

UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

School of Psychology



**The Role of Attachment in Emotion Regulation of Traumatic Stress**

by

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**ABSTRACT**

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Recent research has shown that there is a positive relationship between insecure attachment and psychopathology (van IJzendoorn, Bakermans-Kranenburg & Juffer, 2008). However, there is little evidence for the effect of attachment on emotion regulation of traumatic stress. In my first study I examined whether the following variables were protective or risk factors for PTSD or facilitators of posttraumatic growth: adult attachment dimensions, early traumas, self-esteem, and posttraumatic cognitions. I found that individuals with more early traumas, high attachment anxiety, low self-esteem and more negative posttraumatic cognitions exhibited more PTSD symptoms. Furthermore, there was a positive association between low attachment avoidance and posttraumatic growth and between PTSD and PTG. In the second study, I adopted a psychobiological perspective to investigate the effect of oxytocin and secure attachment priming in emotion regulation of trauma in an analogue trauma paradigm (using trauma films). I found that those in the secure versus control neutral prime condition reported more felt-security and happiness. However, both secure priming and oxytocin did not reduce negative mood, trauma intrusions and heart-rate following the trauma film clips. Both studies provide support for the effect of attachment in emotion regulation of traumatic stress.

## LIST OF CONTENT

|                                                                                                    |      |
|----------------------------------------------------------------------------------------------------|------|
| Abstract_                                                                                          | ii   |
| List of Content                                                                                    | iii  |
| List of Tables                                                                                     | v    |
| List of Figures                                                                                    | vi   |
| Author's declaration                                                                               | vii  |
| Acknowledgement                                                                                    | viii |
| CHAPTER 1: Introduction to the Thesis                                                              | 1    |
| CHAPTER 2: Psychological Perspectives on Attachment, PTSD, and PTG                                 | 4    |
| Attachment theory                                                                                  | 5    |
| Attachment styles                                                                                  | 11   |
| Stability and change in attachment styles                                                          | 15   |
| A model of attachment system functioning and emotion regulation                                    | 18   |
| Attachment and adult psychopathology                                                               | 22   |
| Attachment and trauma                                                                              | 23   |
| Self-esteem and posttraumatic cognitions                                                           | 27   |
| Posttraumatic growth following a traumatic event                                                   | 30   |
| Contributors to posttraumatic growth                                                               | 33   |
| Shaefer and Moos' (1998) Model                                                                     | 37   |
| Summary                                                                                            | 41   |
| CHAPTER 3: Psychobiological Mechanisms for PTSD and Emotion Regulation                             | 44   |
| Brewin' Dual- Representation Model (2003)                                                          | 44   |
| Biological underpinnings of stress response following trauma in relation to emotion regulation     | 47   |
| Introduction to bio-psychological underpinnings of emotion regulation and traumatic stress         | 49   |
| Oxytocin as a facilitator for emotion regulation and attachment                                    | 50   |
| Oxytocin as an anxiety buffer factor                                                               | 52   |
| Oxytocin as a social-bonding facilitator                                                           | 54   |
| Oxytocin and traumatic stress                                                                      | 56   |
| Heinrich and Domes (2008) OT model for psychopathology                                             | 59   |
| Attachment system and stress regulation, Maunder and Hunter's (2001) model                         | 62   |
| CHAPTER 4: The Predictors of Positive and Negative Changes in the Aftermath of Adverse Life Events | 71   |
| Method                                                                                             | 79   |
| Participants                                                                                       | 79   |
| Design and procedure                                                                               | 79   |

|                                                                                                                  |     |
|------------------------------------------------------------------------------------------------------------------|-----|
| Instruments                                                                                                      | 80  |
| Results                                                                                                          | 83  |
| Data Analysis                                                                                                    | 83  |
| Discussion                                                                                                       | 93  |
| Discussion of the PTSD model                                                                                     | 94  |
| Discussion of the PTG model                                                                                      | 101 |
| Limitations                                                                                                      | 104 |
| Conclusion and Implications                                                                                      | 107 |
| CHAPTER 5: Impact of Secure Attachment and Oxytocin on Psychological and Physiological Reactions to Trauma Films | 108 |
| Method                                                                                                           | 111 |
| Participants                                                                                                     | 111 |
| Materials                                                                                                        | 111 |
| Procedure                                                                                                        | 116 |
| Results                                                                                                          | 117 |
| Analytic strategy                                                                                                | 117 |
| Discussion                                                                                                       | 126 |
| Limitations                                                                                                      | 138 |
| Implications                                                                                                     | 139 |
| CHAPTER 6: General Discussion                                                                                    | 167 |
| Reappraising the traumatic event                                                                                 | 168 |
| The effect of attachment dimensions on trauma processing                                                         | 171 |
| Can transient activation of secure attachment and oxytocin protect against PTSD?                                 | 173 |
| Role of individual differences in attachment style for success of oxytocin                                       | 174 |
| Implications                                                                                                     | 176 |
| Future research                                                                                                  | 177 |
| References                                                                                                       | 179 |
| Appendix A                                                                                                       | 207 |
| Appendix B                                                                                                       | 208 |
| Appendix C                                                                                                       | 211 |
| Appendix D                                                                                                       | 212 |
| Appendix E                                                                                                       | 213 |
| Appendix F                                                                                                       | 226 |

## LIST OF TABLES

|                                                                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1.1 Correlations and Descriptives for Variables Used in SEM Models_____                                                                               | 87  |
| 1.2 Model Fit Indices for Three Tested PTSD Models_____                                                                                               | 90  |
| 1.3 Statistical Significance of Indirect Effects in the PTSD Model_____                                                                               | 91  |
| 1.4 Means and Standard Deviations of Variables_____                                                                                                   | 141 |
| 1.5 Correlations for Variables Used in Experimental Design_____                                                                                       | 142 |
| 1.6 ANOVA for Felt Security and for PANAS-N_____                                                                                                      | 145 |
| 1.7 ANOVA for PANAS-P and Arousal_____                                                                                                                | 147 |
| 1.8 ANOVA for Happiness_____                                                                                                                          | 148 |
| 1.9 ANCOVA for Heart-rate during Priming_____                                                                                                         | 150 |
| 2.1 ANCOVA for Heart-rate during Film Clips_____                                                                                                      | 151 |
| 2.2 ANOVA for Film Ratings_____                                                                                                                       | 152 |
| 2.3 ANOVA for Total Intrusions for Seven-days_____                                                                                                    | 153 |
| 2.4 Regression Analysis Testing Moderation of Attachment Dimensions on Effect of Felt Security after Priming Procedure and After Trauma Films_____    | 154 |
| 2.5 Regression Analysis Testing Moderation of Attachment Dimensions on Effect of Oxytocin for Felt Security after Priming and After Trauma Films_____ | 155 |
| 2.6 Regression Analysis Testing Moderation of Attachment Dimensions on Effect of PANAS-N after Trauma Films_____                                      | 156 |
| 2.7 Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for Effect of PANAS-N After Priming and After Trauma Films_____       | 158 |
| 2.8 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Effect of PANAS-P After Priming and After Trauma Films_____        | 159 |
| 2.9 Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for PANAS-P After Priming and After Trauma Films_____                 | 160 |
| 3.1 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Arousal After Priming and After Trauma Films_____                  | 162 |
| 3.2 Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for Arousal After Priming and After Trauma Films_____                 | 163 |
| 3.3 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Happiness After Priming and After Trauma Films_____                | 164 |
| 3.4 Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for Happiness After Priming and After Trauma Films_____               | 165 |

## LIST OF FIGURES

|                                                                                                                |     |
|----------------------------------------------------------------------------------------------------------------|-----|
| 1.1 Ehlers and Clark's cognitive model of PTSD_____                                                            | 6   |
| 1.2 Basic Features of the attachment system_____                                                               | 9   |
| 1.3 Illustration of interpersonal safe-haven and secure-base processes_____                                    | 10  |
| 1.4 Relationship between three-category and four-category models of attachment styles_____                     | 15  |
| 1.5 A model of attachment-system activation and functioning in adulthood_____                                  | 20  |
| 1.6 Growth through adversity schematically represented_____                                                    | 35  |
| 1.7 A conceptual model for understanding positive outcomes of life crises and transitions_____                 | 39  |
| 1.8 Theoretical model of posttraumatic stress and posttraumatic growth in cancer survivors _____               | 41  |
| 1.9 Tested model_____                                                                                          | 43  |
| 2.1 Dual representation model_____                                                                             | 45  |
| 2.2 Behavioral, emotional and neuroendocrine correlates of social attachment_____                              | 51  |
| 2.3 Interactions between anxiety and stress, social behavior and the oxytocinergic system_____                 | 61  |
| 2.4 Model of hypothesized mechanism by which attachment insecurity could contribute to disease _____           | 68  |
| 2.5 The suggested PTSD SEM model_____                                                                          | 76  |
| 2.6 The suggested PTG SEM model_____                                                                           | 77  |
| 2.7 The final PTSD SEM model_____                                                                              | 88  |
| 2.8 The final PTG SEM model_____                                                                               | 92  |
| 2.9 Experimental procedure diagram_____                                                                        | 118 |
| 3.1 Negative Mood: The time by prime interaction for women on OT_____                                          | 146 |
| 3.2 Prime by Time Interaction for Happiness_____                                                               | 148 |
| 3.3 Heart-rate during the priming procedure_____                                                               | 149 |
| 3.4 Heart-rate during the film clips_____                                                                      | 149 |
| 3.5 Intrusions one week following the experiment_____                                                          | 153 |
| 3.6 Moderation effect of attachment anxiety on priming for PANAS-negative mood after priming manipulation_____ | 157 |
| 3.7 Moderation effect of attachment anxiety on OT for PANAS-Negative mood after priming manipulation_____      | 157 |
| 3.8 Moderation effect of attachment avoidance on OT for PANAS positive mood after film clips _____             | 161 |
| 3.9 Moderation effect of attachment anxiety on OT for happiness after priming_____                             | 166 |
| 4.1 Moderation effect of attachment avoidance on OT for happiness after priming_____                           | 166 |

**DECLARATION OF AUTHORSHIP****I, Gizem ARIKAN**

declare that the thesis entitled *The role of attachment in emotion regulation of traumatic stress* and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission.

**Signed:** .....

**Date:** .....

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## CHAPTER 1: Introduction to the Thesis

Individuals experience adverse life events that may influence their lives differently than other events. When these events contain certain characteristics, they are called *traumatic events*. In the *DSM IV* (2000), *trauma* is defined as follows:

1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or a serious injury, or a threat to the physical integrity of self or others.
2. The person's response involved intense fear, helplessness, or horror. (p. 200)

Some traumatic events that people experience are a sudden injury/serious accident, a physical assault, an act of abuse, observing the death or serious injury of another person, news of a sudden death or a serious injury to a relative or a friend, a rape, natural disasters, and others (Joseph, Williams, & Yule, 1997).

Traumatic events may lead to psychological problems and may negatively affect the future of the trauma survivor (Krause, Shaw, & Cairney, 2004; Turner & Llyod, 1995). Posttraumatic Stress Disorder (PTSD) is one of the major psychological problems caused by traumatic events. In the *DSM IV* (2000), PTSD is characterized by three major symptom clusters: re-experiencing symptoms (e.g., nightmares, flashbacks, and intrusive thoughts and images), avoidance and numbing symptoms (e.g., behavioural attempts to avoid reminders of the event), and arousal symptoms (e.g., irritability and difficulty in concentrating).

Even though the traumatic event is pivotal to the aetiology of PTSD, not every individual who has experienced a traumatic event will develop the disorder. Prevalence rates vary between 65% and 85% for those who have experienced a traumatic event (Bernat, Ronfeldt, Calhoun, & Arias, 1998; Green, Goodman, Krupnick, Corcoran, Petty, Stockton et al., 2000; Mizuta, Ikuno, Shimai, Hirotsune, Ogawa, Honaga et al., 2005), and among the general population, the lifetime prevalence is 7.8% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). In addition, traumatic events may cause other psychological problems such as depression. In most PTSD cases, it was found that depression is a comorbid psychological disorder (Bleich, Koslowsky, Dolev, & Lerer, 1997).

There are a number of different theories and models that try to understand what the causes of PTSD are and how it is maintained. They commonly assume

that PTSD is not the consequence of the traumatic event per se, but of an impaired emotional processing of the traumatic event. Some of these theories are stress response theory (Horowitz, 1976, 1986), theory of shattered assumptions (Jannoff-Bulman, 1992), conditioning theory (Keane, Zimmering, & Caddell, 1985; Mowrer, 1960), information-processing theories (Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1998; Creamer, Burgess, & Pattison, 1992; Foa, Steketee, & Rothbaum, 1998; Litz & Keane, 1999), anxious apprehension model (Jones & Bowler, 1990), emotional processing theory (Foa & Riggs, 1993; Foa & Rothbaum, 1998, Foa, Steketee, & Rothbaum, 1989), dual representation theory (Brewin, 1989; van der Hart & Horst, 1989; van der Kolk & van der Hart, 1991), and Ehlers and Clark's cognitive model (2000).

These models focus on what causes and maintains PTSD by postulating that specific cognitive-affective processing alterations such as altered fear learning, dysfunctional memory systems (i.e., enhanced implicit and impaired explicit trauma memory), and dysfunctional negative appraisals about the self, the world, and self-blame elicit and maintain PTSD. They also have in common that they primarily explain the negative side of the post-traumatic change, PTSD. Of major interest for this thesis is the cognitive model by Ehlers and Clark (2001), which integrates a number of model assumptions and which will be described in detail. Recently, researchers have attempted to explore the positive side of post-traumatic change, a phenomenon called posttraumatic growth (PTG).

Posttraumatic growth (PTG) involves a positive transformation following the traumatic event as a result of evaluating the effects of the trauma and of deriving a positive meaning from the traumatic event (Tedeschi & Calhoun, 1996). It suggests that subsequent to a traumatic event, trauma survivors may develop a new understanding and a new way of life rather than remain immersed in the pain and sorrow of the traumatic event (Tedeschi & Calhoun, 1996; Tedeschi, Park, & Calhoun, 1998). This transformation involves positive change in the perception of the self, positive changes in interpersonal relationships, and changes in the individual's philosophy of life (Tedeschi & Calhoun, 1996). Although self view and social relationships play important roles for both PTSD and PTG, the link between early experiences that shape these two aspects of human coping and PTSD and PTG have not been investigated in relation to the emotion regulation mechanism in an attachment relationship.

An attachment relationship refers to an affectional tie that binds someone to a specific other who acts as an attachment figure, such as the primary-caregiver who provides care and basic needs (Bowlby, 1969). The formation and quality of this early relationship would determine the individuals' relationships in adulthood (Hazan & Shaver, 1987), how they cope with negative emotions, and how they develop constructive, adaptive strategies in the times of stress during adulthood (Mikulincer & Shaver, 2005; Sroufe & Waters, 1977). The impact of attachment styles on emotion regulation and on having an efficient social support network could be either a risk factor or a protective factor.

Therefore, the first aim of the thesis is to investigate negative and positive changes in individuals who experienced psychological trauma, specifically the associations between individual differences: early traumatic events; attachment anxiety and attachment avoidance; self-esteem and posttraumatic cognitions; and how these factors are related to PTSD and PTG. The second aim of the thesis is to apply bio-psychological perspectives to understand the mechanism behind trauma processing, specifically the contribution of oxytocin and attachment styles. The thesis consists of two theoretical chapters (chapters 2 and 3) and two empirical study chapters, chapter 4 and chapter 5. In chapter 6, an overall discussion will be presented. In chapter 2, recent psychological models of PTSD and PTG will be reviewed with respect to attachment theory, attachment styles, and their contribution to emotion regulation following a traumatic event. In chapter 3, the bio-psychological perspective of PTSD will be introduced, and a link will be made with the bio-psychological underpinnings of the attachment system and social support network, which would contribute to emotion regulation following a traumatic event. In chapter 4, the first study of the thesis, "The predictors of positive and negative changes in the aftermath of adverse life events," will be presented. In chapter 5, the second study of the thesis "Do secure attachment priming and oxytocin prevent aversive emotional response, physiological arousal, and intrusive memories after processing a trauma film?" will be presented. Lastly, in chapter 6, the main theme of the thesis and general findings from the studies will be discussed, and their main implication for our understanding of protective factors for traumatic stress and implications for psychotherapy will be covered.

## **CHAPTER 2: Psychological Perspectives on Attachment, PTSD, and PTG**

Chapter 1 outlined what the thesis covers and the basic concepts regarding post-traumatic well-being. The overall aim of this chapter is to understand the current state of research and theory on protective factors for PTSD and their impact on PTG within a framework that integrates a recent PTSD model (Ehlers & Clark, 2000) and an emotion regulation model of attachment (Mikulincer & Shaver, 2007).

According to Ehlers and Clark (2000), the nature of trauma memory, which is experienced by PTSD sufferers as if the trauma is in the here and now, and the negative appraisals of trauma shape the symptoms of PTSD, and the strategies intended to control these symptoms can prevent recovery from trauma (see Figure 1.1). According to the model, there are processes that contribute to the perception of current threat. These are individual differences in the appraisal of the trauma and/or its sequelae, and individual differences in the nature of the traumatic event and its relationship with other autobiographical memories (Ehlers & Clark, 2000). They suggested that the current threat perception is associated with intrusions related to the traumatic event and could also be accompanied by re-experiencing symptoms, increased arousal, and anxiety. The perception of threat also triggers some behavioral and cognitive responses to decrease the stress due to the effect of trauma. However, these behavioral and cognitive strategies may prevent the cognitive change and substantially may serve persistent PTSD. Figure 1.1 demonstrates the roots of persistent PTSD and how it is maintained with maladaptive strategies. To understand these maladaptive strategies, this thesis will consider how early experiences could be influential later in adulthood, in the aftermath of trauma. Since attachment theory provides a framework of strategies for emotion regulation, it would expand the understanding of trauma coping, PTSD and PTG. Therefore, attachment theory (Bowlby, 1969) will be discussed first.

The theories and models presented in the following sections basically explain how this emotion regulation process evolves starting from the early years of life and affects the view of self and view of others, as well as strategies for emotion regulation. As a result, attachment styles in infancy and adulthood will be considered regarding Ainsworth's (1967), Hazan and Shaver's (1987), and Bartholomew and Horowitz's (1991) models. Mikulincer and Shaver's (2007)

model of emotion regulation will also be presented. The relationship between attachment styles and psychopathology, as well as attachment styles and posttraumatic psychological problems will be discussed. Finally, PTG and possible links that would enhance positive transformation following a trauma will be presented.

