categories were different in the two IAT Attachment setups.
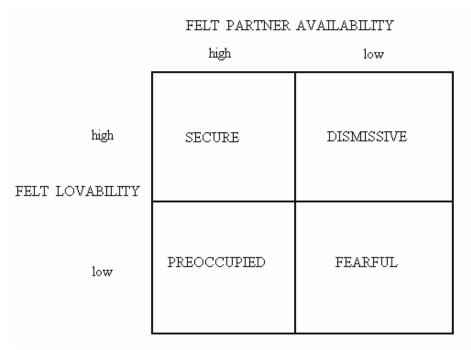
FELT PARTNER AVAILABILITY

	high	low
high	SECURE	DISMISSIVE
low	PREOCCUPIED	FEARFUL

FELT LOVABILITY

Figure 2. The adapted two-dimensional model of attachment used in this study

Validation hypotheses for attachment IAT. Two Implicit Association Tests are used to examine the convergent validity of the Attachment IATs. The first one is IAT for self-esteem developed by Greenwald et al. (1998) and the second one is Sociability IAT. Divergent validity of the attachment IAT is assessed by investigating the relationship between explicit and implicit attachment measures. Following results are expected:

1. For evaluation of convergent validity:
   o Implicit self-esteem is positively related to implicit model of self. (h1)
   o Implicit sociability is positively related to implicit model of other. (h2)
2. For evaluation of divergent validity:
   o Relationship between explicit model of self (anxiety) and implicit model of self should be lower than the relationship between the two implicit models of self. (h3)
   o Relationship between explicit model of other (avoidance) and implicit model of other should be lower than the relationship between the two implicit models of other. (h4)
3. Other relationships:
   o Relationship between two implicit models of self, as measured by the IATs developed in this study, should be positive. (h5)
   o Relationship between two implicit models of other, as measured by the IATs developed in this study, should be positive. (h6)

This initial validation of the attachment IAT should be seen only as the first step in a longer validation process. Further validation is needed, specifically tests of divergent and convergent validity by means of assessing behaviours in the real life and comparing them to the IAT effects.

M e t h o d

Participants

The study was conducted at a vocational college in south of Sweden with 41 participants, of which 10 women (age $M = 39.8$, $SD = 6.05$) and 31 men (age $M = 34.29$, $SD = 7.30$). All the tests were performed at the same college, mainly in two computer rooms.

The participants were contacted via e-mail or asked individually to take part in the study. Those who answered affirmatively were randomized into one of the four testing conditions described below. One important requirement was that the participants were either presently or recently enrolled in a romantic relationship. Every participant was provided with a brief introduction and description of the test procedure and conditions and every participant was given a written informed consent according to the ethical principles. The participants got a simple description of the purpose of the study before they performed the tests and a more detailed information after the test session. Entire test session took between 35 and 45 minutes.

Materials

Apparatus. FIAT. All IAT measurements were administered on IBM compatible personal computers with Windows XP Professional operating system using Farnham Implicit Association Test (FIAT) v2.3 software (Farnham, 1998). Participants gave their responses in FIAT by pressing A-key with their left hand and 5-key (on the numeric key pad) with their right hand. The software recorded every action to a raw data output file which could later be used for further analysis. The data recorded to the output file was, among other things, subject number, gender, session and block number for every session, latency for every response, correctness of every response and the placement of the response (left or right side).

MATLAB. MATLAB software version 6.5 was used for calculating D measure from the FIAT raw data files. All the data from the FIAT raw data files was processed using a Matlab application developed by Professor Georg Stenberg at Kristianstad University.

SPSS. SPSS software v 12 was used for data processing and analysis.

Measures. Two IAT attachment instrument setups were developed for the purpose of the present study. The first IAT attachment setup contained two idiographic stimuli which participants generated at the beginning of every IAT discrimination task. In FIAT, every participant was prompted to generate one self-related and one partner-related stimulus. These two stimuli were participant's name and partner's name and were used as items in *IAT Attachment Model of Self* and *IAT Attachment Model of Other* respectively. The second IAT instrument contained only general stimuli and was again comprised two IAT measures, one for each dimension of attachment. Instruments used for assessment of explicit attachment were ECR (Experience in Close Relationship; Brennan, Clark & Shaver, 1998) and SAQ (Situational Attachment Questionnaire; developed in the present study).

Attachment IAT using idiographic stimuli (IAT Attachment 1). An implicit measure of attachment, comprising two IATs, was administrated in order to assess each dimension of the four-category model (see Bartholomew & Horowitz, 1991). I used the similar rationale as Farnham et al. (1999) used when developing their IAT Self-esteem.

In order to assess the first dimension of attachment, *felt self-worthiness (IAT Attachment 1 Model of Self)*, the categorization into *self* and *other* categories was combined with classification of stimuli into *lovable* and *unlovable* categories. This model comprises a sequence of seven test blocks (see Figure 3 for overview). Each block contains

discrimination of target concepts and attributes. The correct response to every stimulus item is indicated by black circles. Blocks 1, 2, 3, 5 and 6 are practice blocks comprising 20 trials each. Blocks 4 and 7 are "for real" containing 40 trials each.