### **Attachment theory.**

Attachment theory has been proposed as a way to explain the inner mechanisms of social bonding, the influences of past experiences in establishing relationships with others, and the role of attachment as a stress buffer (Bowlby, 1969; Mikulincer & Shaver, 2007). The impact of early experiences in social bonding as a pre-trauma factor may affect emotion regulation after traumatic events in adulthood, PTSD, as well as PTG. Therefore, this section will summarize the basic concepts and their meaning to the emotion regulation process and attachment styles.

An attachment relationship refers to an affectional tie that binds someone to a specific other who acts as an attachment figure, the primary-caregiver who provides care and basic needs (Bowlby, 1969). Attachment behaviour is a biologically rooted behavioural system that is activated by environmental cues such as threat or the need for protection and care. In other words, attachment behaviour is part of a genetically programmed and directed mechanism that has a survival-promoting function for the newborn (Bell & Ainsworth, 1972).

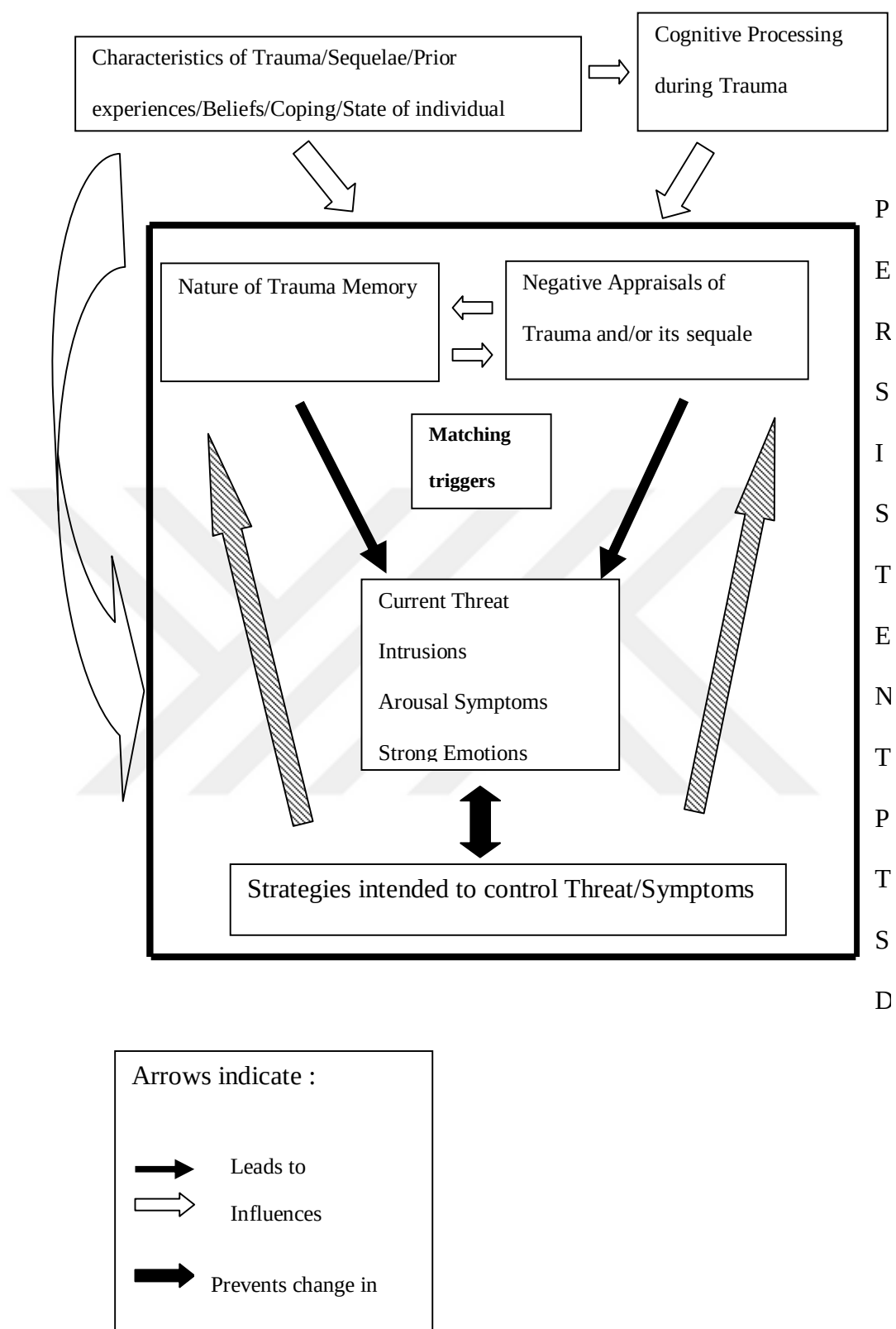


*Figure 1.1 Ehlers and Clark's Cognitive Model of PTSD*

*Note.* From Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, 38, p. 321.

According to attachment theory, an attachment figure serves three basic functions, namely *proximity seeking*, *safe haven*, and the provision of a *secure base* (Ainsworth, 1991; Hazan & Shaver, 1994). Proximity seeking is the primary strategy used by the infant to ensure the satisfaction of survival needs such as those for food, protection, and care (Ainsworth, 1991; Bowlby, 1969; Hazan & Shaver, 1994). The infant gets close to the caregiver to fulfill these needs and to feel secure and comfortable. The attachment system can also be activated in response to stress, so that the infant seeks proximity and obtains comfort from the primary caregiver (Ainsworth, 1991; Bowlby, 1969; Hazan & Shaver, 1994). As a result, a relationship starts to form. A set of behaviours such as smiling and crying follow to serve proximity maintenance. The attachment system is designed to obtain a state of “felt security,” which results from proximity to a primary caregiver (Bowlby, 1969). Experiencing love and care encourages the infant to be more playful and sociable. This represents a secure attachment prototype (Ainsworth, 1967). On the other hand, if the primary caregiver is not present and leaves the child without love and adequate care, the child may experience anxiety or defensiveness. This represents insecurity in the form of anxious or avoidant attachment. In anxious attachment, the infant becomes preoccupied about the primary caregiver’s presence and shows this preoccupation by engaging in visual checking, calling, moving to re-establish contact, and clinging behaviours. In avoidant attachment, the infant shows defensive strategies and is likely to avoid the primary caregiver although the infant needs the caregiver’s attention. In Figure 1.2, the influence of the primary caregiver and infant interactions on attachment style formation is represented. As the figure shows, the responsiveness and different patterns of care from the attachment figure shapes the infant’s attachment style. As a result, the infant can develop secure or insecure-anxious or insecure-avoidant attachment styles.

The second function of the primary caregiver is to provide a *safe haven*. In times of danger or in unfamiliar situations, the infant looks for the attachment figure to check whether the primary caregiver is available and likely to be supportive. If the attachment figure is present and responsive when the infant requires protection, the attachment figure fulfils the function of a safe haven for the infant. Later, in adult attachment, the partner in an intimate relationship starts to fulfil the *safe haven* function (Collins, Guichard, Ford, & Feeney, 2006).

Providing a safe haven in adulthood includes being available for the partner; providing open communication; showing interest in the problems, worries, and fears of the other; confirming the partner's ability to deal with stressful events; giving importance to the partner's worth; maintaining physical closeness and affection in times of need; and providing help (Collins et al., 2006).

Lastly, the attachment figure creates a predictable and safe environment called the *secure base* (Bowlby, 1969). If this happens, the infant can explore the surrounding environment and interact with the social and the physical world, while continuously monitoring the primary caregiver's availability and proximity. In the early years of development, exploration may take place in the playground and at home. Later in life, new opportunities may be explored at school and at work while an intimate partner may fulfill the secure-base needs of the individual (Ainsworth, 1991; Hazan & Shaver, 1994). The *secure-base* function in intimate relationships includes encouraging the partner to get involved in challenges and new things; sharing the partner's interest in goals, plans, and desires for the future; conveying a sense of trust in the partner's capacity to deal with problems and to succeed; maintaining instrumental assistance; being sensitive and showing acceptance of the partner's failures; and supporting the partner in his or her personal growth (Feeney, 2004; Feeney & Collins, 2004). See Figure 1.3 for the *safe-haven* and *secure base* processes. Basically focuses on how an attachment relationship is established in early years with the primary caregiver

It is important to understand how the secure-base and safe-haven functions of an attachment figure take place because it will follow a similar pattern in other attachments, as in intimate partner attachment later in life would become easy (Mikulincer & Shaver, 2007). According to Bowlby (1969), an attachment relationship is shaped by the responsiveness of the caregiver and by the fulfilment of the infant's needs and expectations. As a result of parent-infant interactions, the infant establishes mental representations or internal working models that include generalized expectations and beliefs about the world, others, the self, and relationships with others (Collins & Read, 1994; Hazan & Shaver, 1987; Main, Kaplan, & Cassidy, 1985).

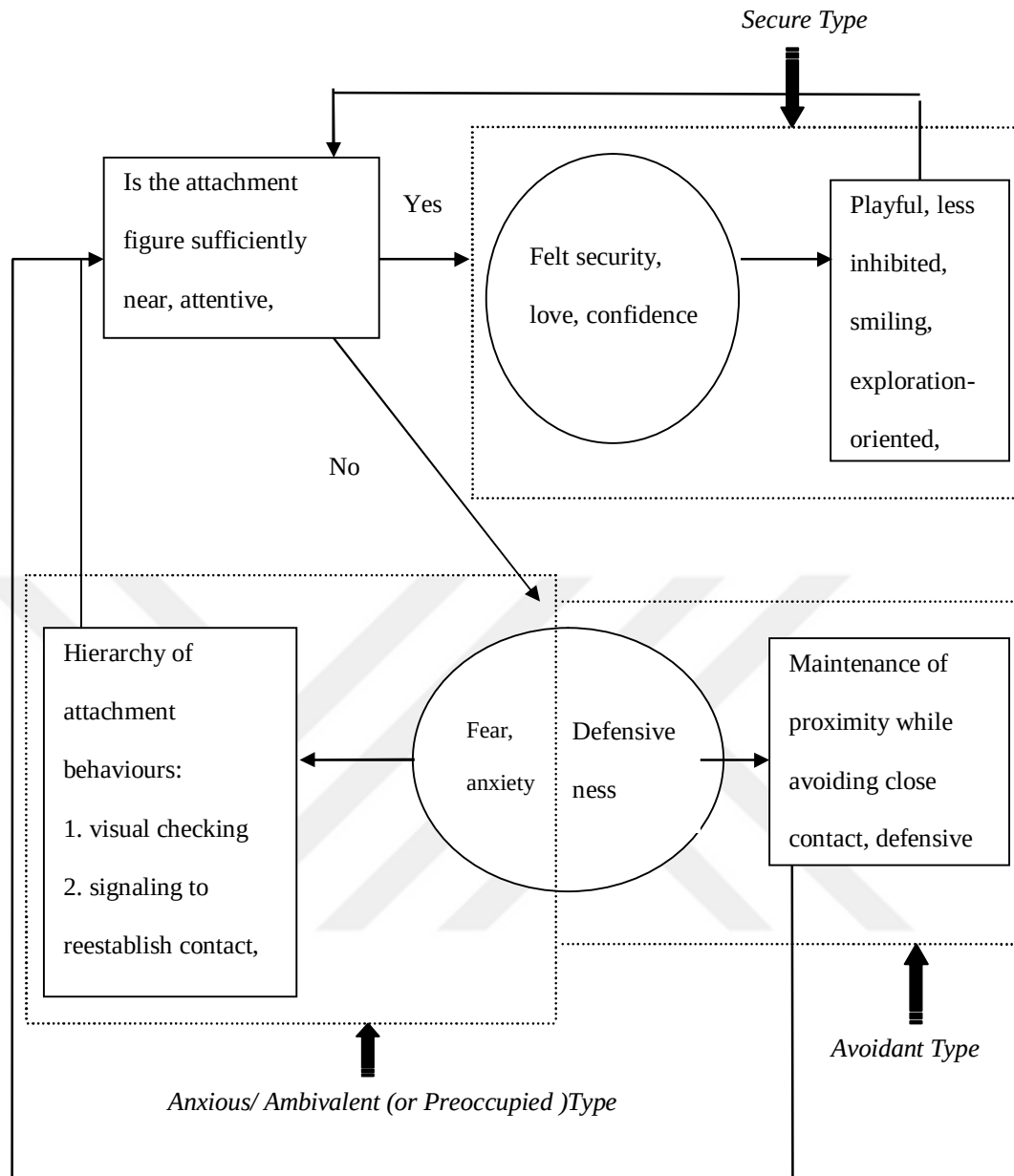


*Figure 1.2 Basic Features of the Attachment System.*

*Note.* From Hazan, C., & Shaver, P.R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, 5(1), 1-22.

Internal working models involve feelings, verbal and non-verbal behaviour patterns, and attention, as well as memory and cognition about the self, others, and relationship patterns (Main et al., 1985). When the attachment figure in the

relationship is responsive to needs and provides care and love, the individual develops a coherent model of a lovable self and of others. This contributes to gaining a sense of security and safety, which enables the individual to cope with stress in times of danger and to manage difficulties in life.

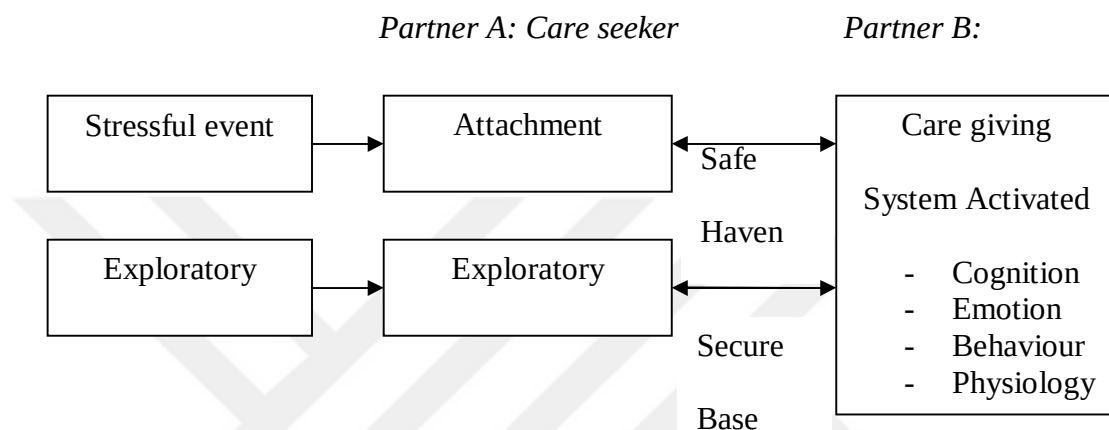


*Figure 1.3.* Illustration of interpersonal safe-haven and secure-base processes

*Note.* From Collins, N.L., Guichard, A. C., Ford, M. B., & Feeney, B. C. (2006). Responding to need in intimate relationships: Normative processes and individual differences. In M. Mikulincer and G. S. Goodman (Eds.), *Dynamics of romantic love: Attachment, caregiving and sex* (p. 156). New York: Guilford Press.

Individuals differ in their early experiences and form different working models. The mental representations of the self and others contribute to attachment styles and determine both the nature and the quality of future relationships. Insecure individuals who were rejected as children may develop insecure attachment relationships with significant others later in life, whereas secure individuals who experienced positive relationships may continue to seek such relationships (Hazan & Shaver, 1994). Insecure individuals may vary in terms of their relationship patterns later in adulthood as well. Those who are anxiously

attached show a preoccupation with intimacy and engage in constant proximity-seeking behaviours, whereas avoidant attachment is associated with limited closeness with others (Mikulincer & Shaver, 2007). However, the impact of previous relationships may not be conclusive and may change with time, mainly due to the type of interactions one has with others later in life (Bowlby, 1969). Thus, attachment theory might explain sources of social support and could provide a background to understand emotion regulation following a traumatic event and might help to understand coping mechanisms.

### **Attachment styles.**

In this section, attachment styles, psychological processes regarding attachment style functioning, and individual differences, which can play a role in coping with traumatic events with respect to emotion regulation strategies and social support mechanism, will be discussed. Initially, Ainsworth's (1967, 1979) categorization, which was developed using the strange situation paradigm, will be explained. Then, its reflection on adult attachment styles as represented in Hazan and Shaver's (1987) model and in the four-category model of Bartholomew and Horowitz (1991) will be described. Lastly, attachment style stability and the role of the attachment system as an emotion regulatory mechanism will be considered in order to explain variations in attachment styles. These would serve understanding of stress management after the traumatic event and to form a helpful social support network.

Ainsworth (1967) found evidence for three attachment styles (secure, avoidant, and anxious-ambivalent) using the *strange situation* paradigm in a study in which she tested 49- to 51-week-old infants in order to explore their attachment relations. During the experiment, infants were initially put in a room with their mother. After their mother left the room, a stranger came in and interacted with them. Then the mother appeared again. It was observed that securely attached babies greeted the mother positively upon reunion (Ainsworth, 1979; Ainsworth & Bell, 1970). However, anxious-ambivalent infants showed frequent separation protests or crying and were not easily comforted upon mothers' return. The reunion was full of conflicting feelings of seeking proximity and rejecting the mother. Meanwhile, avoidant infants showed little or no distress upon separation

and avoided the mother upon reunion, directing their attention towards the toys instead (Ainsworth, 1979; Ainsworth & Bell, 1970).

Later work helped researchers identify another attachment style: the disorganized type (Main & Solomon, 1986, as cited in Main et al., 1985), in which infants experience the loss of the primary care-giver or an abusive relationship with the primary caregiver. In this attachment style, contradictory behaviours were observed in infants upon reunion, such as falling on the floor or suddenly freezing while approaching the caregiver. Such responses may be an indication of unresolved feelings and incoherent thinking patterns about the caregiver, which may have developed as a result of traumas and losses. Having an abusive or a depressed caregiver might contribute to disruptions in the formation of a secure relationship.

These attachment relationship characteristics observed in previous studies reflect the infants' relationship prototypes with the primary caregiver. Their responses and interactions after the caregiver's arrival are determined by previous experiences with the caregiver. Bowlby (1969) proposed that attachment relationships and attachment styles might have a life-long impact on the individual's life. Their influence is mainly observed in intimate relationships, which have been the focus of more recent research and contribute to individuals' social support and positive transformation following trauma.