BLOCK 1

me		others
●	I	
●	first name	
	others	●
	they	●
●	my	
	them	●
●	me	
●	mine	
	their	●
	it	●

BLOCK 2

lovable		unlovable
●	liked	
●	lovable	
	execrable	●
	hateful	●
●	lovely	
	obnoxious	●
●	admirable	
	unpleasant	●
●	sweet	
	disgusting	●

BLOCK 3

me lovable		others unlovable
●	I	
	others	●
●	lovely	
	obnoxious	●
	they	●
●	admirable	
●	me	
●	sweet	
	them	●
	hateful	●

BLOCK 4

me lovable		others unlovable
●	liked	
	their	●
●	my	
	disgusting	●
	hateful	●
●	me	
●	I	
●	admirable	
	execrable	●
	them	●

BLOCK 5

others		me
	me	●
	mine	●
●	others	
●	their	
	my	●
●	them	
	I	●
	first name	●
●	they	
●	it	

BLOCK 6

others lovable		me unlovable
	my	●
●	liked	
	hateful	●
	I	●
●	their	
	execrable	●
	disgusting	●
●	them	
●	it	
●	admirable	

BLOCK 7

others lovable		me unlovable
	hateful	●
	I	●
	my	●
	disgusting	●
●	liked	
●	their	
●	them	
●	admirable	
	execrable	●
●	it	

Figure 3. Illustration of the IAT Attachment 1 Model of Self (using idiographic stimuli).

In block 1 participants practiced discrimination on the target level by categorizing items into *me* and *other* categories. In block 2 participants did similar thing for attribute categories *lovable* and *unlovable*. In block 3 participants practiced categorization of stimuli into one of the two combined categories, each including one attribute and one target. The categories were assigned the same key as in the two preceding blocks; categories *me* or *lovable* were assigned to the left key (A) and *other* or *unlovable* were assigned to the right key (5). Block 4 was the first of the two critical trials and was the same as block 3 but this time with 40 trials. In block 5 the targets *me* and *other* from the block 1 were reversed. Block 6 was a practice block complementary to block 3 with the difference that this time targets (me and others) were switched. Block 7 was the second critical block and complementary to block 4 but this time with switched target categories.

The second dimension of attachment, *IAT Attachment 1 Model of Other*, was measured by assessing the strength of association between the categories *partner* and *availability*. The categorization of the target categories *partner* and *others* were combined with classification of stimuli items into categories *availability* and *unavailability*. First two blocks were practice blocks, the first one for classification to the target categories (partner and others) and the second one to the attribute categories (available and unavailable). In blocks 3 and 4 participants classified stimuli into two combined categories (e.g. partner + available and other + unavailable). In block 5 the target categories from block 1 were reversed. See Figure 4 for an overview and appendix 1 for a complete list of stimuli items.

	BLOCK 1	BLOCK 2	BLOCK 3	BLOCK 4	BLOCK 5	BLOCK 6	BLOCK 7
	Attribute Discrimination	Target Discrimination	Initial combined task	Initial combined task	Reversed target discrim.	Reversed combined task	Reversed combined task
Categories	● Partner Others ●	● Available Unavailable ●	● Partner ● Available Others ● Unavailable ●	● Partner ● Available Others ● Unavailable ●	● Others Partner ●	● Others ● Available Partner ● Unavailable ●	● Others ● Available Partner ● Unavailable ●
Sample items	● sweetheart ● darling they ● their ●	● Present ● Disposable Absent ● Away ●	● sweetheart ● Present they ● Absent ●	● sweetheart ● Present they ● Absent ●	● they ● their sweetheart ● darling ●	● they ● Present sweetheart ● Absent ●	● they ● Present sweetheart ● Absent ●
Trials	20	20	20	40	20	20	40

Figure 4. Illustration of IAT Attachment 1 Model of Other (using idiographic stimuli).

Attachment IAT using generic stimuli (IAT Attachment 2). Second attachment IAT setup was designed to assess the two attachment dimensions *avoidance* and *dependence* by using two new IAT measures containing general stimuli. Two attribute categories, *assets* and *deficits*, were used for every attachment dimension. The target categories used in this setup were as in the idiographic model, *me + others* and *partner + others*, this time with general items only. The test procedure was very similar to the one used with IAT Attachment 1. See Appendix 1 for a complete list of stimuli.

IAT Self-Esteem. IAT for self-esteem developed by Greenwald et al. (1998) was used in this study. The stimuli items used in this IAT are shown in Appendix 1.

IAT Sociability. An IAT for assessing social orientation was developed for the purpose of this study. Categories *me, others, sociability* and *loneliness* were used. See Appendix 1 for a complete list of stimuli.

Experience in Close Relationships (ECR) Inventory. ECR is a self-report measure developed by Brennan, Clark and Shaver (1998). This questionnaire measures a person's placement on one of two attachment dimensions – *anxiety (model of self)* and *avoidance (model of other)*. In this study the Swedish version of the test translated by Bo Persson (1998) was used. ECR questionnaire consists of 36 items and is designed to determine individual differences with respect to attachment related avoidance and attachment related anxiety (see Appendix 2 for ECR). The participants rated every item on the scale from 1 to 7 to give their degree of agreement to every statement.