Firstly, attachment styles in adult romantic relations were investigated by Hazan and Shaver (1987). They referred to Ainsworth's categorization and formulated three attachment styles for adult intimate relationships. In the self-report measure of adult attachment patterns that they developed, individuals were rated as having secure, avoidant, and anxious attachment styles:

*Secure*: "I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't worry about being abandoned or about someone getting close to me."

*Avoidant*: "I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, to allow myself to depend on them. I am nervous when anyone gets too close and others often want me to be more intimate than I feel comfortable being."

*Anxious*: "I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay

with me. I want to get very close to my partner and this sometimes scares people away.” (Hazan & Shaver, 1987, p. 515)

Secondly, Bartholomew and Horowitz’s (1991) model specified attachment styles and attachment relationship in adulthood with a two-dimensional model concerning the mental models of self (a person’s positive or negative view about himself or herself) and the mental models of others (a person’s negative or positive view about others). Compared to Hazan and Shaver’s (1987) model, this model includes a new category: Fearful attachment in which individuals have both a negative view of self and negative view of others. However, the basic categorization of Ainsworth (1967, 1979) and Hazan and Shaver (1987) is still present in it, though under different names: *preoccupied* and *dismissing attachment styles* (see Figure 1.4). According to Bartholomew and Horowitz’s model (1991), there are four attachment styles that depend on internal working models. The secure attachment type, which results from a positive view of self and a positive view of others, leads to a comfortable relationship characterized by intimacy and autonomy. The dismissing type, containing a positive view of self and a negative view of others, involves elimination of intimacy and a search for counter-dependence. Individuals with this attachment style prefer to be independent in their relationships and expect others to be self-reliant as well. The preoccupied attachment type results from a positive view of others and a negative view of self. People with this attachment style show hypervigilance to stress cues and preoccupation in their intimate relationships. Finally, the fearful type involves a negative view of both self and others, reflecting fear of intimacy and social avoidance. These four types of attachment can be formulated by the anxiety and avoidance dimensions of attachment as well (Brennan, Clark, & Shaver, 1998). Those who are low in anxiety and avoidance dimensions are labeled as *secure*, those who are high in anxiety and low in avoidance are *preoccupied*, those high in avoidance and low in anxiety are categorized as *dismissing*, and those high in both avoidance and anxiety are categorized as *fearful*.

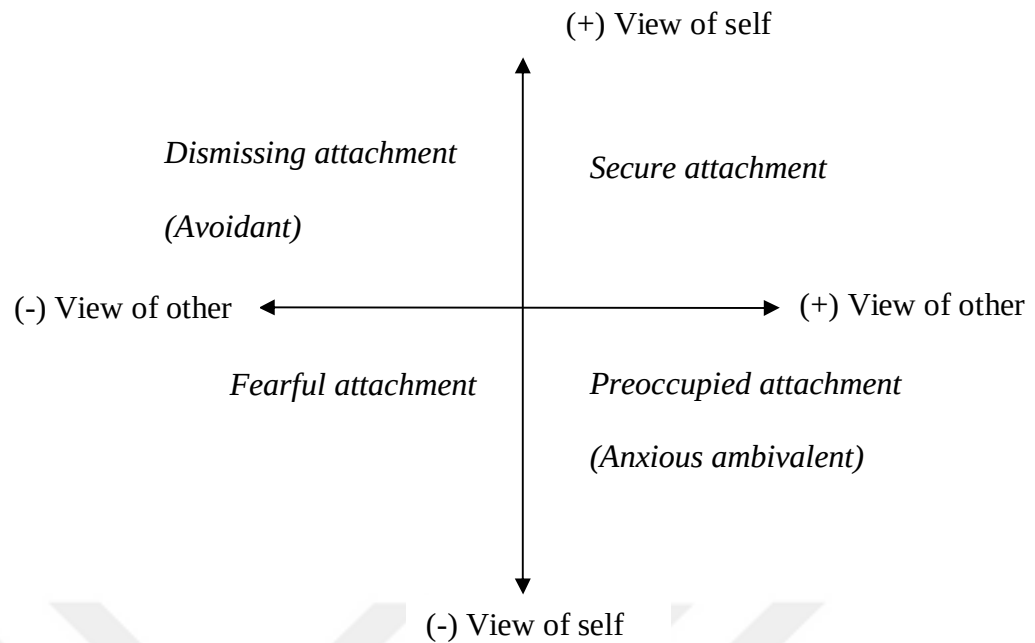


*Figure 1.4* Relationship between three-category and four-category models of attachment styles.

*Note.* From Feeney, B. C., Noller, P., & Hanharan, M. (1994). Assessing adult attachment. In M. Sperling, & H. Berman (Eds.), *Attachment in adults: Clinical and developmental perspectives* (pp. 128-152). New York: Guilford.

In the attachment literature, some studies use three categories of attachment (secure, anxious/ambivalent, and avoidant) and some others use four (secure, dismissing, preoccupied, and fearful). The relationship between the three-category model and the four-category one can be seen in Figure 1.4.

The advantage of this model is that it explains attachment styles in terms of a view-of-self and view-of-others axis. This is relevant to evaluate individuals' view of self before and after the traumatic event and how it changes in the trauma sequel and with PTSD as well as with PTG. Basically, individual differences in view of self could be linked with self-esteem, and view of others could be linked with social interactions and social support in the aftermath of traumatic events, and these may lead to different coping mechanisms as part of emotion regulation strategies in attachment.

### **Stability and change in attachment styles.**

Although attachment styles continue to have an effect in future relationships, they may change through future interactions with other attachment figures in life (Crowell, Treboux, & Waters, 2002; Fraley, 2002; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). The following section will therefore summarize evidence for change in attachment styles throughout life and possible ways to change attachment styles temporarily by use of priming manipulation. The temporary change of an attachment state is a promising area, because it could serve the psychotherapy and treatment process in PTSD, and individuals can better cope with stress when they have access to supportive memories of the primary caregiver or attachment figure in the face of stress.

The impact of certain life events can lead to a change in a person's life; if these experiences happen early in life, they could alter attachment styles. In a longitudinal study in which participants were measured when they were 12 months old and after 20 years, it was found that the impact of adverse early experiences altered their attachment status towards insecurity (Waters et al., 2000). The negative early life events, such as the loss of a parent, parental divorce, life-threatening disease of a parent or child (e.g., diabetes, cancer), parents' psychiatric disorder, and physical or sexual abuse by a family member could alter individuals such that they develop insecure attachment styles (Waters et al., 2000). The change in attachment styles is not restricted to childhood experiences, but it is also related to changes in life and interpersonal relationships.

Life transitions such as marriage (Crowell et al., 2002) and the first year attending university (Frederick & Gormley, 2002) may cause individuals to undergo changes in their relationship styles, which may reflect how they manage stress. The study, which was conducted among 157 couples 3 months before they got married and 18 months after they got married showed that individuals who moved from insecurity to security in terms of attachment were those who had secure partners (Crowell et al., 2002). It seems the change of mental representations is possible when insecure individuals find a secure partner (Crowell et al., 2002). However, the fluctuations between insecure and secure attachment styles may cause problems in individuals' lives. It was shown that the stability of an attachment style can be a protective factor for distress and depression in the first year of college, and the change, especially from secure to

insecure attachment, is associated with depression and distress (Lopez et al., 2002). The change in attachment styles can take place at different time points in life.

In a meta-analysis about attachment stability, it was revealed that attachment style change might occur at different times, for example, during infancy, childhood, adolescence, and young adulthood (Fraley, 2002). Early attachment relationships as a prototypical process exert their impact throughout life. In other words, concurrent beliefs and expectations that are formed in early relationships influence upcoming information from new relationships. Although there is a moderate degree of stability, the change and revision of the earlier prototype is likely. In a female sample, it was found that 28% percent of the participants changed attachment prototypes after 6 months, and 34% did so after 2 years of the first assessment (Davila, Burge, & Hammen, 1997).

On the other hand, attachment prototypes may differ according to the relationship. Individuals may have both secure and insecure relationships with different people (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996; Collins & Read, 1994). When individuals were asked to list their 10 most significant relationships and describe them in terms of attachment prototypes, 88% responded with at least two of the three attachment-style descriptions. Forty-seven percent of the participants generated names from among their significant relationships for three different prototypes (Baldwin et al., 1996).

In addition, it is likely that the impact of adverse experiences may lead to continuous activation of maladaptive emotion regulation strategies and may result in changes in attachment styles. It was shown that early traumatic events may remain unresolved in adulthood and can act as a risk factor for the development of further psychological problems (Nye, Katzman, Bella, Kilpatrick, Brainard, & Haalanda, 2008; Stovall-McClough, & Cloitre, 2006;). Solomon, Dekel and Mikulincer (2008) reported increased levels of attachment anxiety and attachment avoidance in Yom Kippur War veterans at a 12-year follow-up between the years of 1991 to 2003. In other words, individuals became more insecure 12 years after the first measurement. One of, and probably the most important, disadvantage of that study is that the second measurement time occurred during a period when terrorist attacks were taking place. In the first measurement, there were no terrorist activities in the area, whereas in the second measurement time, there

were some terrorist incidents occurring. Therefore, the effect of these attacks in the second measurement time may act as reminders of the traumatic experiences that participants lived through in the Yom Kippur War and activate the attachment system, therefore leading to feelings of insecurity. Furthermore, the study did not measure the impact of these terrorist attacks on participants and how they perceived the event. Since individuals may experience different levels of stress due to terrorist attacks in time two measurements, this may change their attachment security. However, it is still important to pave the way to conduct research on the impact of continuous adult traumatic events on attachment and to determine whether this change is permanent or not.

Although the evidence from these studies indicated negative changes in attachment security, there is also some evidence regarding positive changes in attachment security in other studies. In Muller and Rosenkranz's study (2009), treatment-seeking PTSD patients who underwent the Programme for Traumatic Stress Recovery (Wright & Woo, 2000) reported decreased levels of attachment avoidance, especially as compared to those patients with attachment anxiety in a waiting list control group 6 months after the therapy. This reflected on the patients' PTSD severity as well, and they reported fewer symptoms compared to those on the waiting list. This study also suggested that adherence to psychological treatment can enhance individuals' attachment security resulting in change in attachment dimensions.

Another therapy outcome study from Scandinavia reported that 6 months in therapy has a positive change in self-worth as well as in attachment styles (Elkhit, 2009). In the study, the anxiety subscale of attachment significantly decreased following therapy, and one-third of the participants with childhood sexual abuse, who reported insecure attachment style, reported secure attachment at the end of the therapy (Elkhit, 2009).

It seems that traumatic events and psychotherapy could play a role in the alteration of felt security and in the individual's sense of self-worth. Another way in which change in attachment has been evaluated is through priming methods. Attachment priming involves making an attachment relationship salient at the conscious or unconscious level. In the literature, priming manipulations have been conducted by presenting participants with the names of attachment figures (Mikulincer, Gillath, & Shaver, 2002), words (Mikulincer, Birnbaum, Woddis &

Nachmias, 2000), pictures (Mikulincer, Hirschberger, Nachmias & Gillath, 2001), or by making participants write about a fictional scene or an attachment-related memory (Carnelley & Rowe, 2007; Fraley & Shaver, 1997; Rowe & Carnelley, 2003). Although priming studies have not demonstrated stable changes in attachment styles, they have shown that priming has a short-term impact on individuals' reactions and evaluations as well as on attachment anxiety (Carnelley & Rowe, 2007; Miterany, 2004, as cited in Mikulincer, Shaver, & Horesh, 2006). Specifically, the activation of secure attachment by priming resulted in higher liking for neutral stimuli (Mikulincer et al., 2001), attenuation of negative reactions towards out-group members (Mikulincer & Shaver, 2001), more positive expectations about relationships, more positive self-views, and less attachment anxiety (Carnelley & Rowe, 2007). In another study, the contextual activation of a secure attachment style led to a reduction in attachment anxiety and accessibility of trauma-related thoughts by eliminating the difference between PTSD and non-PTSD groups (Miterany, 2004, as cited in Mikulincer et al., 2006).

Individuals may have different attachment styles, and attachment relationships may vary depending on the time and surrounding conditions. Whereas persistent adversities may shift individuals towards insecurity, providing a secure base in psychotherapy may lead them to become more secure. The priming studies also suggested that people could benefit from temporary activation of attachment security while they are coping with traumatic events because it may result in decreased symptoms of PTSD.

The research findings in attachment priming studies are very promising in terms of the possibility of changing individuals' perception of self and others, which can contribute to the development of better relationships with others and could also help people to manage stress more easily. In addition, the alteration in felt-security in priming can be useful during psychotherapy and the treatment process when the psychotherapist is trying to form a trustful relationship with the client and to foster a safe-haven.

### **A model of attachment system functioning and emotion regulation.**

Attachment styles might be influential on how a person copes with stress and what kind of emotion regulation strategy a person will adopt. The link between attachment styles, emotion regulation, and stress-management after the traumatic event could be crucial to understand the process of trauma within

attachment theory. Therefore, I will review in this section the individual differences in emotion regulation and coping when individuals are exposed to stress. Previous relationships with attachment figures that provided or could not provide the safe haven function may determine the individual's ways of coping. Individuals who have access to secure attachment figures could find social support and ease the effect of stress. However, those with insecure attachment figures could not easily facilitate help and could not manage the stress.

Regarding the differences between secure and insecure individuals in attachment systems and stress management, Mikulincer and Shaver (2007) proposed a model to explain repeated patterns of interaction between attachment styles and different ways of coping with stress. They basically considered attachment-related stress and in their emotion regulation model to analyze the coping routes of people with different attachment styles. Their model suggested that stress might activate the attachment system, and that individuals with different attachment styles engage in different ways of coping.

The model consists of three modules (Mikulincer & Shaver, 2007): (a) following a threat appraisal, activation of the attachment system and proximity seeking, (b) using an effective strategy to obtain support from a security-providing attachment figure or attachment figure representation, and (c) secondary strategies (hyperactivation and deactivation), which are developed in response to unavailability and unresponsiveness of previous attachment figures (see Figure 1.5). The Mikulincer and Shaver's (2007) model is similar to Hazan and Shaver's (1994) model. However, they evaluated attachment relationships in the context of adulthood.

According to the emotion regulation model, when danger appears, the individual determines whether the event represents a threat or not. If the event is perceived as a threat, then the attachment system is activated. The individual then determines whether an attachment figure is available and responsive. If the individual found security in previous interactions with the attachment figure, then he or she can easily seek support from an attachment figure or recall memories related to previous secure relationships as a source of support. If the individual perceives an attachment figure as unavailable or recalls memories of an unresponsive attachment figure in the stressful situation, secondary strategies (hyperactivation and deactivation) are put into action.

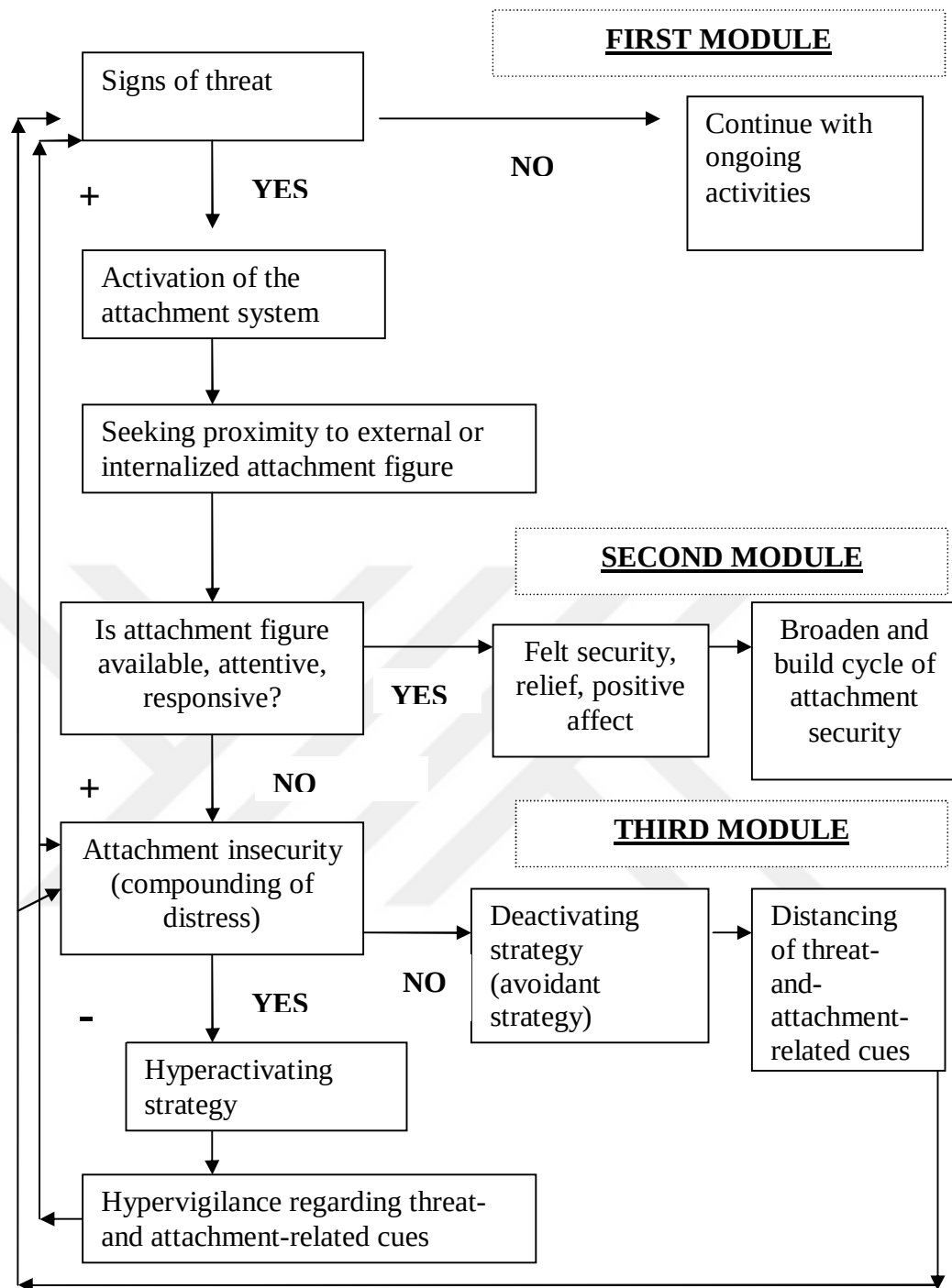


Figure 1.5 A model of attachment-system activation and functioning in adulthood.

Note. From Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. New York: Guilford Press, p. 31.