Situational Attachment Questionnaire (SAQ). This measure was developed for the purpose of this study. The aim was to assess attachment-related emotional reactions to different kinds of real-life relational events and to examine whether the implicit attachment attitudes associate with attachment-related categories based on self-reported behaviours in real-life relational situations. Real-life situations can be seen as attachment theory at work and is not to be neglected. Six kinds of possible relational events based on the model proposed by Mikulincer and Shaver (2005) were tested. This model uses three categories of attachment: *secure, avoidant* and *anxious*. One question and three answers per question were developed for every relational event. Each answer corresponds to one of the attachment styles. Each answer corresponded to one of the attachment dimensions secure, anxious and ambivalent. The participants rated each answer on the scale 1 to 7 to show their degree of agreement. See Appendix 3 for SAQ.

Procedures

The entire test session contained six IAT measures and two questionnaires. Two different IAT attachment setups were administered with two IATs per setup, one for each attachment dimension. Additional two IAT measures were administrated for assessing self-esteem and sociability. Partial counterbalancing, described bellow was used for the IAT sequence. Every participant first performed six IATs in a row and then completed two self-report questionnaires.

Partial counterbalancing of IAT sessions. Order of implicit measures does not systematically affect the relationship between explicit and implicit measures (Lane et al., 2007). However, order effects within IAT are well documented and it is recommended for researchers to counterbalance the presentation of order of the combined conditions. Fixed order of pairings may give overestimation or underestimation of the effect. If, for example *me + pleasant* stage is always presented first then there is a risk for overestimate of the magnitude of the effect between these two categories. Six IAT measures in a row plus a requirement for counterbalancing within every IAT in order to compensate for order effects (Lane et al., 2007) yield 12 different test conditions and 12! (479,001,600) different sequences. Due to insufficient number of participants complete counterbalancing was not possible. Instead, participants were assigned to one of four testing sequence conditions. See Figure 5 for overview of partial counterbalancing technique used in this study.

TESTING CONDITION 1	TESTING CONDITION 2	TESTING CONDITION 3	TESTING CONDITION 4
IDIOGRAPHIC IAT MODEL OF SELF	IAT - SOCIABILITY	IDIOGRAPHIC IAT MODEL OF SELF (IC)	IAT – SOCIABILITY (IC)
IDIOGRAPHIC IAT MODEL OF OTHER	IAT - SELF ESTEEM	IDIOGRAPHIC IAT MODEL OF OTHER (IC)	IAT - SELF ESTEEM (IC)
GENERAL IAT MODEL OF SELF	GENERAL IAT MODEL OF OTHER	GENERAL IAT MODEL OF SELF (IC)	GENERAL IAT MODEL OF OTHER (IC)
GENERAL IAT MODEL OF OTHER	GENERAL IAT MODEL OF SELF	GENERAL IAT MODEL OF OTHER (IC)	GENERAL IAT MODEL OF SELF (IC)
IAT - SELF ESTEEM	IDIOGRAPHIC IAT MODEL OF OTHER	IAT - SELF ESTEEM (IC)	IDIOGRAPHIC IAT MODEL OF OTHER (IC)
IAT - SOCIABILITY	IDIOGRAPHIC IAT MODEL OF SELF	IAT – SOCIABILITY (IC)	IDIOGRAPHIC IAT MODEL OF SELF (IC)

Figure 5. Partial counterbalancing
Note: IC=Internal Counterbalancing.

IAT scoring procedure. The scoring method used in the present study is the one proposed by Greenwald et al. (2003). This scoring method recommends using the D effect measure which is computed as the difference in average response latency between the IAT's two combined tasks divided by standard deviation of subject response latencies in the two combined tasks (Lane et al., 2007). Table 2 shows stages of the scoring algorithm for calculating D measure.

Table 2. Overview of IAT scoring method recommended by Greenwald et al. (2003)

STAGE	CALCULATION PERFORMED
1	Trials with latencies longer than 10,000 ms are deleted
2	Subject for whom more then 10% of trials have latency less than 300 ms
3	Mean latency of correct responses for each combined stage (3,4,6 and 7)
4	Replace each error latency with an error penalty (stage mean + 600 ms)
5	"Inclusive" standard deviation for all trials in stages 3 and 6 and 4 and 7 is computed
6	Mean latency for responses for each of stages 3,4, 6 and 7 is computed
7	Two mean differences are computed ($M_{stage\ 6} - M_{stage\ 3}$ and $M_{stage\ 7} - M_{stage\ 4}$)
8	Each mean difference is divided by its associated standard deviation computed in stage 3
9	D = the equal-weight average of the two resulting ratios calculated in stage 8

R e s u l t s

The reliability of self-reporting measures was assessed by calculating Cronbach's α. See Table 3 for overview. The calculated Cronbach's Alphas for the SAQ measures were lower than the recommended level, α = 0.7.

Table 3. Cronbach's Alpha for ECR and SAQ measures

Measure	N	α
ECR		
Avoidance	18	0.86
Anxiety	18	0.85
SAQ		
Secure	6	0.64
Anxious	6	0.61
Avoidant	6	0.52

One-way between subjects ANOVAs were performed for each IAT measure in order to examine whether there is any significant gender effect. None of the IAT attachment measures showed significant difference between genders. There was no significant gender effect for IAT self-esteem or IAT sociability either. See Table 4 for an overview.

Table 4. Results of One Way between genders ANOVAs for the IAT measures

IAT measure	Females (N=10)		Males (N=31)		$F_{(1, 39)}$	Sig.
	M	SD	M	SD		
Attachment 1 Model of Self	0.76	0.39	0.64	0.32	0.90	0.39
Attachment 1 Model of Other	0.59	0.28	0.59	0.29	0.01	0.93
Attachment 2 Model of Self	0.32	0.31	0.49	0.32	2.01	0.16
Attachment 2 Model of Other	0.53	0.12	0.72	0.36	2.72	0.11
Self-esteem	0.49	0.28	0.55	0.34	0.26	0.61
Sociability	0.12	0.37	0.22	0.46	0.37	0.54

Note: Higher values indicate higher implicit self-esteem, sociability, model of self and model of other.

One-way between subjects ANOVAs were calculated for each IAT measure in order to investigate whether there is any significant effect across the testing conditions. No significant differences across the testing conditions could be found. See Table 5 for overview.

Table 5. Results of One Way across test conditions ANOVAs for the IAT measures

IAT measure	Testing Condition 1 (N=11)		Testing Condition 2 (N=10)		Testing Condition 3 (N=10)		Testing Condition 4 (N=10)		$F_{(3, 37)}$	Sig.
	M	SD	M	SD	M	SD	M	SD		
Attachment 1 Model of Self	0.84	0.26	0.50	0.34	0.73	0.39	0.59	0.29	2.27	0.10
Attachment 1 Model of Other	0.57	0.38	0.55	0.20	0.68	0.27	0.57	0.28	0.41	0.75
Attachment 2 Model of Self	0.51	0.44	0.35	0.26	0.40	0.33	0.51	0.20	0.65	0.59
Attachment 2 Model of Other	0.59	0.33	0.65	0.41	0.67	0.32	0.78	0.27	0.59	0.62
Self-esteem	0.72	0.43	0.55	0.26	0.40	0.23	0.46	0.28	2.09	0.12
Sociability	023	0.43	0.45	0.49	0.00	0.36	0.08	0.40	2.19	0.11

Note: Higher values indicate higher implicit self-esteem, sociability, model of self and model of other.

Pearson correlation coefficients were computed between ECR Anxiety (M = 2.88, SD = 0.83), ECR Avoidance (M = 2.30, SD = 0.83), SAQ Secure (M = 6.26, SD = 0.66), SAQ Anxious (M = 2.80, SD = 0.99), SAQ Avoidant (M = 2.26, SD = 0.74) and each IAT attachment measure: IAT Attachment 1 Model of Self (M = 0.67, SD = 0.38), IAT Attachment 1 Model Of Other (M = 0.59, SD = 0.29), IAT Attachment 2 Model Of Self (M = 0.45, SD = 0.32), IAT Attachment 2 Model of Other (M = 0.67, SD = 0.33), IAT Self-Esteem (M = 0.54, SD = 0.33) and IAT Sociability (M = 0.19, SD = 0.44). See Table 6 for overview.

Convergent validity

The strongest positive correlation was found between IAT Attachment 2 Model of Self and IAT Self Esteem (r^2 = 0.32, p<0.01). IAT Attachment 1 Model of Self and IAT Self esteem were also positively correlated (r^2 = 0.18, p<0.01). These two findings support the first hypothesis of this study in which it was predicted that the attachment dimension model of self should be positively associated with self-esteem. (h1)

According to the second validation hypothesis (h2) of this study a positive association between IAT Model of Other and IAT Sociability was expected. Pearson correlation could not reveal any positive associations, neither between IAT Attachment 1 Model of Other and IAT Sociability (r^2 = 0.02, p = *ns*) nor between IAT Attachment 2 Model of Other and IAT Sociability (r^2 = 0.002, p = *ns*). The second validation hypothesis could thus not be supported.

Table 6. Pearson correlations between IAT, SAQ and ECR measures

Measure	1	2	3	4	5	6	7	8	9	10
IAT										
1. Attachment 1 Model of Self	-									
2. Attachment 1 Model of Other	0.32*	-								
3. Attachment 2 Model of Self	0.43**	0.49**	-							
4. Attachment 2 Model of Other	0.07	0.38*	0.35*	-						
5. Self-esteem	0.42**	0.24	0.57**	0.23	-					
6. Sociability	0.04	0.14	0.30	0.04	0.38*	-				
ECR										
7. Avoidance	-0.30	-0.11	-0.35*	-0.13	-0.47**	-0.25	-			
8. Anxiety	0.06	0.13	-0.15	0.28	-0.17	-0.04	0.38*	-		
SAQ										
9. Secure	0.13	-0.11	0.23	-0.01	0.13	0.22	-0.28	-0.32*	-	
10. Anxious	0.02	0.01	0.08	0.15	0.12	0.18	0.00	0.41**	0.26	-
11. Avoidant	-0.1	0.09	-0.07	0.13	0.03	0.21	0.10	0.28	-0.02	0.39*

Note: ** p<0.01, * p<0.05

Divergent validity

The third validation hypothesis (h3) predicted that the relationship between the explicit model of self (anxiety) and the implicit model of self should be lower than the relationship between the two implicit models of self. In this study two explicit measures of attachment were used – ECR and SAQ. The correlation between the ECR Anxiety and IAT Attachment 1 Model of Self was low and non-significant ($r^2 = 0.004$, p = *ns*). Similarly, the correlation between the ECR Anxiety and IAT Attachment 2 Model of Self was low and non-significant ($r^2 = 0.02$, p = *ns*). The correlations between SAQ Anxious and the implicit models of self were low and non-significant as well; IAT Attachment 1 Model of Self ($r^2 = 0.00$, p = *ns*) and IAT Attachment 2 Model of Self ($r^2 = 0.006$, p = *ns*). All these association levels were lower than the correlations between the explicit models of self, IAT Attachment 1 Model of Self and IAT Attachment 2 Model of Self ($r^2 = 0.19$, p<0.01), as was expected by the third validation hypothesis.