People high in attachment anxiety use hyperactivating strategies such as catastrophizing threat appraisals and rumination about previous adverse experiences. The anxious individual becomes preoccupied with the attachment figure's support and attention due to previous relationship patterns. As a result, the individual can be intrusive, aggressive, and coercive in his or her relationships. On the other hand, avoidant individuals engage in deactivation strategies. They are likely to direct their attention to something else by distancing themselves and trying to inhibit threat-related cues. They aim to maximize psychological distance so that they do not have to face any rejection in their attachment relationships. Therefore, unlike anxious individuals, they do not require emotional intimacy, self-disclosure, and interdependence (Mikulincer & Shaver, 2007)

According to Mikulincer and Shaver (2007), hyperactivating strategies and anxious attachment have a negative impact on one's self-image. Anxious individuals who use such strategies overemphasize their vulnerability to rejections and make negative appraisals of others. Anxiety proneness of anxious ambivalent individuals may result in a limited capacity to realize different sides of the situation and may inhibit their potential to shift to other mood states (Mikulincer & Shaver, 2007). Therefore, they can hardly maintain their emotional stability and psychological adjustment. Avoidant individuals using deactivating strategies, on the other hand, have negative views of others. Those individuals are likely to engage in avoidant coping while managing with difficulties (Mikulincer et al., 1993). Although these individuals show defensiveness and feel less vulnerable in relationships, they are still likely to suffer from their impaired ability to form close relational bonds.

The differences in emotion regulation strategies in close relationships could be an indicator of how they cope and make use of social support in the face of other stressors such as traumatic events. Therefore, it is important to understand whether individual differences in attachment and emotion regulation strategies do make a difference in terms of psychopathology. In the next section, I will cover the association between attachment and adult psychopathology.

### **Attachment and adult psychopathology.**

In this section, attachment styles will be discussed in relation to psychopathology. Early secure relationships equip the individual with a positive view of self and others. In addition, attachment security provides the person with inner resources to manage negative emotions and develop constructive, adaptive strategies in the face of life problems (Mikulincer & Shaver, 2005; Sroufe & Waters, 1977). On the other hand, attachment insecurity leads to a negative view of self and/or others. This maintains dysfunctional coping, and as a result, is associated with a higher risk of psychopathology (Pianta, Egeland, & Adam, 1996). It is known that early adverse life events such as abuse, domestic violence, and loss of an attachment figure are strongly associated with an insecure attachment style and psychological problems in adulthood (Shapiro, & Levendosky, 1999; Stalker, Gebtys, & Harper, 2005). It was found that preoccupied and dismissing attachment styles are predominantly represented in psychiatric disorders (Stovall-McClough & Cloitre, 2006; van IJzendoorn & Bakermans-Kranenburg, 1996). Among psychiatrically hospitalized adolescents, a dismissing attachment style was associated with conduct disorder, affective disorder, and substance abuse problems (Rosenstein & Horowitz, 1996). Moreover, dismissing attachment was related to criminal behaviours in young adults (Allen, Hauser, & Borman- Spurrell, 1996) and to more somatic complaints, dissatisfaction, and more direct expression of hostility among adults (Pianta et al., 1996). Preoccupied adults, on the other hand, reported more symptoms of psychopathology in Minnesota Multiphasic Personality Inventory II (MMPI II) (Pianta et al., 1996). In addition, childhood traumas were common in psychiatric patients who were diagnosed with personality and anxiety disorders (Fonagy et al., 1996) as well as with PTSD (Iversen et al., 2008; Schumm, Briggs-Phillips, & Hobfoll, 2006) and PTSD-related avoidance symptoms compared to securely attached individuals (Nyea et al., 2008; Stovall-McClough & Cloitre, 2006). In the review of van IJzendoorn, Bakermans-Kranenburg, and Juffer (2008), which included 105 samples and 4200 participants, secure attachment was not represented as much as insecure attachment in clinical samples (unlike normal samples).

The studies conducted in clinical samples give an overview regarding the attachment styles in psychopathology groups; however, it is important to know

the role of attachment and psychological problems in normal samples. There are not many studies in which attachment styles, their correlates, and psychopathology are examined longitudinally. A 1-year follow-up study with female college students showed that attachment-related cognitions predicted onset and severity of depression on the Structured Clinical Interview for DSM (SCID), a diagnostic interview (Hammen, Burge, Daley, Davila, Paley, & Rudolph, 1995). In studies that investigated PTSD symptoms, attachment security was found to be a protective factor for symptom severity at 3 months follow-up (Benoit, Bouthillier, Moss, Rosseau & Brunet, 2010), 4-months follow-up (Besser, Yuval, & Neria, 2010), and attachment related cognitions were a significant predictor for the onset of depression in a 1-year follow-up (Hammen et al., 1995). Moreover, in the review chapter of Mikulincer and Shaver (2007), insecure attachment was strongly associated with psychological problems. In general, attachment insecurity can be a contributor to PTSD, suicidal tendencies, eating disorders, conduct disorders, substance abuse, criminal behaviours, and personality disorders (Mikulincer & Shaver, 2007). The studies on attachment mostly do not underline the differences between different emotion regulation mechanisms, namely, attachment anxiety and attachment avoidance. Therefore, the differences in emotion regulation mechanisms of attachment and their contribution to different psychopathologies are not conclusive.

### **Attachment and trauma.**

Most research related to attachment styles and psychopathology has focused on early adverse experiences and their impact on psychological problems. In general, an insecure attachment style and negative life events such as childhood sexual abuse and emotional abuse, loss of a parent, domestic violence, and psychological abuse are predictors of psychopathology (Hankin, 2005; McLewin & Muller, 2006; Muller, Sicoli, & Lemieux, 2000; Stovall-McClough & Cloitre, 2006). The research on attachment theory and traumatic stress typically focuses on early traumatic experiences such as incest (Alexander, Anderson, Schaeffer, Grelling, & Kertz, 1998), abuse (Shapiro, & Levendosky, 1999; Stalker et al., 2005), neglect (Lundgren, Gerdner, & Lundqvist, 2002), and physical maltreatment (McLewin & Muller, 2006). Furthermore, childhood abuse and maltreatment may lead to depression in later years. Styron and Janoff-Bulman

(1997) found that those who had a history of abuse reported less secure childhood and adult relationships and more depression than those who had no abuse histories. Traumatic events might result in psychological problems not only in the form of PTSD, but in the form of depression or both, which is called *comorbidity*.

In the studies investigating early and adulthood traumas, insecure individuals reported more distress than secure ones (Fraley, Fazzari, Bonanno, & Dekel, 2006; Mikulincer et al., 1993; Schottenbauer et al., 2006; Shapiro & Levendosky, 1999; Solomon, Ginzburg, Mikulincer, Neria, & Ohry, 1998; Wei, Happner, & Mallinckrodt, 2003). Veterans with PTSD scored high on preoccupied, fearful, and dismissing attachment scales (Diepernick, Leskela, Thuras, & Engdahl, 2001). In a retrospective study that investigated the effects of war after 18 years, psychological problems due to imprisonment during war were related to attachment styles (Solomon et al., 1998). In this study, compared to secure individuals, avoidant and ambivalent veterans reported more psychiatric symptomatology, intrusions, avoidance tendencies, and problems in functioning. These are similar to the findings of Mikulincer and colleagues (1993), who found that anxious-ambivalent participants reported higher levels of anxiety, depression, hostility, and somatization than secure participants. In addition, anxious-ambivalent individuals reported more war-related avoidance and intrusions than avoidant individuals. The avoidant individuals reported more somatization, hostility, and avoidance than secure participants. On the other hand, in Besser, Neria, and Haynes's (2009) study, avoidant attachment was not significantly associated with avoidance symptoms of PTSD among civilians following terrorist attacks in Israel. Similar to Mikulincer et al. (1993), Kanninen, Punamaki, and Qouta (2003) found that torture survivors with a dismissing attachment style reported more psychosomatic symptoms than secure and preoccupied torture survivors. O'Connor and Elklit (2008) found the same association between somatization and dismissing attachment among Danish students. In line with these findings, it was found that attachment could also mediate the relationship between childhood trauma and somatization for women (Waldinger, Schulz, Barsky, & Ahern, 2006).

Individuals who suffer from current traumatic events may develop more severe symptom patterns if they had experienced traumatic events previously. The proposed mechanism of action is that the current traumatic event reactivates the

earlier memories and thus can make people more vulnerable to PTSD (Iversen et al., 2008). There are many studies that have revealed early traumatic events, especially childhood adversities, as an important risk factor (Brewin et al., 2000; Nye, Katzman, Kilpatrick, Brainard, & Haaland, 2008; Schumm et al., 2006; Stovall-McClough & Cloitre, 2006). Regarding attachment anxiety, it seems that anxious-ambivalent individuals' anxiety sensitivity keeps them preoccupied with the stress-provoking cues through which they experience more intrusions (Kemp, & Neimeyer, 1999; Mikulincer et al., 1993). In some cases, anxious-ambivalent individuals may not receive adequate social support due to their hypervigilant relationship characteristics and may be faced with rejection. They may also misinterpret the received social support as unsatisfactory. Through higher anxiety sensitivity and lower perceived social support, they may develop more severe symptomatology. On the other hand, avoidant individuals may engage in avoidance coping, which may lead to poorer health status, more somatization (Lawler, Outimette, & Dahlstedt, 2005), and higher reported PTSD severity (Schider, Elhai & Gray, 2007).

There are not many studies on attachment and PTSD symptom severity that consider the effect of emotion regulation strategies of different attachment styles. In some studies, attachment anxiety is the unique predictor for posttraumatic stress and trauma-related psychological problems (Besser, Neria, & Haynes, 2009; Besser, Yuval, & Neria, 2010). However, in others, a dismissive attachment style (O'Connor & Elklit, 2008) or an insecure attachment style as an overall attachment cluster was found to be associated with PTSD (Ghafoori, Hierholzer, Howsepian, & Boardman, 2008; Leskela, Thuras & Engdahl, 2001; Renaud, 2008). From various review papers, it is evident that lack of social support (Brewin et al., 2000; Galea, Tracy, Norris, & Coffey, 2008; Johnson & Thompson, 2008; Nandi & Galea, 2008; Ozer et al., 2003) and ways of coping (Lawler, Ouimette, & Dahlstedt, 2005; Schnider, Elhai, & Gray, 2007) is an important risk factor for the development of PTSD. Therefore, it is not only essential to understand the emotion regulation mechanism and coping strategy for PTSD, but also as a mean for social support.

According to Mikulincer and Shaver (2007), the functioning of the attachment system may influence the extent and impact of PTSD symptoms. In the face of trauma, if individuals activate mental representations of security-

providing attachment figures and support resources, they manage stress and may suffer less from adversity. Felt security can be a protective factor in coping with trauma (Mikulincer & Shaver, 2007).

However, hyperactivating and deactivating strategies may lead to intensification of distress and inhibition of self-regulation as a result of the activation of negative working models of self and others. In addition, attachment style variations may have an influence on how a person reacts to trauma in terms of symptoms. Individuals who engage in hyperactivating strategies are likely to ruminate and therefore may experience intrusion and avoidance symptoms. Avoidant individuals who use deactivating strategies, on the other hand, may suppress trauma adversity and experience more avoidance symptoms, as Mikulincer and colleagues (1993) found. In their study, both anxious and avoidant participants suffered from trauma-related psychological problems, but in different ways. In other words, the attachment styles of trauma survivors influence their coping styles and their symptomatology.

Mikulincer, Shaver, and Horesh (2006) found that insecure participants in general suffer more severe war-related PTSD than secure ones. They also found that a sense of secure attachment led to a decrease in reports of war-related intrusions in anxious individuals. This means that felt security in the aftermath of an adverse life event such as war may have a healing effect on anxiously attached individuals.

The attachment styles and contextual activation of secure attachment might be influential on emotion regulation and coping with post-traumatic stress. Miterany (2004) investigated the impact of global and contextual attachment-related representations on explicit and implicit responses to trauma (as cited in Mikulincer et al., 2006). The explicit trauma-related indicators consisted of self-reported PTSD symptoms such as intrusion, avoidance, and hyperarousal. Implicit trauma responses were measured by the cognitive accessibility of trauma-related mental representations using the Stroop colour-naming task, in which participants were requested to name the colour of trauma-related words. In this task, higher latencies for the colour naming of trauma-related words showed higher accessibility. Results showed that participants in the PTSD group took longer than those in the non-PTSD group to name the colours of trauma-related words. The effects of contextual activation of attachment security representations

in a Stroop task were also examined in this study. Participants were subliminally presented with security-related words, neutral words, or positive words before the trauma-related word. It was found that the effect of PTSD severity was significant when participants were primed with neutral or positive words, but not when they were primed with security words. In other words, security word priming reduced the accessibility of trauma-related thoughts, thus causing the lack of differences observed between the PTSD and non-PTSD groups in reaction times. An interesting association was found for anxiously attached individuals. When these individuals were subliminally primed with security words, their latencies for colour naming decreased significantly. This might indicate that felt security may have a soothing effect on the negative effects of trauma.

In this section, the impact of traumatic experiences such as abuse and war on attachment insecurity, ways of coping, and symptomatology were discussed. People with anxious attachment and people with avoidant attachment both exhibit avoidance and intrusions following a traumatic event, but they use different routes to achieve emotion regulation (e.g., anxious people engage in hyperactivating strategy and rumination about trauma, whereas avoidant people engage in deactivating strategy and suppressing the traumatic event). It is important to note here that secure attachment priming might be a promising way to decrease symptom severity and facilitate trauma coping by activating feelings of felt security. In the following section, the impact of attachment styles on one's view of self and posttraumatic cognitions will be reviewed.

### **Self-esteem and posttraumatic cognitions.**

Since view of self and view of others shape the attachment styles, it is important to emphasize the link to self-esteem with a positive view of self. The positive view of self and high self-esteem can be protective factors in the aftermath of traumatic events and might be associated with PTG in the long run.

Self-esteem refers to how much value people place on themselves and on their evaluations about themselves (Baumeister, Campbell, Krueger, & Vohs, 2003). Self-esteem is positively related to many domains in life such as academic performance (Davies & Bremner, 1999), social interactions and social support (Lakey, Tardiff, & Drew, 1994; Leary, 1999; Murray, Rose, Bellavia, Holmes, & Kusche, 2002), life satisfaction (Diener & Diener, 1995), and psychological well-

being (Franck & De Raedt, 2007; Kashdan, Uswatte, Steger, & Julian, 2006; Kernis, 2005; Murrell, Meeks, & Walker, 1991).

Throughout development, interactions with parents and attachment styles influence personality in different ways. In attachment theory, the responsiveness of the caregiver gives the child the message that he/she is worthy of love, care, and support. However, unresponsive care-giving teaches the child that he/she is unworthy of love and thus contributes to the formation of a negative view of self. The link between attachment styles and psychopathology, then, may be significantly shaped by these views of self that are formed throughout a child's development. Attachment styles are influential in forming self-esteem (Blysm, Cozzarelli, & Sumer, 1997; Brennan & Morns, 1997) and by means of that having a more positive view of self may contribute to psychological well-being following a traumatic event (Agar, Kennedy, & King, 2006; Bryant & Guthrie, 2007; Littleton, Magee, & Axsom, 2007; Walter, Horsey, Palmieri, & Hobfoll, 2010). Self-esteem as a protective factor might be one of the most influential determinants for the process of adaptive strategies and developing posttraumatic cognitions in the aftermath of traumatic events.

There is evidence that self-esteem can mediate the relationship between parental relationships and depressive symptoms (Restifo, Akse, Guzman, Benjamins, & Dick, 2009) and that it can predict dysphoria in university students (Chang, 2001). In clinical disorders, generally people either do not have a positive view of self or cannot maintain and enhance their positive view of self. They are more willing to find out their negative sides, especially if they have experienced adverse life events such as abuse (Luke & Stopa, 2009). Feelings of self-worth and mental models of the self develop through positive experiences with attachment figures during early childhood (Bowlby, 1969). Mikulincer (1995), for example, found that secure people described themselves in more positive terms. Furthermore, they had highly differentiated and integrated self-structures and low levels of discrepancies between different domains of the self compared to insecure people. Securely attached individuals, in fact, are likely to develop positive and coherent self-organizations as a result of their positive interactions with early attachment figures and current secure relationships which contribute to their well-being. In addition, secure people are mentally able to reproduce their positive attachment experiences in times of distress and to use them as means of tolerating

and overcoming stress (Mikulincer, 1998). Cozzarelli, Sumer, and Major (1998) demonstrated that women with a positive model of self reported more adjustment and less distress than women with a negative view of self following an abortion. In general, anxious attachment was associated with increased difficulty in becoming close to others, dysfunctional attitudes, low self-esteem, and high levels of depression (Carnelley, Pietromonaco, & Jaffe, 1994; Roberts, Gotlib, & Kassel, 1996). Wei, Mallinckrodt, Larson, and Zakalik (2005) found that the capacity for self-reinforcement and need for reassurance from others mediated the relationship between anxious attachment and depression in university students. In addition, attachment anxiety partially mediated the relationship between intimate partner violence or sexual victimization and posttraumatic stress among female college students (Sandberg, Suess, & Heaton, 2009). Since attachment anxiety is linked with a negative view of self, it is more likely that individuals who experience traumatic events might be damaged more from the traumatic event than those who have a positive self view. As their hyperactivating strategy is triggered by the trauma, they might perceive the event to be overwhelming and cannot facilitate active coping. There are no studies in the literature that directly focus on self-view prior to the traumatic event and its influence as a protective factor for traumatic stress. However, in the study of Bryant and Guthrie (2007), it was found that negative appraisals about oneself prior to trauma predicted PTSD among fire brigades.

Following the traumatic event, individuals can develop negative posttraumatic cognitions about themselves and the world. Considering the other findings from studies, posttraumatic cognitions and negative appraisals about self were predicting both posttraumatic stress and depression (Agar, Kennedy, & Nigel, 2006; Karl et al., 2009; Kelim, Ehlers, & Glucksman, 2007; Sanders, Buck, & Arntz, 2009; Startup et al., 2007). Negative appraisal about self was a consistent predictor for PTSD and depression in 2-week, 1-month, 3-month, and 6-month follow-ups among motor vehicle accident survivors (Ehring, Ehlers, & Glucksman, 2008). In the meta-analysis of Ozer, Best, Lipsey, and Weiss (2003), one of the most important factors contributing to PTSD was posttraumatic cognition. Although a person's view of self is substantially determined by previous experiences and events, an unexpected traumatic event might cause a change in self-esteem and his or her view of self, as well, especially in the case of

interpersonal traumas. On the other hand, having high self-esteem and a positive self-view can protect the individual from adversities of posttraumatic stress.