In the fourth validation hypothesis (h4) it was predicted that the relationship between the explicit model of other (avoidance) and the implicit models of other should be lower than the relationship between the two implicit models of other. The correlations between ECR Avoidance and the implicit models of other were low and non-significant; IAT Attachment 1 Model of Other ($r^2 = 0.01$, p = *ns*) and IAT Attachment 2 Model of Other ($r^2 = 0.02$, p = *ns*). In the similar way, the associations between SAQ Avoidant and the implicit models of others were all low and non-significant; IAT Attachment 1 Model of Other ($r^2 = 0.01$, p = *ns*) and IAT Attachment 2 Model of Other ($r^2 = 0.02$, p = *ns*). The calculated association levels between the implicit and explicit models of others were lower than the correlations between the implicit models of other, IAT Attachment 1 Model of Other and IAT Attachment 2 Model of Other ($r^2=0.14$, p<0.05), exactly as predicted by the fourth validation hypothesis.

Relationship between congruent dimensions of implicit attachment

Some other significant correlations were found as well. There were positive and significant correlations between IAT Attachment 1 Model of Self and IAT Attachment 2 Model of Self ($r^2 = 0.19$, p<0.01) as well as between IAT Attachment 1 Model of Other and IAT Attachment 2 Model of Other ($r^2=0.14$, p<0.05). These two findings supported the fifth (h5) and sixth (h6) hypotheses of this study.

Remaining relationships

There were significant correlations between the non-congruent dimensions of attachment in both IAT Attachment measures, IAT Attachment 1 Model of Self and IAT Attachment 1 Model of Other ($r^2=0.10$, p<0.05), IAT Attachment 2 Model of Self and IAT Attachment 2 Model of Other ($r^2=0.12$, p<0.05). A moderate significant correlation between IAT Self-Esteem and IAT Sociability was also found ($r^2 = 0.14$, p<0.05).

There were some significant correlations between the explicit attachment measures as well. The strongest association was found between ECR Anxiety and SAQ Anxious ($r^2 = 0.17$, p<0.01). The intercorrelation between ECR Avoidance and ECR Anxiety was moderate ($r^2 = 0.14$, p<0.05). Similarly, the intercorrelation between SAQ categories Anxious and Avoidant was moderate ($r^2 = 0.15$, p<0.05).

D i s c u s s i o n

The main purpose of this study was to develop implicit measures of attachment models of self and other and to examine their validity. Actually, this is a pioneering attempt to develop IAT for measuring attachment related attitudes. The importance of such an implicit measure of attachment can be traced back to the original attachment theory and Bowlby's (1973) assertion that internal working models of attachment are automatic unconscious structures. Knowing that, it is reasonable to claim that attachment related attitudes should be measured with instruments able to tap into unconscious attachment processes. No such tools exist today.

Relationship between IAT Attachment Model of Self and IAT Self-Esteem

The results show that the implicit levels of felt lovability (Model of Self) in both attachment setups are positively associated with implicit self-esteem. This finding is supportive for the first validation hypothesis of this study in which it was expected that the self-esteem would be positively related to the attachment model of self. Earlier research using explicit instruments has shown that there is significant relation between high self-esteem and secure and dismissive attachment styles (Bylsma, Cozzarelli & Sumer, 1997; Bartholomew & Horowitz, 1991). Although both dismissing and secure individuals show similarly high self-esteem, Bartholomew and Horowitz (1991) suggest that the high self-esteem of dismissive individuals could arise more from their capability of inhibiting and denying their negative feelings about themselves than from their true feelings of self-worth. Dismissive individuals are believed to have low self-esteem at heart, but that they have ability to minimize the importance of other people who they have experienced as rejecting and therefore are able to maintain a high self-esteem (Bartholomew & Horowitz, 1991). It is therefore reasonable to conclude that there should be two aspects of self-esteem in dismissive individuals. The first aspect is the conscious or the explicit one, while the second aspect is the unconscious or the implicit one. The implicit self-esteem in dismissive individuals could therefore be expected to be lower than the implicit self-esteem in secure individuals. Preoccupied individuals, on the other hand, are believed to blame themselves for perceived rejections by others and therefore maintain low self-esteem (Bartholomew & Horowitz, 1991). Positive self-regard in preoccupied and fearful individuals can only be maintained with others' ongoing acceptance (Bartholomew & Horowitz, 1991) because the internal validation is not enough. Secure persons' high self-esteem comes from their true sense of worthiness and their ability to establish self-regard internally without need for external validation. It is therefore reasonable to expect that their implicit self-esteem should be high.

The two implicit lovability measures (IAT Attachment Model of Self) differed in level of association with IAT Self-esteem. It was the test with idiographic stimuli that had the lowest correlation with implicit self-esteem (r = 0.42 vs. r = 0.57). Greenwald and Farnham (2000) observed earlier that idiographic IATs tended to correlate more highly with explicit measures than did the generic IAT (non-idiographic IAT, i.e. IAT with stimuli not personally related to the individual taking the test). The generic IAT measures of attachment correlated slightly higher with the explicit measure (ECR) (see Table 6) in the present study. One possible explanation for the lower correlation of idiographic IAT attachment lovability with implicit self-esteem is that idiographic stimuli probably activate some explicit aspect in IAT. We use our personal name to present ourselves to other people and therefore our personal name can be seen as a social aspect of self-concept. It is possible that explicit aspects of IAT measure activated by an idiographic stimulus (one's personal name for instance) can dependent on the social dimension activated by the stimulus. As a result, the idiographic attachment IAT is

possibly a "less implicit" measure than the non-idiographic attachment IAT and thereby less prone to correlation with implicit measures.

Implicit model of other and implicit sociability

The second validation hypothesis of this study, in which it was expected that the effect of the IAT Sociability would correlate with IAT Attachment Models of Other, could not be supported. One explanation could be that the developed Sociability IAT is not a valid measure of implicit sociability. This measure is completely new, developed for the present study and its validity has not yet been examined.

   Another noteworthy result of this study was the significant correlation between IAT Self-esteem and IAT Sociability. The question is whether this finding should be taken seriously as the Sociability IAT cannot fully be trusted. However, there is support in research literature for positive relationship between extraversion and self-esteem (see Francis & James, 1996). Sociability can be recognized as one aspect of extraversion (Plomin, 1976; Watson and Clark, 1997) even if the sociability should not be regarded as the core of the trait (Lucas, Diener, Grob, Suh & Shao, 2000).

Relationships between explicit and implicit measures

The correlations between the explicit measures of attachment (ECR and SAQ) and the IAT attachment measures were, as expected, low and non-significant and lower than the implicit intercorrelations. The third and fourth validation hypotheses of this study are thereby supported. This finding supports the idea that implicit attachment instruments measure different constructs than the explicit instruments do, which suggests that the implicit cognitions and attitudes are distinct from the explicit ones and that explicit and implicit attitudinal systems somewhere diverge (see Lane et al., 2007; Wilson et al., 2000). Some other studies have also given strong support for the distinction between explicit and implicit attitudes with findings that, for example, implicit and explicit attitudes predict unique variance in math performance (Nosek et al., 2002).

   How can we know which of these tests, the explicit or the implicit ones, measure "real" constructs? A justified counter-question would be: is there such a thing as "real" constructs and how can we be sure that they can be expressed on a Likert scale? Actually it is wrong to say that any of these instruments is the only measure of "real" constructs. IAT is no more a measure of "real" construct than a self-report test using a Likert scale (Lane et al., 2007). A person's result on a test depends on the measurement context, mood of the subject and order of questions (Lane et al., 2007). It is impossible to give an answer to this question. Both explicit and implicit constructs should be regarded as equally "real" in this respect, both of them should play equally important role in studies of attitudes. The main difference between explicit and implicit measures of attitudes is that implicit measure of attitudes (IAT in this case) relate more strongly to activation of amygdala which in its turn suggests that IAT measures more automatic than controlled attitudes (Lane et al. 2007). Implicit constructs can therefore be regarded as automatic or unconscious processes while explicit constructs are influenced by consciously controlled processes. As Fyodor Dostoyevsky once wrote: "Every man has reminiscences which he would not tell to everyone but only his friends. He has other matters in his mind which he would not reveal even to his friends, but only to himself, and that in secret. But there are other things which a man is afraid to tell even to himself, and every decent man has a number of such things stored away in his mind."

Relationship between congruent dimensions of attachment IATs

One of the important findings in this study was the moderate correlation between the two implicit measures of model of self. This result was predicted by the fifth hypothesis. The association was expected because these two measures were supposed to assess the same dimension of attachment. Similarly, the two implicit measures of model of other correlated significantly. This finding was predicted by the sixth hypothesis of this study as these two measures were expected to assess the same construct to a certain degree. Correlations between idiographic and non-idiographic IATs were slightly lower than in the Greenwald and Farnham (2000) study. This outcome could depend upon the fact that, in the present study, the attribute items were completely different in non-idiographic and idiographic IATs. Greenwald and Farnham (2000) used exactly the same attributes in both non-idiographic and idiographic versions of their test.

The correlation between the non-congruent dimensions of attachment is probably due to a combination of chance and insufficient validity in the measuring procedures.