As a result, the relationship among early traumatic events, self esteem, and posttraumatic cognitions could reveal who is more vulnerable to suffer following traumatic events. There are no studies in the literature that investigate specifically these relationships and interpret Ehlers and Clark's (2000) model accordingly.

In the previous sections, pre-trauma factors and negative appraisals following the trauma were discussed. The posttraumatic stress was evaluated with respect to attachment theory and its main concepts, which can either, serve the process of managing stress positively with adaptive emotion regulation strategies or negatively with maladaptive emotion regulation strategies. The link between view of self and self-esteem was also emphasized in this respect. In the next part, a review of the positive consequences of traumatic experience will be covered with respect to posttraumatic growth, the positive transformation following the traumatic event and its link with self-esteem and attachment will be evaluated.

### **Posttraumatic growth following a traumatic event.**

As mentioned in the introduction, although adverse life events may lead to psychological problems, they do not necessarily bring about negative changes. They can, in fact, also initiate positive changes. The aim of this section is to describe the phenomenon of finding positive meaning in traumatic experiences and positive transformation following a traumatic event, which is conceptualized as PTG. This phenomenon has also been described as stress-related growth (Park, Cohen, & Murch, 1996), perceived benefits (McMillen & Fisher, 1998), thriving (Abraido-Lanza, Guier, & Colon, 1998), positive changes in outlook (Joseph et al., 1993), and positive by-products (McMillen, Howard, Nower, & Chung, 2001). The most recent approach is Posttraumatic Growth Theory (Tedeschi & Calhoun, 1996).

PTG defines a new way of evaluating the effects of trauma and of conceptualizing the positive meaning derived from a traumatic event. Basically, PTG occurs in five general areas of life (Tedeschi & Calhoun, 1996; Tedeschi, Park, & Calhoun, 1998). First, after a traumatic event, people may develop a sense that new opportunities and possibilities are likely to appear (e.g., "I changed my priorities about what is important in life," "I established a new path for my

life”). Secondly, a positive change in relationships with others may take place. People may become closer with specific significant others and/or feel an increased sense of connection to people who have had similar adverse experiences (e.g., “I have a greater sense of closeness with others,” “I put more effort into my relationships”). Thirdly, individuals may experience an increased sense of strength and self-efficacy after fighting against the negative outcomes of trauma (e.g., “I discovered that I’m stronger than I thought I was,” “I have a greater feeling of self-reliance”). Fourthly, some people may experience a greater appreciation for life in general (e.g., “I have a greater appreciation for the value of my own life,” “I can better appreciate each day”). Lastly, people may question their existence and find meaning through development in spiritual or religious domains (e.g., “I have a stronger religious faith,” “I have a better understanding of spiritual matters”). PTG is both a cognitive process of change that starts with coping and a process of outcome (Tedeschi et al., 1998). The transformation takes place in the perception of self, in interpersonal relationships, and in the individual’s philosophy of life (Tedeschi & Calhoun, 1996).

Recently, the factor structure of the posttraumatic growth inventory has been investigated (Taku, Cann, Calhoun & Tedeschi, 2008). When compared with a three-factor model, namely, changed perception of self, changed interpersonal relationships, and changed philosophy of life, it was found that a five-factor model is valid and producing the best model fit (Taku et al., 2008). PTG theory suggests that finding positive meaning following a traumatic event might transform an individual’s perception of self and the world. Individuals start to view themselves as survivors rather than victims of the trauma. This may make them attribute special meaning to a traumatic event (Tedeschi, 1999; Tedeschi et al., 1998) and lead to positive changes as a result of the challenging aftermath of the traumatic event (Tedeschi & Kilmer, 2005).

Qualitative studies as well as quantitative studies (Dirik & Karanci, 2008; Jim & Jacobsen, 2008) have suggested that posttraumatic growth and finding positive meaning via reappraisal of relationships, adopting a new appreciation of life, having a new awareness of a stronger self, and spiritual change are likely to occur following physical illnesses (Hefferon, Greal, & Mutrie, 2009). PTG as an outcome measure may be observed for almost all trauma types. Some of them include: health problems (Cadell, 2003; Fortune, Richards, Griffiths, & Main,

2005; Kesimci, 2003; McGrath & Linley, 2006; Oaksford, Frude, & Cuddihy, 2005; Schultz & Mohamed, 2004; Sheikh, 2004), disasters (Güneş, 2001), community violence and terrorist attacks (Davis & McDonald, 2004; Laufer & Solomon, 2006; Park, Aldwin, Fenster & Snyder, 2008; Updegraff & Marshall, 2005), loss (Büchi et al., 2007; Polatinsky & Esprey, 2000; Taku et al., 2010), childhood traumas (Woodward & Joseph, 2003), intimate partner violence (Cobb, Tedeschi, & Calhoun, 2006) and wars (Erbes et al., 2005; Lev-Wiesel & Amir, 2003; Maercker & Herrle, 2003; Pietrzak, et al., 2010; Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003; Salo, Qouta, & Punamaki, 2005).

PTG is accompanied by different trauma-related factors and personality characteristics in the studies above. On the other hand, it may co-exist with traumatic stress, posttraumatic stress symptoms (Lev-Wiesel & Amir, 2003; Morrill et al., 2007; Petrzak et al., 2010; Powell et al., 2003), depressive symptoms, and anxiety (Dirik & Karanci, 2008; Morrill et al., 2007). Since PTG could occur while an individual is facing the traumatic event and its consequences, the confrontation may be associated with distress during the meaning making process that forms the positive transformation. The majority of research into PTG has been conducted in self-report, cross-sectional, and retrospective studies. Few studies used a clinical sample and multi-methods and longitudinal approaches. In other words, using cross-sectional designs to understand PTG does not really offer a deeper understanding of how the positive transformation process takes place. One of the recent studies mainly evaluated the trauma survivors' and their significant others' reports of positive change in the aftermath of trauma (Shakespeare-Finch & Enders, 2008). They found supportive evidence for PTG validity by showing a significant correlation between two types of reports in a clinical sample for the first time in the literature. The only longitudinal study is a 6-month follow-up measuring perceived posttraumatic growth and actual posttraumatic growth by changing the Posttraumatic Growth Inventory items into items that indicate the current state of positivity (e.g., "I have a greater sense of closeness with others" into "I have had a sense of closeness with others") (Frazier, Tennen, Gavian, Park, Tomich, & Tashiro, 2009). The results indicated that perceived growth was related to higher distress levels and that actual growth was associated with decreased stress. In that study, PTGI tapped into a different side of the PTG, mainly perceived growth rather than

actual growth. The relationship between the actual growth and the perceived growth was small. This provides evidence for the difference of perceived growth, which may give rise as a result of defensiveness; however, actual growth could be the real positive transformation (Frazier et al., 2009). Although the study was not conducted in a clinical sample, it is novel as it indicates the difference between perceived and actual change in the aftermath of a traumatic event.

Traumatic events challenge the individual's assumptions about the world (Joseph & Linley, 2008). Individuals may follow two different pathways as they work through the traumatic event: assimilation and accommodation (see Figure 1.6). In the assimilation process, individuals modify the upcoming trauma information and integrate it in the existing cognitive schemas, whereas in the accommodation process they modify their cognitive schemas and basic assumptions. In Joseph and Linley's (2008) model, they argued that only the latter results in PTG. In other words, PTG occurs when the individual accepts the traumatic event and understands that people in general are vulnerable to adverse life experiences, but that coping following an adverse life event is possible. The authors postulated that the world assumption, as safe and predictable, prior to the event contributes to its processing. However, their model does not further specify in which way it might predict assimilation and accommodation. I suggest that psychosocial factors such as attachment styles might be involved, contributing towards a positive self-view and facilitating social support. As a result, these factors might facilitate growth and influence the individual's coping in the aftermath of a traumatic event.

### **Contributors to posttraumatic growth.**

According to Linley and Joseph's (2004) review, growth is associated with different factors related to the individual. It is possible to analyze these factors in three major categories: pretraumatic, peri-traumatic, and posttraumatic conditions.

For pretraumatic factors, demographic characteristics such as gender, age, income, and education level were associated with growth in the reviews of Linley and Joseph (2004) and Joseph and Linley (2005). Females reported more growth than males (Arikan, 2007; Güneş, 2001; Helgeson, Reynolds, & Tomich, 2006; Laufer & Solomon, 2006). Younger individuals seemed to benefit more from the growth in the aftermath of adverse life events (Fortune et al., 2005; Helgeson et

al., 2006; Laufer & Solomon, 2006; Linley & Joseph, 2004; Polatinsky & Esprey, 2000; Powell et al., 2003). Furthermore, in most studies, income and education factors were positively associated with traumatic growth (Bellizi & Blank, 2006; Linley & Joseph, 2004; Salo et al., 2005). Different personality characteristics contributed to PTG (Joseph & Linley, 2005; Linley & Joseph, 2004), such as extraversion (Sheikh, 2004), openness to experience, agreeableness, and conscientiousness. These personality characteristics were found to be positively correlated with growth, as well as with self-efficacy, hardiness, self-esteem, and optimism (Linley & Joseph, 2004).

Importantly, another factor that contributes to growth is attachment style. Secure individuals were affected less by adverse events (Fraley et al., 2006a) and reported more growth (Salo et al., 2005). Optimism was another factor that contributed to growth (Helgeson et al., 2006; Urcuyo, Boyers, Carver, & Antoni, 2005). All of these personality factors are important for the trauma sequel as well. They may influence individuals' appraisals of the traumatic events, posttraumatic cognitions, and psychological changes. As a result, they may empower individuals and facilitate growth. The crucial link is how personality characteristics influence appraisals, posttrauma cognitions, and psychological well-being following a traumatic event, yet there is no previous study which investigates these relationships.

For trauma-related factors, greater levels of perceived threat and harm were associated with higher levels of growth (Arikan, 2007; Armeli, Gaunthert, & Cohen, 2001; Davis & Macdonald, 2004; Morris, Shakespeare-Finch, Rieck, & Newbery, 2005). According to PTG theory, the individual can undergo positive transformation following a traumatic event if the trauma affects his or her life to a great extent (Tedeschi et al., 1998). Therefore, the severity of the traumatic event and perceived impact are crucial elements for the growth process. When the impact of the traumatic event is high, and the individual manages to survive, he or she starts to develop a greater awareness of his or her self-efficacy and power to cope with the negative outcomes of the traumatic event. This facilitates a new understanding and posttraumatic growth. Nevertheless, the relationship between PTG and perceived traumatic stress is not linear, but curvilinear (Linley & Joseph, 2004; Powell et al., 2003). The benefit finding is at its peak in the intermediate level of stress rather than in the weakest or strongest levels. Moreover, cognitive

appraisals such as awareness and controllability of the event have been found to be associated with higher levels of growth (Linley & Joseph, 2004; Park, 1998).

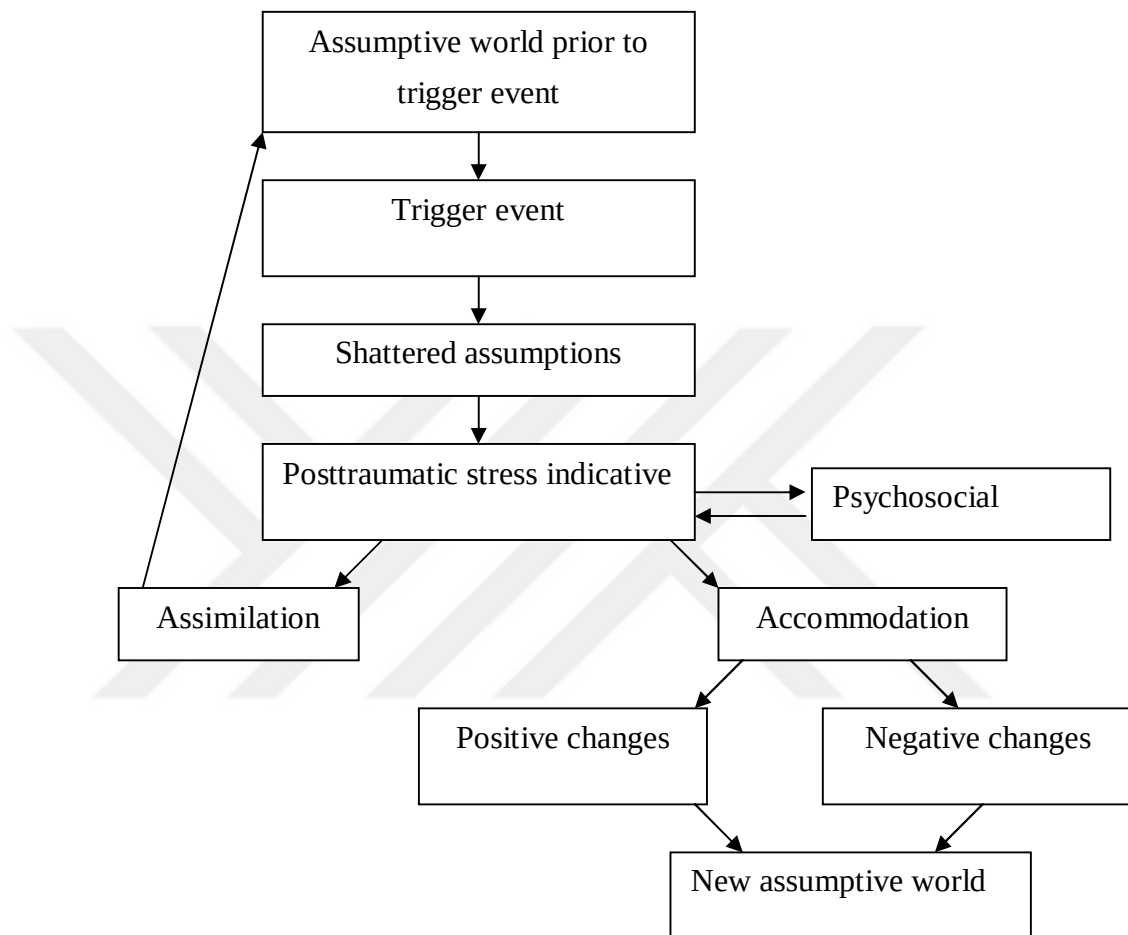


Figure 1.6. Growth through adversity schematically represented.

Note. From Joseph, S., & Linley, P. A. (2008). *Trauma, recovery and growth: Positive psychological perspectives on posttraumatic stress*. In S. Joseph & P. A. Linley (Eds.). New Jersey: John Wiley & Sons Inc, p. 13.

For the posttraumatic factors, individuals who adopt coping mechanisms of positive reappraisal and acceptance (Helgeson et al., 2006) report more growth. The posttraumatic cognitions are related to PTSD (Ozer et al., 2003). Negative

cognitions related to self and worldview are found to be related to negative psychological changes. On the other hand, more positive appraisals related to the traumatic event and trauma sequel might contribute to growth. This suggests that negative and positive posttraumatic cognitions are key factors for posttraumatic negative and positive change.

In addition, individuals who report problem-focused coping (Sheikh, 2004), religious coping (Armeli et al., 2001), and obtaining social support handle the trauma more easily and show greater improvement (Linley & Joseph, 2004). The availability of social support and relationship networks facilitates growth (Armeli et al., 2001; Schulz & Mohamed, 2004; Tedeschi & Kilmer, 2005). Although rumination was a negative way of dealing with a traumatic event and might contribute to symptomatology, it was one of the most important aspects that predicted growth in the above studies. This finding is counterintuitive and may be due to differences in definition and measurement of rumination, there are studies in which writing and confronting personal issues or problematic events could reduce distress and the effect could be long lasting, especially for those who are reluctant or afraid to face the problems (Pennebaker, 1997). Facing a traumatic event and expressing it in narrative forms was found to be associated not only with psychological well-being, but physical well-being as well (Pennebaker, Kiecolt-Glaser & Glaser, 1988; Pennebaker, Zech, & Rime, 2001).

However, thought suppression, especially of those thoughts which foster negative emotions, was found to affect immunological markers in the blood of first-year medicine students in an experimental design in which participants were trying to suppress thoughts that they wrote (Patrie, Booth, & Pennebaker, 1998). A similarity may be suggested to take place in the relationship between trauma and PTG. Thinking and cognitively elaborating on effects of trauma and trauma itself can lead individuals to realize different points of views and as a result, that person may adopt a more positive evaluation of the traumatic event.

Calhoun, Cann, Tedeschi, and McMillan (2000) argued that people who report more event-related rumination experience more growth because cognitive processing in the form of rumination eases the shaping of a new perspective in life. The rumination in Calhoun and colleagues' (2000) study could be related to what the studies on thought expression and well-being have proposed (Pennebaker et al., 2001). If individuals share their experiences rather than

suppress them, they could physically and psychologically feel better, and viewing the traumatic event in a different way becomes possible. It might be a way of processing the traumatic event. Because the trauma shatters basic assumptions of the individual (Horowitz, 1986), the event-related rumination may facilitate cognitive processing of the trauma-related material and allow assimilation and accommodation processes to take place.

The evidence on the time interval between the traumatic event and PTG is not yet conclusive, and the time needed for the benefit finding is not known yet and may vary. The studies retrospectively analyzed and found positive changes after many years, for example, after Holocaust experiences (Lew-Wiesel & Amir, 2003), the Vietnam War (Erbes et al., 2005), and the Second World War Dresden bombing (Maercker & Herrle, 2003).

The majority of studies that have investigated the factors associated with PTG are correlational, and they indicated that PTG is determined by trauma-related factors, demographic characteristics, personality aspects, coping styles and posttrauma factors. Although many variables predict growth, their interactive nature and how they contribute to the re-framing of the traumatic event has not yet been properly discussed. Unlike Joseph and Linley (2008), who in their model focused on the cognitive processing of the traumatic event, Schaefer and Moos (1998) explained posttraumatic positive changes by referring to surrounding individual factors and differences such as demographics, personality characteristics, coping style, trauma severity, and trauma-related appraisals. In other words, they aimed to formulate a model by drawing the relationships among different factor groups and explaining how they lead to positive change. In the next section, this model will be presented.