Validity and reliability in the present study

According to Goodwin (2005) there are four ways in which psychological experiments can be considered valid. (1) *Statistical conclusion validity* is high if statistical instruments are used correctly and if the conclusions drawn from the statistical results are appropriate. In the present study the SPSS software is used and all results are reported in form of tables and figures. Reliability for the measures developed for use in this study, IAT Attachment, IAT Sociability and SAQ, has not been thoroughly examined. SAQ showed reliability lower than $\alpha = 0.7$ which can be regarded as too low. ECR questionnaire on the other hand showed high levels of reliability as measured Cronbach's Alpha ($\alpha > 0.8$). (2) *Construct validity* is the adequacy of the definitions for the variables used in a study (Goodwin, 2005). Definitions used for the explicit attachment, self esteem and sociability variables have been used in earlier research literature and their validity has already been examined. (3) *Internal validity* is, according to Goodwin (2005), defined as the degree to which an experiment is methodologically sound and confound-free. The IAT measures used in this study were, in accordance to earlier research, expected to be prone to milieu influence as described earlier in this text. For that reason the experiments were performed in silent rooms free from exterior and interior sounds or disturbing light influences. For moderating of possible sequence effects a partial counterbalancing of IAT sessions was used. The results of the present study could not demonstrate any significant sequence effects. Assessment of construct validity of implicit measures of attachment was one of the purposes of this study and as such it has not been examined in earlier research. (4) *External validity* is considered as the degree to which study findings generalize beyond the experimental context (Goodwin, 2005). The sample used in this study was not random and the gender distribution was less satisfactory with 10 women and 31 men participating in this study. The results of this study can be generalized to the population which this sample represents (students of vocational courses).

Future work

Further testing is needed in order to strengthen the validity and reliability of IAT attachment measures. To ascertain the degree to which the IAT attachment assesses automatic attachment processes it could be suitable to compare the IAT results to results on AAI, which is regarded as a good measure of automatic attachment processes (Maier et al., 2004). Test-

retest reliability of attachment IAT measures should be evaluated as well. As it was pointed out earlier in this report, further validation is needed, specifically tests of divergent and convergent validity by means of assessing behaviours in the real life and comparing them to the IAT effects. The reliability and the validity of the IAT sociability should be further examined. It would be interesting to do a more extensive comparison between implicit and explicit attachment categorizations, with higher number of participants and more balanced representation in all four attachment categories. It would also be interesting to more extensively examine relationship between explicit attachment categories, as measured with ECR, and implicit self-esteem, model of other and model of self.

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A p p e n d i x 1 –
Stimuli items used in the Attachment IATs

Attachment IAT 1 Model of Self

ME	OTHERS	LOVABLE	UNLOVABLE
I	THEY	LIKED	EXECRABLE
"FIRST NAME"	OTHERS	LOVABLE	HATEFUL
MY	THEM	LOVELY	OBNOXIOUS
ME	THEIR	ADMIRABLE	UNPLEASANT
MINE	IT	SWEET	DISGUSTING

Attachment IAT 1 Model of Other

PARTNER	OTHERS	AVAILABILITY	UNAVAILABILITY
SWEETHEART	THEY	PRESENT	ABSENT
DARLING	OTHERS	REACHABLE	INACCESSIBLE
"PARTNER'S NAME"	THEM	SUSCEPTIBLE	AWAY
PARTNER	THEIR	AVAILABLE	RESERVED
LIFE COMPANION	IT	DISPOSABLE	UNAVAILABLE

Attachment IAT 2 Model of Self

ME	OTHERS	ASSETS	DEFICITS
I	THEY	POPULAR	UNLOVED
SELF	OTHERS	LOVED	DISLIKED
MY	THEM	IN DEMAND	IGNORED
ME	THEIR	ADMIRED	DEPRECIATED
MINE	IT	VALUED	ABANDONED

Attachment IAT 2 Model of Other

PARTNER	OTHERS	ASSETS	DEFICITS
SWEETHEART	THEY	AVAILABLE	INACCESSIBLE
DARLING	OTHERS	PRESENT	SELF-CENTRED
BELOVED	THEM	WARM	RUTHLESS
PARTNER	THEIR	CONSIDERATE	COLD
LIFE COMPANION	IT	ACCEPTING	REJECTING

Self-Esteem IAT

ME	OTHERS	PLEASANT	UNPLEASANT
I	THEY	JOY	VOMIT
SELF	OTHERS	PEACE	AGONY
MY	THEM	SUNRISE	DEATH
ME	THEIR	WARMTH	CORPSE
MINE	IT	GOLD	SLIME

Sociability IAT

ME	OTHERS	SOCIABILITY	LONELINESS
I	THEY	COMPANY	ISOLATION
SELF	OTHERS	SOCIETY	SECLUSION
MY	THEM	RELATIONS	SOLITARINESS
ME	THEIR	FRIENDS	LONELINESS
MINE	IT	TEAM	LONE WOLF

Appendix 2 – ECR Questionnaire

ERFARENHETER AV NÄRA RELATIONER

Kön_____ Ålder_____år Subjektnummer: _____

Instruktioner: Följande påståenden handlar om hur du känner dig i kärleksrelationer. Jag är intresserad av hur du i allmänhet uppfattar relationer, inte bara vad som gäller i din nuvarande relation. Svara på varje påstående genom att ange hur väl du instämmer med det.