### **Schaefer and Moos' (1998) Model.**

Schaefer and Moos (1998) proposed a model in which they categorized environmental, social, trauma-related, and posttrauma factors in different compartments and discussed possible directions that lead to positive transformation. According to the model, environmental system factors (e.g., an individual's relationships and social support network, economic situation, home and living conditions) and personal system factors (e.g., socio-demographic characteristics, self-efficacy, resilience, motivation, health status, and prior crisis

experiences) are crucial for improvement in PTG. They suggested that these factors group together and can begin the process of positive transformation in the aftermath of a trauma. Appraisals and coping responses shape the individual's successful resolution after the event.

The coping style with the traumatic event can be divided into approach and avoidant coping. In the approach coping, the individual analyzes the event in a logical way, reappraises the crisis in a more positive manner, and takes actions to solve problems. In avoidant coping, the individual undervalues the event and chooses to be passive in the face of this event (Schaefer & Moos, 1998). Approach coping, rather than avoidant coping, was associated with PTG in several studies (Linley & Joseph, 2004). In other words, both coping styles influence benefit finding or positive change after adverse life events, but they do so in different ways.

Trauma characteristics may play a role in PTG (Schaefer & Moos, 1998). These are duration and proximity of the event, amount of exposure, extent of loss, and scope. The traumatic event may be an individual event (e.g., abuse, accident, or illness) or a community event (e.g., natural disasters, wars, or epidemics). Later, all these trauma characteristics influence the development of positive outcomes or personal growth (Schaefer & Moos, 1998). In Figure 7, environmental and personal factors are depicted in Panel I and Panel II. They contribute to the life crisis or transition. In Panel III, event-related factors are represented. The influence of coping styles and appraisals are illustrated in Panel IV. Lastly, Panel V includes positive outcomes of life crises and transitions.

The model aims to summarize factors into different groups. It basically presents all factor groups in relation with each other. However, it is hard to make conclusions about relevance and importance of factors. The presentation of the model does not involve a hierarchy of importance in terms of their influence on PTG. Furthermore, the model does not offer precise directional routes for positive transformation. Even though positive transformation has been studied for more than 10 years, the direction of the relationship among the found correlates still needs to be considered in a hierarchical framework and factored for their level of importance for PTG.

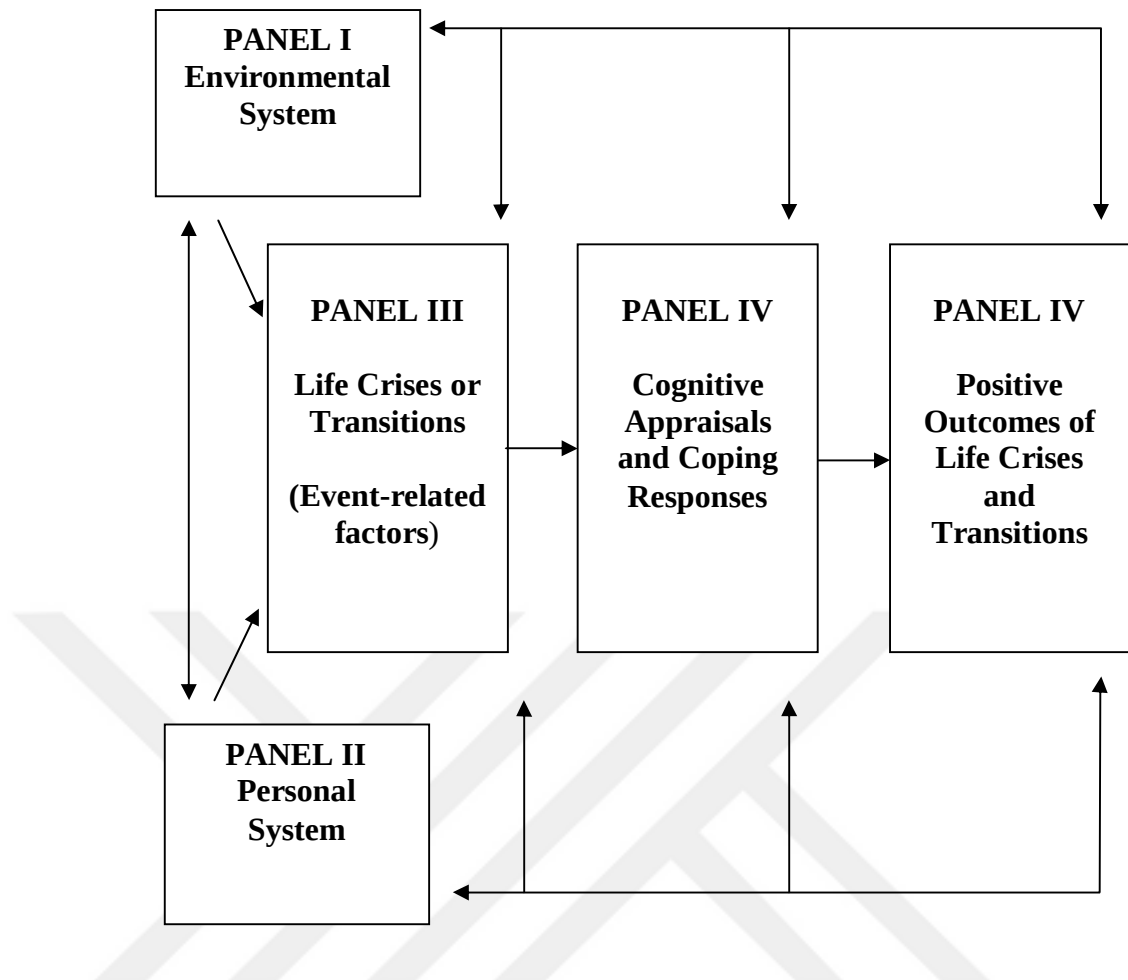


Figure 1.7 A conceptual model for understanding positive outcomes of life crises and transitions

Note. From Schaefer, J. A., & Moos, R. H. (1998). The context for posttraumatic growth: Life crises, individual and social resources and coping. In R. G. Tedeschi, C. L. Park, & L. G. Calhoun (Eds.). *Posttraumatic growth: Positive changes in the aftermath of Crises* (p. 100). USA: Lawrence Erlbaum Associates, Inc.

Another model of PTG (Jim & Jacobsen, 2008) focuses on cancer survivors. The paths in the model clearly show the association between PTSD and PTG compared to Scheafer and Moos's (1998) model. In their model, personal, event-related and environmental factors are leading to shattered assumptions about self and the world, and these are associated with PTSD symptoms,

intrusions, avoidance, and hyperarousal sources. The coping that takes place as a result of PTSD symptoms is in relation to the self and worldview as well as to PTG. In other words, coping and revision of shattered assumptions are occurring at the same time with PTG (Jim & Jacobsen, 2008). Unlike Scheaffer and Moos (1998), they tapped into specific symptom clusters of PTSD, and the model depicts the relationship among factors, PTSD symptom clusters, and PTG. Although they specifically targeted cancer survivors and PTG following cancer, the model could be applied to other traumas as well.

To evaluate the influence of PTG on shattered assumptions, longitudinal rather than cross-sectional designs are essential. Although the model outlines the main links with PTSD and coping, the relationship between personal factors and environmental factors with PTG are not depicted in detail. Personality factors (Joseph & Linley, 2005; Linley & Joseph, 2004) and social support (Armeli et al., 2001; Schulz & Mohamed, 2004; Tedeschi & Kilmer, 2005) have been shown to be associated with PTG in previous research, and therefore, direct links of personal factors and environment factors to PTG are likely, but not explicitly spelled out in the model (see Figure 1.8).

Even though there are some inconclusive issues with the concept, PTG provides a framework to explain positive changes following a traumatic event. Joseph and Linley (2008) examined how posttraumatic change and positive transformation take place cognitively. They focused on the cognitive process rather than influential individual factors, unlike Shaefer and Moos (1998) and Jim and Jacobsen (2008). The relationship between posttraumatic negative changes and posttraumatic positive changes need more investigation in terms of their relationship. We know that personality characteristics are influential for both PTSD and PTG. However, their causal relationship with each other and how, when, and under what circumstances they start to be influential have not been investigated. Because both negative and positive changes can co-occur, it is important to reveal underlying mechanisms and key features that lead to psychopathology or positive change.

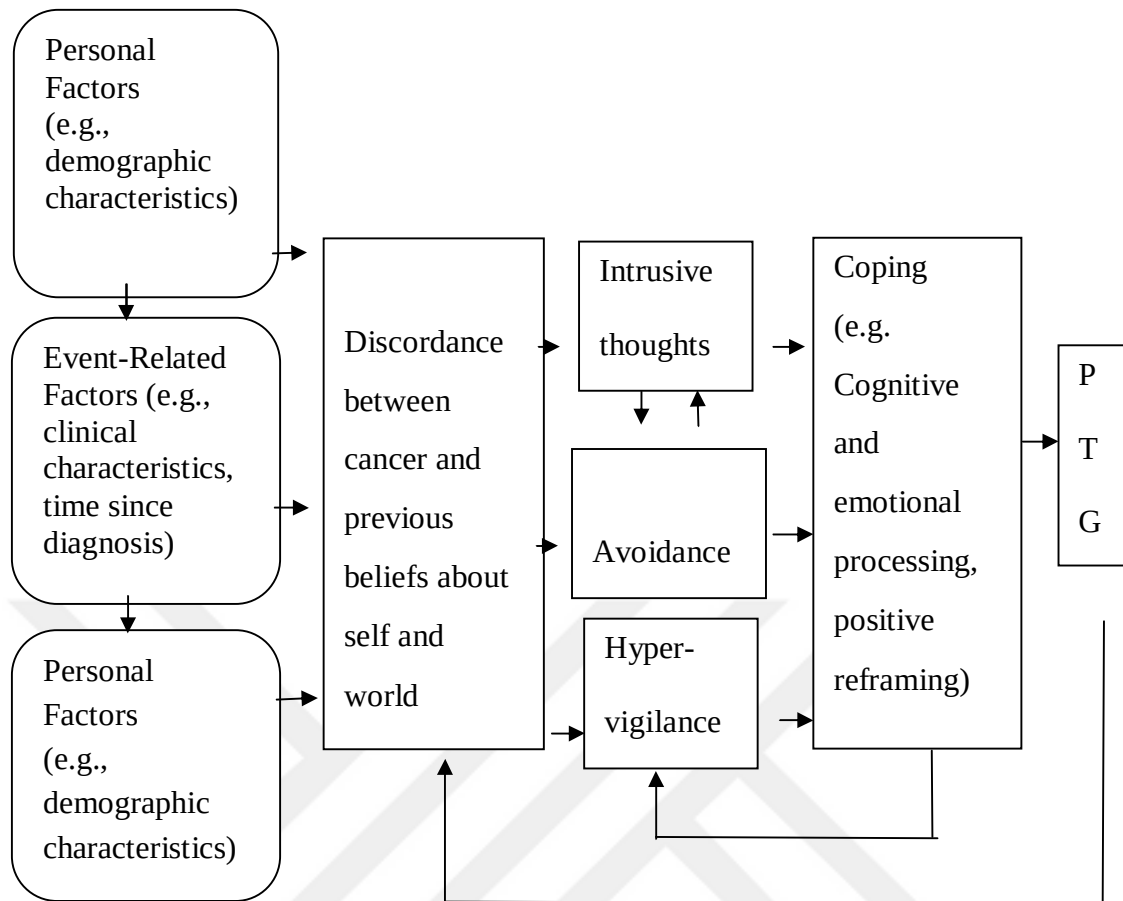


Figure 1.8. Theoretical model of posttraumatic stress and posttraumatic growth in cancer survivors

Note. From Jim, H. S. L. & Jacobsen, P. B. (2008). Posttraumatic stress and posttraumatic growth in cancer survivorship: A review. *The Cancer Journal*, 14, p.415.

### Summary.

The aim of this review section was to establish a link between attachment styles, self-esteem, posttraumatic cognitions, PTSD, and PTG, and to provide a base for the extended model of Ehlers and Clark (2000). Therefore, this chapter presented an evaluation of the pre-trauma components of the model in relation to early traumatic events, attachment insecurity, and negative self-view. Then, negative post-trauma cognitions and how trauma affects the view of self and the view of the world, as well as self-esteem and an individual's belief in himself or herself, were covered in relation to attachment theory, PTSD, and PTG. To be

more specific, these factors were emphasized in Ehlers and Clark's model (see Figure 1.9). In the extended version of the model, a set of pre-trauma factors such as early traumas and insecure attachment, which determine a person's emotion regulation capacities (Mikulincer & Shaver, 2007) are emphasized in reference to prior experiences. These factors may lead to increased negative appraisals of the traumatic event and lower individuals' self-esteem. On the other hand, the extended model assumes that having less early traumatic events, secure attachment, and high self-esteem may be protective factors for PTSD and important elements for PTG. Furthermore, the integration of attachment not only provides a base to evaluate prior experiences, but it also helps to understand the possible emotion regulation mechanism following the traumatic event.

There are number of studies that focus on the impact of early traumas on attachment, self-esteem, PTSD, and PTG. Nevertheless, there is no study that investigates their interrelationship and how they contribute to the development of PTSD and PTG. In addition, there are no studies that aim to formulate PTSD and personal differences with respect to emotion regulation strategies and attachment dimensions as stated by Mikulincer and Shaver (2007). Future research should focus on the mediator variables for PTSD and PTG that enable interventions and could reveal vulnerabilities while treating psychological problems in the aftermath of traumas. The present section did not only offer combining two models, Ehlers and Clark (2000) and Mikulincer and Shaver (2007), but also suggested possible mediators for PTSD and PTG. In the next chapter, survey study results will be presented, and there will be a series of models for PTSD and PTG in which mediators are also outlined.

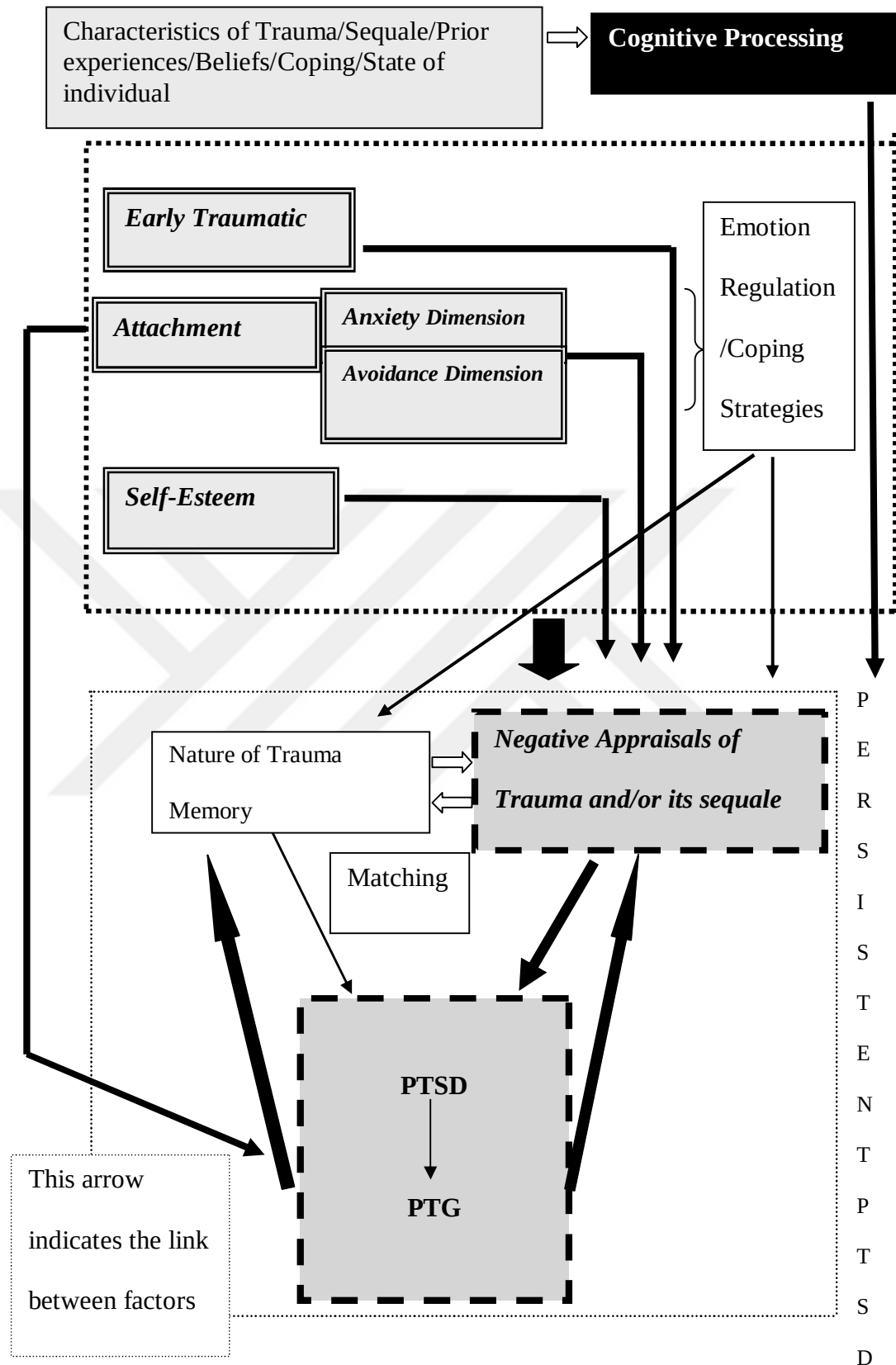


Figure 1.9. Tested model.

### **CHAPTER 3: Psychobiological Mechanisms for PTSD and Emotion Regulation**

In chapter 2, a number of psychological models and empirical findings that help one to understand the association between early trauma, attachment, self-esteem, and posttraumatic cognitions and PTSD as well as PTG were reviewed. This chapter will turn to psychobiological mechanisms related to PTSD (Brewin, 2003). Chapter 3 will present an overview on the memory processing of trauma, its biological underpinnings, and biological and attachment-related factors as contributors. In addition, empirical studies and key models that explain the link between cognitive processing of trauma and attachment in relation to a neuroendocrinological mechanism and emotion regulation framework will be presented.

To understand the impact of attachment (both physiologically and psychologically) on emotion regulation following traumatic events, first Brewin's (2003) model regarding trauma, memory, and the link with Hypothalamic-Pituitary-Adrenal (HPA) system will be covered. Following, Heinrichs and Domes' (2008) psychobiological model will be discussed with respect to possible biological protective mechanisms, which are related to attachment for PTSD. Lastly, the link between PTSD and the emotion regulation system in attachment will be discussed with respect to Mikulincer and Shaver's (2007) and Maunder and Hunter's (2001) models. The research findings regarding these models will be covered as well.

#### **Brewin's Dual-Representation Model (2003)**

One of the major underlying mechanisms for PTSD symptoms is cognitive processing during a traumatic event (Ehlers & Clark, 2000). According to Brewin's (2003) dual representation model (see Figure 2.1), there are two memory systems involved in the processing of a traumatic event, namely, the verbally accessible memory (VAM) system and the situationally accessible memory system (SAM). In VAM, the trauma memory is integrated with other autobiographical memories and can be retrieved deliberately in a narrative form. It involves information concerning activities that the individual engaged in before,

during, and following the traumatic event. All of this information should be consciously processed and transferred to long-term memory to be recalled later. However, the VAM system is limited in terms of its content. It only covers consciously attended information, and, during a highly stressful event, it is restricted in volume to register the relevant aspects of trauma verbally. It also includes evaluations concerning the impact of the traumatic event, previous events and the future after a traumatic event. It enables an individual to organize the occurrence of the traumatic event in a framework involving trauma-related emotions and cognitions.

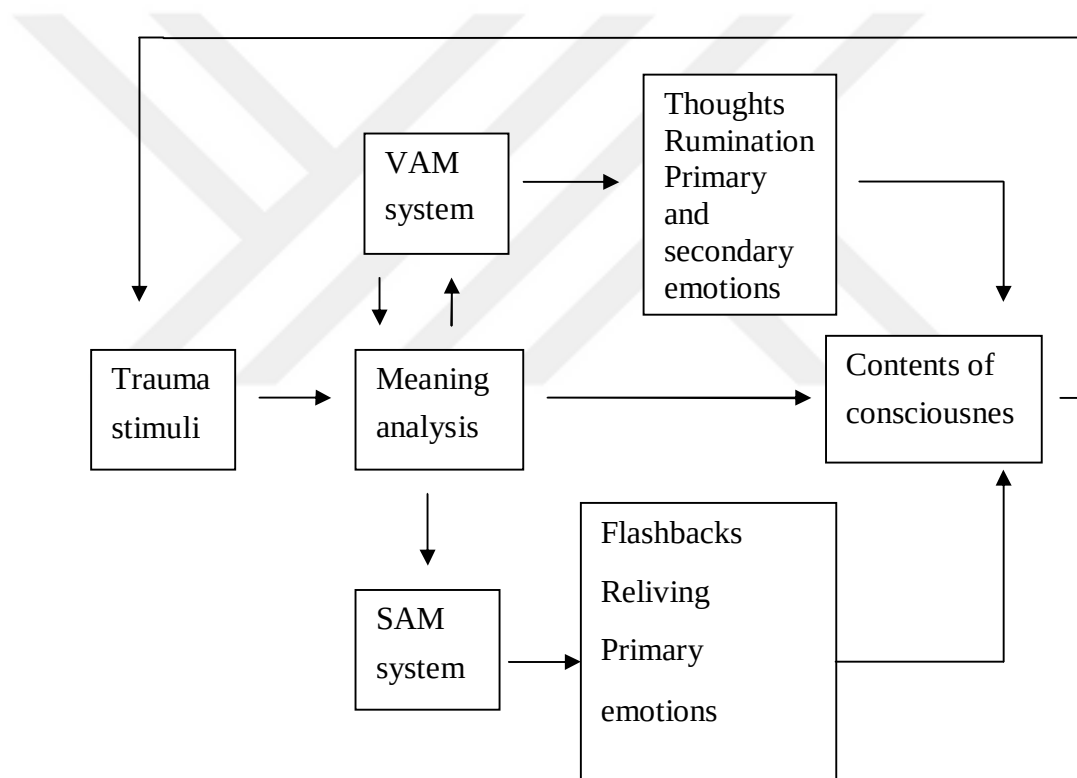


Figure 2.1. Dual representation model

Note. From Brewin, C. R. (2003). *Post-traumatic stress disorder: Malady or myth?* London: Yale University Press. p.109.

On the other hand, perceptual processing of a traumatic event such as sights and sounds are processed by the SAM system. Information in the SAM system is also related to the person's reaction to the traumatic event such as pain, heart-rate, and arousal, as well as to primary emotions such as fear, helplessness, and horror. Because this type of information is processed involuntarily, it is more emotion-laden and potent in producing flashbacks later on.

For a clearer understanding of how neurobiology leads to changes in processing a traumatic event by prioritizing the sensual cues as suggested in Brewin's (2003) dual representation model, an analogue trauma method that presents an individual with a trauma-like stimuli to induce distress similar to trauma has been used in research. These studies were designed to test the effect of trauma on cognitive processing of trauma, physiological responses, and psychological symptoms such as intrusions (for a review, see Holmes & Bourne, 2007). In those studies, individuals were exposed to trauma films while some distraction tasks were presented, such as visual tapping. Participants' physiological and psychological responses as well as symptomatic differences (e.g., dissociation and intrusion) were assessed (Holmes & Bourne, 2007). Holmes, Brewin, and Hennessey (2004) reported that during watching the stressful films, participants recorded lower heart-rates, which was found to be associated with an increased number of intrusions related to the movies in the 1-week time period following exposure to the trauma films. In addition, peri-trauma distraction tasks reduced the intrusions. In other words, distractions while watching the trauma films may lead to a different processing. By not paying enough attention to sensual cues, an individual does not experience intrusions later. This provides evidence for the SAM and VAM systems. Moreover, the negative association between heart rate and intrusions after exposure to the trauma film indicates that physiological responses to trauma stimuli could predict the development of future psychological problems such as intrusions.

The main theme of the dual processing theory is that the SAM and VAM systems use different cues for registering the trauma information while processing the traumatic event; and, during the traumatic event, they encode in different modes (e.g., sensual and verbal). The psychological symptoms following the traumatic event are reflections of this two-headed memory system and the cognitive effort to integrate the traumatic information to existing memory structures. It is also possible

to find a basis for the model of Brewin (2003) in biopsychological explanations regarding the hypothalamic-pituitary-adrenal axis regulatory mechanisms.

In the next section, I explain the biological underpinnings of emotion regulation with respect to attachment and how this might be relevant to coping with traumatic stress. While presenting biological underpinnings, the basic understanding in the trauma literature will be discussed to address the contribution of oxytocin and attachment styles to understand emotion regulation following traumatic events.

### **Biological underpinnings of stress response following trauma in relation to emotion regulation.**

In this section, I will explain the biological changes that result from traumatic stress and the effect of these changes on memory processing as well as on emotion regulation. To understand how stress exposure affects physiological and psychological responses, it is crucial to know how the related nervous system operates, especially the hypothalamic-pituitary-adrenal (HPA) axis. The autonomic nervous system consists of motor nerves, control functions for involuntary movements, cardiac muscles, and glands (Kalat, 2000). The autonomic nervous system has two generally opposite systems, namely the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). When an individual is exposed to stress, the SNS is activated, whereas the PNS activity is suppressed until the stressor is removed (Kalat, 2000). The SNS basically prepares the body for muscular activity that enables *fight or flight* survival responses in times of stress. In addition, release of adrenalin and noradrenalin into the system increases the heart rate and blood pressure, and this stimulates SNS activation and also increases the release of epinephrine in the adrenal medulla into the blood stream, which serves as a messenger for activating the stress system that is directed by the HPA. The HPA axis involves interactions between the hypothalamus, the pituitary gland in the brain, and the adrenal glands at the top of the kidneys (Kalat, 2000). The HPA is activated while a person reacts to stress, trauma, and injuries (Kalat, 2000). The system starts working when stress is perceived, and it is mediated by the release of the corticotrophin releasing hormone (CRH). CRH triggers the pituitary gland in the brain to secrete the adrenocorticotrophic hormone (ACTH), and this activates the release of cortisol, which is a stress hormone in the adrenal glands (Kalat, 2000). With the activation of the HPA system, the SNS is activated as well, producing a

sustained fight or flight response. This is normally an adaptive response and serves survival. Different sorts of stressors can elicit this sympathetic and HPA response, e.g. psychosocial stressors such as public speaking (Kirschbaum et al., 1993). These stressors are usually short lasting and the individual recovers quickly, i.e., the stress response is acute. Severe psychological traumatization or chronic unavailability of a secure attachment figure presents unusual challenges for the stress system, and the stress response can become chronic (Hertsgaard, Gunnar, Farrell, & Nachmias, 1995) and lead to maladaptive consequences such as for PTSD, suppression of the immune system (Segerstorm & Miller, 2004), and functional and structural brain changes (Karl, Schaefer, Malta, Dorfel, Rohleder, & Werner, 2006).

The HPA activation is related to trauma responses and to how the memory works. The cognitive system functions at the time of a distressing traumatic event. It is suggested that the traumatic event is not similar to ordinary life events in terms of both its impact and its content, which are opposite to the basic assumption that the world is a safe and benevolent place (Jannoff-Bulman & Frieze, 1983). As a result, it is hard to assimilate the traumatic information, which also exhibits its effects at the physiological level. Chronic alterations are also observed in cardiac functioning. For example, it is known that trauma victims with PTSD have increased heart rate responses to trauma reminders and, less consistently reported, baseline heart rates (Pole, 2007), and increased cortisol levels just after the traumatic event (Hetz et al., 1996; Resnick et al., 1995); and, this may influence long-term dysregulation of the HPA axis, which is known as *hypercortisolism* or *hyper-secretion of cortisol*. Furthermore, the amygdala in the brain, which is sensitive to threat-related information, plays a role when a person is faced with excessive stress. A person may generalize a fear response to the cues that are not directly associated with trauma (e.g., after a car accident on a rainy day, a person may find rainy days anxiety-provoking; Kalat, 2000). Therefore, individuals with PTSD become agitated with trauma-related cues and sometimes one instance of excessive fear can lead to certain phobias (e.g., phobias to avoid possible risks to be a victim again). These physiological changes following stressful events might be associated with a different kind of memory processing; a high level of arousal due to trauma could inhibit verbal memory and favors situational accessible memory, which is explained in Brewin (2003).

Brewin's (2003) model suggested that the inhibited memory functioning of VAM, verbal format, and registering the traumatic event cues in sensory format in SAM may lead to the continuation of PTSD symptoms such as intrusions because recording the threat-related information in sensory format could be also explained in evolutionary terms. When a person experiences a threat to his/her existence, the smell, texture, and colour of the cues related to the trauma are registered fully in order to use this information later to prepare the individual to recognize and avoid the traumatic event occurrence again.

In the following sections, I will explain psychobiological underpinnings of emotion regulation and traumatic stress and the possible role of oxytocin as a protective factor.

### **Introduction to bio-psychological underpinnings of emotion regulation and traumatic stress.**

Previously, I presented Ehlers and Clark's (2000) model of PTSD and, in particular, how pre-traumatic factors and cognitive appraisals of the traumatic event could be linked with attachment as conceptualized in the Mikulincer and Shaver (2007) model. The contribution of attachment as an emotion regulation mechanism to process a trauma was emphasized with respect to hyperactivating and deactivating maladaptive strategies of attachment to cope with stress (see chapter 2). The second aim of the thesis is to understand the impact of attachment and the affiliate hormone oxytocin as determinants of emotion regulation processes as well as possible psychological well-being following traumas. In this section, biopsychological factors, specifically oxytocin, and psychological factors that may positively influence trauma processing such as felt security and secure attachment will be discussed.

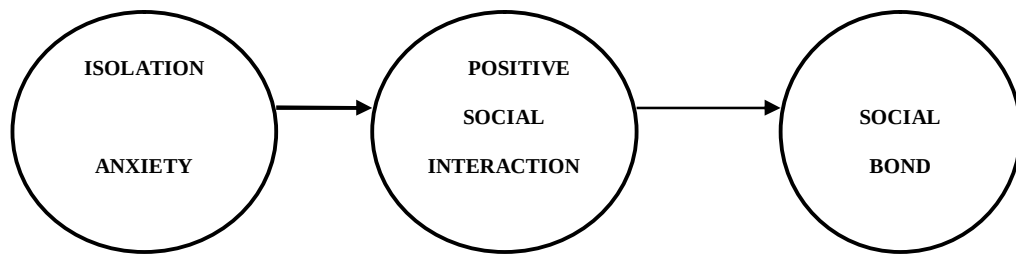
One of the most important factors for posttrauma psychological well-being is social support (Ozer et al., 2003). It is now known that those who receive social support from significant others empower themselves to face difficulties following a traumatic event. Individual differences such as genetic make-up, hormonal differences, impact of early adverse events, and relationship prototypes, namely, attachment styles, may contribute to receiving social support following a traumatic event. In addition, the individual differences of attachment styles may also influence physiological and psychological reactions to traumatic events that

are important in the development of chronic PTSD (Buckley & Kaloupek, 2001; Ozer et al., 2003). Of particular interest for the biological underpinning of the attachment system is the neuropeptide, oxytocin (Carter, 1998). Therefore, the next sections will focus on a review of social bonding and the anxiolytic effect of oxytocin and its relation with psychopathology and attachment systems as an emotion-regulation mechanism. Finally, I will review how attachment and oxytocin can contribute to physiological and psychological responses to trauma.

### **Oxytocin as a facilitator for emotion regulation and attachment.**

Social relationships are bi-polar in nature and serve a survival function. One side of social relationships includes social attachment and altruistic behaviours, and the other side includes aggression and defensiveness to defeat the enemy, both of which helps individuals to survive. To form social attachments, individuals need to suppress the defensive side and establish positive relationships with the others. Porges (1998) suggested that certain physiological states could promote positive social relations, such as attachment and reproduction, whereas others may lead to self-defense and aggression. Recently, the psychobiological underpinnings of social bonding and attachment have been investigated in sheep, primates, rats, and humans (see reviews of Bratz & Hollander, 2006; Carter, 1998; Insel, 1997; Lim & Young, 2006) to find out whether there are certain indicators that facilitate forming social bonds. There are a number of biological determinants that were associated with social bonding, such as neuropeptides like oxytocin, vasopressin, prolactin, and endogenous opiates (Carter, 1998; see Figure 2.2). In Figure 2.2, the behavioural or emotional response section basically focuses on how social bonding takes place by eliminating the stress and activating the social interaction. In the neuroendocrine modulation, the corresponding physiological changes during stress isolation and positive social interaction as well as during bonding are depicted. The social bonding mechanism facilitates the survival of the individual by getting support from others and guarantees the production of new generations. In the second section of the figure, corresponding hormonal changes and physiological mechanisms related to this social process are depicted. One of the markers that shape the social interaction and attachment is oxytocin.

## BEHAVIORAL OR EMOTIONAL RESPONSE



## NEUROENDOCRINE MODULATION

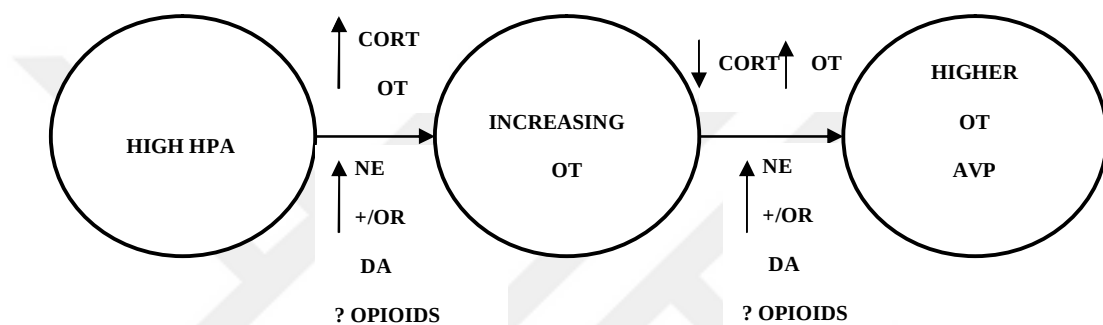


*Figure 2.2.* Behavioural, emotional, and neuroendocrine correlates of social attachment. HPA, hypothalamic- pituitary- adrenal axis; CRH, corticotrophin-releasing hormone; ACTH, adrenocorticotrophic; CORT, cortisol; OT, oxytocin; AVP, vasopressin; OPIOIDS, opioids; NE, endogenous opioids; 5Ht, serotonin. C. S. Carter (1998). Neuroendocrine perspectives on social attachment and love. *Psychoneuroendocrinology*, 23, 779-818.

Oxytocin (OT) consists of nine amino-acid peptides (nonapeptides) synthesized in the hypothalamus and released through the pituitary gland or neurohypophysis into the circulatory system (Insel, 1997). It is not only synthesized in the brain, but it has also been found throughout the autonomic nervous system in the brainstem and the limbic system (Barberis & Tribollet, 1996). In addition, the brain regions containing OT receptors are associated with sensory processing, memory, behavior, reproduction, and the PNS, which causes

relaxation response contrary to SNS and HPA axis regulation (Dreifuss et al., 1992; Uvnas-Moberg, 1994). In terms of social attachment, OT plays a role in milk ejection, uterine contractions in labor (Insel, 1997), sexual behaviour in males and females, as well as maternal behaviours (Carter & Altemus, 1997). Carter (1998) proposed that OT may provide neuroendocrine substrates for social behaviors and emotions. In other words, it could facilitate bonding relationships and could play a role in decreasing the anxiety to form a relationship. Other peptides or neurotransmitters such as endogenous opioids may modulate the release of OT and functions of the HPA axis by influencing arousal, attention, motivation, and reward mechanisms. Furthermore, these neuropeptides can have an impact on the association between OT functioning and the HPA axis as well as SNS functioning (e.g., modulating heart rate) because they also influence social bonding, forming attachments, and emotion regulation.

For example, OT may inhibit neo-phobia, which is avoiding the new person, to have intimate contact by regulating the HPA axis so the mother can develop an attachment to her newborn. OT decreases anxiety by inhibiting the SNS and HPA axis response to a novel subject, which would enable bonding with a newborn or a partner. The studies either specifically looked into effect of OT in terms of an anxiety buffer or social bonding factor (Bick & Dozier, 2009; Bucheim et al., 2009; Domes et al., 2007; Petrovic et al., 2008). Therefore, it may be useful to examine studies under two groups: OT as an anxiety buffer and as a facilitator for social relationships.

### ***Oxytocin as an anxiety buffer factor.***

Numerous studies have revealed that OT has an anxiolytic effect, which inhibits the HPA axis activation in both animals and humans (see review of Heinrichs, von Dawans, & Domes, 2009). The animal studies conducted to measure OT's anxiolytic effect involving a stress induction such as social isolation and noise stress (Grippe et al., 2009; Parker et al., 2005; Windle et al., 1997). Windle et al. (1997) found that endogenous, centrally infused OT can modulate physiological responses by reducing the release of stress hormones, ACTH. The animals that received OT showed decreased corticosterone concentrations in plasma levels compared to rats that received a placebo.