Skriv en siffra på raden före varje påstående, använd följande skattningsskala:

	instämmer inte alls			neutral			instämmer helt
	1	2	3	4	5	6	7

_____ Jag föredrar att inte visa min partner vad jag känner innerst inne.

_____ Jag oroar mig för att bli övergiven.

_____ Det känns mycket bra för mig att vara nära min partner.

_____ Jag oroar mig en hel del för hur det ska gå med mina relationer.

_____ Det är just när min partner kommer för nära som jag vill dra mig undan.

_____ Jag är orolig för att en partner inte ska bry sig om mig i samma utsträckning som jag bryr mig om honom/henne.

_____ Jag känner mig besvärad när en partner vill komma mycket nära mig.

_____ Jag oroar mig en hel del över att förlora min partner.

_____ Jag tycker inte det är behagligt att öppna mig helt och hållet inför en partner.

_____ Jag önskar ofta att min partners känslor för mig vore lika starka som mina känslor för honom/henne.

_____ Jag vill komma nära min partner men drar mig ändå tillbaka gång på gång.

_____ Jag vill ofta känna mig helt och hållet förenad med en partner och detta skrämmer ibland bort honom/henne.

_____ Jag blir orolig när en partner kommer mig alltför nära.

_____ Jag bekymrar mig för att bli ensam.

	instämmer inte alls			neutral			instämmer helt
	1	2	3	4	5	6	7

_____ Jag tycker det känns tryggt att dela mina privata tankar och känslor med min partner.

_____ Min önskan att komma mycket nära skrämmer ibland bort folk.

_____ Jag försöker undvika att komma alltför nära min partner.

_____ Jag behöver ofta få veta att jag är älskad av min partner.

_____ Jag tycker det är förhållandevis lätt att komma nära min partner.

_____ Ibland känner jag att jag tvingar min partner att visa mer känslor, mer engagemang.

_____ Jag tycker det är svårt att låta mig själv bli beroende av min partner.

_____ Jag bekymrar mig inte ofta över att bli övergiven.

_____ Jag föredrar att inte komma för nära min partner.

_____ Om jag inte kan få min partner att visa intresse för mig blir jag irriterad eller arg.

_____ Jag berättar i stort sett allting för min partner.

_____ Jag tycker inte att min partner vill ha lika mycket närhet som jag vill.

_____ Jag diskuterar ofta mina problem och angelägenheter med min partner.

_____ När jag inte är engagerad i en relation känner jag mig lite ängslig och osäker.

_____ Det känns tryggt för mig att vara beroende av en partner.

_____ Jag blir besviken om min partner inte är tillgänglig så ofta som jag skulle önska.

_____ Jag har inget emot att be en partner om tröst, råd och hjälp.

_____ Jag blir besviken om en partner inte finns där när jag behöver honom/henne.

_____ Det är till stor hjälp att jag kan vända mig till min partner när jag behöver det.

_____ När en partner tycker illa om mig känner jag mig värdelös.

_____ Jag vänder mig till min partner i många angelägenheter inklusive att få stöd och tröst.

_____ Jag tycker mycket illa om när min partner är ute på egen hand och borta från mig.

Appendix 3 – SAQ

Nya instruktioner: Läs igenom följande hypotetiska situationer och svara på varje påstående genom att ange hur väl du instämmer med det. Använd följande skala:

	instämmer		neutral			instämmer	
	inte alls					helt	
	1	2	3	4	5	6	7

Låt ditt svar återspegla ditt mest sannolika beteende/reaktion i en sådan situation, inte det du tycker är det mest önskvärda eller normala.

Föreställ dig en situation där din partner har, utan din vetskap, tagit ut en stor summa pengar från ert gemensamma sparkonto och spenderat den. Hur reagerar du?

_____ Jag blir arg och besviken men kontrollerar min ilska och förklarar för min partner hur jag tycker att det var fel av honom/henne att göra på det där viset och att vi måste reda ut saken.

_____ Jag blir arg men visar inte min ilska öppet utan undertrycker den. Just då känner jag att jag aldrig kan förlåta honom/henne och gör planer på att hämnas.

_____ Jag känner mig arg, sårad, förtvivlad och ledsen.

Tänk dig en situation där din partner gör en överraskningsfest för dig på din födelsedag. Hur reagerar du?

_____ Jag blir mycket glad och tacksam.

_____ Jag blir ganska likgiltig.

_____ Jag reagerar med blandade känslor av glädje, kärlek och misstänksamhet.

Föreställ dig en situation där din partner känner sig upprörd över någonting du har gjort. Hur reagerar du?

_____ Jag känner skuld och försöker reparera skadan.

_____ Jag förstår inte riktigt varför min partner blir så upprörd över småsaker. Därför känner jag förbittring och ilska.

_____ Jag känner skam och förtvivlan och mår illa för att jag har sårat min partner.

Tänk dig en situation där din partner känner sig ledsen över att ha blivit illa behandlad på jobbet. Hur reagerar du?

____ Jag känner medlidande och ger min partner stöd.

____ Innerst inne föraktar jag honom/henne och tycker att det är fel att vara så sårbar och svag.

____ Jag känner mig upprörd för min partners skull. Jag känner förtvivlan för detta kunde ha hänt mig också.

Föreställ dig en situation där din partner känner sig överlycklig över att ha fått en rejäl löneförhöjning. Hur reagerar du?

____ Jag känner lycka, respekt och beundran.

____ Jag blir avundsjuk.

____ Jag känner mig orolig för vår relation eftersom min partners framgångar kan leda till separation.

Tänk dig en situation där du ger din partner en mycket fin present. Hon/han blir mycket lycklig. Hur reagerar du?

____ Jag känner mig stolt och lycklig.

____ Jag känner mig stolt över mig själv.

____ Jag känner lite ångest. Mitt beteende har kanske höjt kraven från min partners sida.

TACK ÄN EN GÅNG FÖR DIN MEDVERKAN!