In other studies, social isolation was used as a stressor studies conducted with in prairie voles (Grippe et al., 2009) and monkeys (Parker et al., 2005). The findings indicated that long term peripheral injections of OT can influence active coping and physiological consequences such as decreased heart rate following social isolation in female prairie voles (Grippe et al., 2009) and that chronic intranasal administration before acute social isolation attenuates the adrenocorticotropine hormone (ACTH) response to stress in monkeys (Parker et al., 2005). These findings provide support for the view that OT attenuates the activation of the HPA axis and can be a protective factor for stress and the development of problems related to stress exposure.

Like the animal studies, neuro-imaging research showed that a similar stress reduction mechanism works for humans (Domes et al., 2007a; Petrovic et al., 2008). In the study of Domes et al. (2007), a single dose of OT attenuated the right-sided amygdala responses to angry, fearful, and happy faces. This finding supports the view that OT attenuates social fear processing and is thus consistent with animal studies (Uvnas-Moberg, 1998). Similarly, in another study with human participants, it was found that OT has a unique anxiolytic effect in experimental stress induction by the Trier Social Stress Test (TSST), an experimental procedure in which individuals undergo a social distressing experience, a job interview, involving assessment of the performance (Kirschbaum, Pirke, & Hellhammer, 1993). For example, Heinrichs, Baumgartner, Kirschbaum and Ehlers (2003) investigated the effect of TSST on cortisol stress hormone changes in 37 male subjects and found that OT had a significant anxiolytic effect. In another study conducted with breast-feeding women, a significant suppression of cortisol responses was recorded when they were put into the TSST (Heinrichs et al., 2008). Similarly, when lactating healthy women were put into exercise test conditions in which individuals were forced to exercise, they showed significantly lower ACTH and cortisol responses to the exercise stress condition compared to bottle feeding healthy women (Altemus, Deuster, Galliven, Carter, & Gold, 2008). These results demonstrated that the suckling response and OT release during breast-feeding decrease the HPA axis responses to stressful conditions. The studies reviewed in this paragraph support an anxiolytic effect of OT by means of down-regulation of the stress response to threatening information as a result of reduced amygdala activation and reduced cortisol response. The studies highlighted responses and mechanisms in adult

participants. However, not many studies have been conducted to reveal the developmental underpinnings of OT in the neuroendocrinological mechanism regarding how plasma OT changes might be associated with the bonding relationship.

Increased anxiety due to the trauma's effect and remembering the trauma with flashbacks and in nightmares created tension in the individual. Processing trauma related information in a more relaxed state with the help of OT might be useful. The literature reviewed above suggests that OT can serve for this purpose. Another potentially related effect of OT has been observed in the context of social relationships, during which it has been found to be a facilitator of affiliative functioning (e.g., increasing trust). This could be important for maintaining social support in the aftermath of a traumatic event. Therefore, the next section will investigate the bonding aspect of OT in research findings.

### ***Oxytocin as a social-bonding facilitator.***

Apart from OT's anxiolytic effect, Carter (1998) indicated that it might also ease forming a relationship with a new person. It can be assumed that OT administration would improve social contacts and social relationships by down-regulation of stress towards the new stimuli. Although, many studies focused on adults and the influence of OT as a stress-regulatory element, there is a limited number of studies that investigated the effects of OT in childhood. The relationship patterns that are formed in early years could be influenced by the genetic make-up, which could facilitate or inhibit OT response or secretion of OT during childhood and later in adulthood. The accumulation of knowledge on how the oxytocinergic system develops and changes would enable a better understanding regarding the contribution of OT to developmental psychopathology as well as to adulthood psychological problems. Moreover, only if critical phases are determined during childhood, there might be some interventions that contribute to the normal development of the oxytocinergic system.

It has been suggested that the primary influence of OT on social relationships might be related to genetic make-up. In the study of Bakermans-Kranenburg and van IJzendoorn (2008), it was found that sensitive parenting (i.e., responsiveness to the needs of the infant) was associated with molecular genetic differences of OT and 5-HTT genetic markers that may be related to the secretion of

OT or a variability in the OT level. This may highlight the importance of the intra-individual differences regarding gene expressions and how they contribute to interactions between care-giver and child. When individuals' plasma level OT is lower due to their gene expression, their bonding relationship may require more time and more effort than the others. Therefore, it is important to evaluate genetic markers while examining the effects of OT on social interactions. Supporting this view, it was found that plasma OT was positively related to parental bonding elements such as the mother care and the father care in adults (Gordon et al., 2008). These results suggest that having a lack of certain genetic markers such as 5-HTT (Bakermans-Kranenburg & van IJzendoorn, 2008) and adverse, and an insufficient early relationship with parents (Fries et al., 2005; Heim et al., 2008), may affect social relationships later in adulthood. In other words, genetic variability may interact with neuroendocrinologic differences, and their interactive nature may contribute to the development of secure or insecure attachment. As a result, individuals with maladaptive emotion regulation strategies as suggested in Mikulincer and Shaver (2007) could be affected by trauma differently due to a combination of genetic markers and insensitive parenting, which affect attachment relationship and stress management.

Although there are not many studies investigating the impact of early traumas and their effect on OT secretion variability, Fries, Ziegler, Kurian, Jacoris, and Pollak (2005) investigated the interactions between step-mothers and their 34-36-month-old children with a history of neglect and biological mothers and their interactions with their own children. They found lower levels of OT in the urine samples of those children with a neglect history as compared to those without in response to physical interaction in a game playing session. Importantly, children experienced an average of 3 years of relatively stable and normal family environments at the time of the experiment. However, this does not seem to change the effect of the early deprivation in infancy or other types of problems such as abuse. Heim and colleagues (2009) found that among 22 medically healthy women, those who experienced maltreatment showed decreased OT concentration in their cerebrospinal fluid compared to those who did not have a history of maltreatment. It seems that early adverse experiences of individuals can have detrimental negative effects on the neuroendocrinological system by producing less OT and this may affect individuals' social relationships and emotion regulation mechanisms.

In adults, exogenous, centrally administered OT has been suggested as a facilitator for interpersonal relationships, which may be important for seeking and receiving social support following trauma. OT was found to be associated with trust in interpersonal interactions (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005) and interpersonal communications (Bick & Dozier, 2009; Domes, Heinrichs, Michel, Berger, & Herpertz, 2007; Guastalla, Mitchell, & Dadds, 2008; Theodoridou, Rowe, Penton-Voak & Rogers, 2009). Furthermore, OT improved encoding and retention of positive social stimuli by reducing fear and social threat detection while enhancing positive social cues by activating social reward neural networks (Guastalla, Mitchell, & Mathews, 2008; Hollander et al., 2007). There is also evidence that OT might increase perceived social support or perceived positive relationship. Buchheim et al. (2009) found that OT increases the ratings of the attachment security and decreases the rankings of attachment insecurity among healthy males when they were subjected to the Adult Attachment Projective Test (AAP; George & West, 2001), which includes seven attachment images and one neutral image; it measures mental representations as well as defensive processes of individuals, with forced choices. Unfortunately, by offering participants forced multiple-choice options, they also changed the projective nature of the assessment without conducting any validation study. Therefore, the results obtained from Buchheim et al. (2009) can hardly be conclusive about the relationship between attachment security and OT.

In another experiment on stress response, it was found that those who received social support and endogenous OT had lower cortisol levels, which is a psychobiological indicator for stress, than those who just received OT or social support (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003). The studies evidenced that OT could facilitate social interaction, which would be important for trauma survivors in terms of their perceived and received social support. Therefore, OT could serve to enhance social relationships while it reduces the anxiety level of individuals, which in turn could help trauma processing and managing adverse effects of trauma.

#### ***Oxytocin and traumatic stress.***

OT's effect on social bonding and stress reductions could serve as a protective factor for PTSD development following traumatic events. Although it is hard to reduce the impact of neuroendocrinology systems on posttrauma

psychological well-being solely to OT, it is important to reveal how individual differences concerning OT can mediate the link to traumatic stress.

There is a limited number of studies concerning the anxiolytic effect of OT on psychopathology. The studies presented here are related to PTSD autism spectrum disorders, social anxiety, and obsessive compulsive disorder. The results from these studies may provide a better understanding of the function of OT for psychological disorders and traumatic stress.

There is one study regarding the effect of OT on trauma survivors that focuses on physiological responses more than on symptomatic changes (Pitman, Orr, & Lasko, 1993). It was conducted on 43 combat veterans, and investigated the effect of OT, vasopressin (which has an opposite effect of OT on individuals), and examined the drug conditions' effects on physiological responses of heart rate, skin conductance (SCR), and electromyogram (EMG) to combat experiences and a mental arithmetic task (Pitman et al, 1993). Participants were divided into three groups, and they were given OT, vasopressin, or a placebo. Following that, they performed a 2-minute mental arithmetic task in which they counted backwards by 3's from 20 and then by 7's from 100. After a 5-minute resting period, they were shown a neutral audiovisual stimulus consisting of outdoor winter pictures. Then they were exposed to a combat audiovisual stimulus. They took a 5-minute resting period before listening to pleasant and combat-related scripts, and they were instructed to imagine the scenes vividly. There were effects of OT in the study for the EMG in a decreasing trend and a marginal decreasing effect on SCR. However, there were no significant drug effects for self-reported arousal, vividness, or unpleasantness during the personal trauma imagery. Although participants took part in a similar trauma reminders study previously and may have shown habituation to the presented stressful trauma reminders, it is evident that OT can reduce physiological responses to a stressful stimulus. This physiological finding provides support for OT's anxiolytic effect.

In recent studies about autism spectrum disorders, it was found that adults who were administered OT intravenously showed significant decreases in repetitive behaviors, and there was improvement in the processing and retention of social information (Hollander et al., 2003; Hollander et al., 2006). OT may reduce anxiety and amygdala reactivity in autistic individuals' experiences in the social context and may cause an increased attention to social cues, auditory processing

of social stimuli and assigning significance to speech, and the retention of this information for longer periods (Hollander et al., 2007). This reduced amygdala activity could also be beneficial for people who suffer from PTSD. They experience traumatic events in the form of intrusions, their physiological system become alert to stress frequently, and this causes constant distress, which makes it hard to deal with the effects of the trauma. However, with the use of OT, individuals can experience less physiological reactivity to stress and can manage stress more easily.

In another study that considers the impact of OT administration before therapy sessions for social anxiety, the OT group showed more enhancements in both speech performance and speech appearance ratings compared to the placebo group (Guastella, Howard, Dadds, Mitchell, & Carson, 2009). Moreover, as the treatment progressed, the social anxiety patients in the OT group reported fewer negative and dysfunctional appraisals regarding the exposure experience. One of the most persistent predictors for PTSD is dysfunctional posttraumatic cognitions (Ozer et al., 2003). Reports of less negative and dysfunctional appraisals in anxious people would provide relevant information on the possible effect of OT on posttraumatic cognitions and development of PTSD later on. Although in the social anxiety and OT study of Guastella and colleagues (2009), the finding suggests a decrease in the negative cognitions, it did not emphasize the change in symptomatology level. In other words, the effect of OT at the symptom level was not investigated in that study (Guastella et al., 2009). Despite the evidence related to OT and dysfunctional appraisals (Guastella et al., 2009), it seems that repeated exposure to OT for 1-week period did not change OCD patients' obsession and compulsion reports (Epperson, McDougle, & Price, 1996). This might be related to temporary effects of OT. When repeated OT exposure is combined with psychotherapy, it might be more beneficial because it enables the individual to learn certain ways to manage obsessions and compulsions under the effect of OT with a less anxious state. Similar to that, individuals with PTSD also could process and express traumatic events more comfortably. That would ease the treatment and management of stress associated with trauma cues.

The only study focusing on attachment styles and borderline personality disorder investigated the effects of intranasal OT on trust and cooperation (Bartz, Simeon, Hamilton, Kim, Crystal, Braun et al., in press). In the study, the

borderline personality disorder group and the control participants received intranasal OT and played a social dilemma game with a partner. Results demonstrated that OT produced different effects on participants with borderline personality disorder, decreasing trust and the likelihood of cooperative responses. The study also showed that differences in attachment anxiety and avoidance across the borderline personality disorder group and control participants indicated that these divergent effects were driven by the anxiously attached, rejection-sensitive participants. This showed that attachment style might be a moderator for the effect of OT.

In this part of the chapter, literature findings regarding the anxiolytic and social effect of OT were reviewed. There are not many studies on psychopathology and the effect of OT on traumatic stress. However, its anxiolytic effect and beneficial influence in terms of attachment are promising for trauma survivors suffering from consistent stress due to trauma reminders and for those who are having difficulties in establishing social support. In the following part, Heinrich and Domes's (2008) OT model for psychopathology will be covered to help synthesize the research findings on OT for its stress-buffer and social bonding facilitator effects into a theoretical framework.

### **Heinrich and Domes (2008) OT model for psychopathology.**

In the review chapter of Heinrichs and Domes (2008), the main findings concerning OT studies are summarized and synthesized into a model, and I will evaluate their model regarding traumatic stress and its impact. They suggested that OT works as a regulator element in the behavioral and endocrine stress responses and that it is released as a result of socially challenging events and decreased autonomic responses to stress. Furthermore, OT may enhance social interaction and readiness for social approach behavior and empathy. The evidence coming from autism spectrum studies (Hollander et al., 2003; Hollander et al., 2006), social anxiety studies (Guestella et al., 2009), and stress induction studies (Altemus et al., 2008; Heinrichs et al., 2003; Heinrichs et al., 2008) provides a basis to understand the effects of OT as an anxiety buffer as well as a facilitator for social interaction.

Heinrichs and Domes (2008) also proposed the following model (see Figure 2.3) to explain OT's functioning in the process of stress management and its benefits in forming social relationships. The aim of this part of the chapter is to

evaluate their model in reference to attachment theory and the PTSD model of Ehlers and Clarks (2000). Stress leads to increased activation of HPA and the amygdala. However, the effect of OT was associated with decreased activation of HPA and amygdala response and positively related to social approach behaviour, which may contribute to social support seeking, to physical contact, and to coping behaviours and healthy outcomes. It can be assumed that secure attachment would be related to that mechanism as well because individuals with secure attachment can easily engage in social support seeking behaviours, and secure attachment might be associated with increased OT levels regulating distress during social contact (Heinrichs & Domes, 2008). Therefore, it is possible to assume that secure attachment and OT would be positively associated with each other and that they reciprocally serve to facilitate positive social relationships.

In the second part of their model, it is postulated that psychotherapy helps the individual to develop social support seeking behaviours and to reduce maladaptive coping mechanisms (Heinrichs & Domes, 2008). Psychotherapy may provide a secure base for the individual in which a secure relationship with the psychotherapist is established, psychological problems are explored, and working on these problems can be facilitated within this therapeutic secure relationship (Bowlby, 1969).

Heinrichs and Domes (2008) proposed that for the early understanding of the psychotherapy process and forming rapport with the psychotherapist, the use of OT stimulation might positively contribute to the management of stress and psychopathology. In other words, the use of OT in the treatment process would be helpful to form a trusting relationship with the psychotherapist and to overcome anxiety while dealing with certain symptoms, especially with insecure clients.

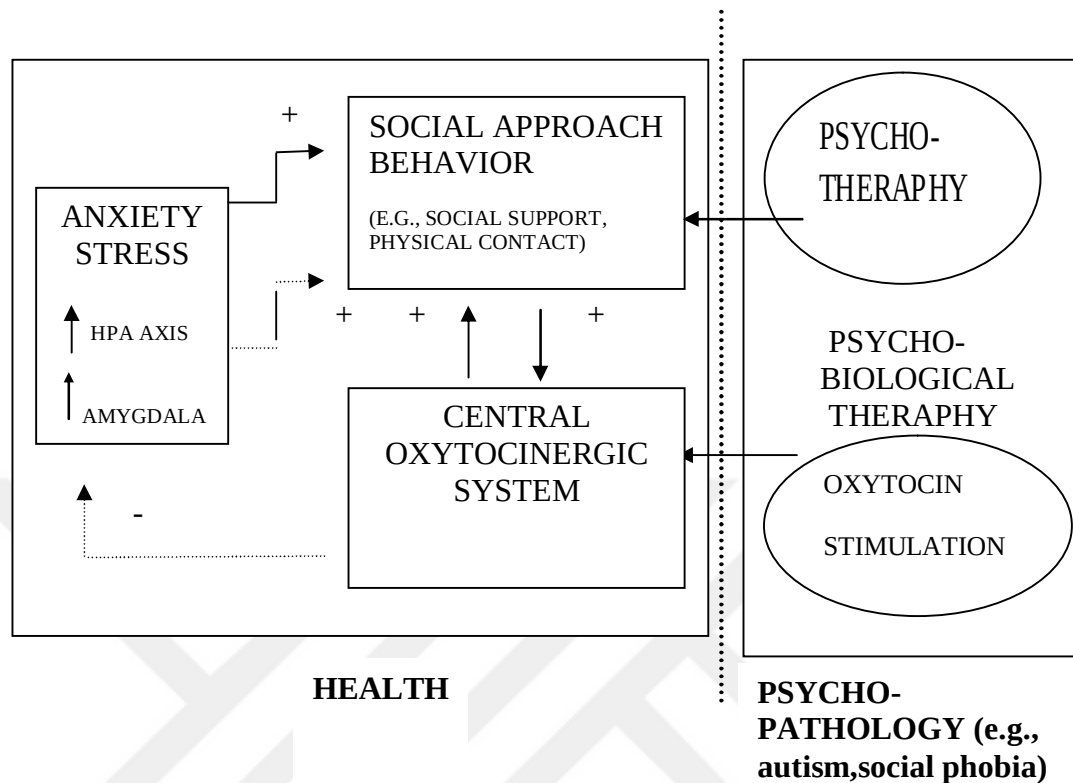


*Figure. 2.3.* Interactions between anxiety and stress, social approach behaviour, and the oxytocinergic system. Anxiety and stress encourage social approach behaviour and stimulate OT release in healthy individuals. Different kinds of positive social interaction (e.g. physical contact) are associated with OT release, and in turn, OT promotes social approach behaviour. As OT reduces HPA axis responses and limbic reactivity (especially amygdala) to social stressors, the neuropeptide plays an important role as an underlying neurobiological mechanism for the anxiolytic/stress-proactive effects of positive social interaction. In mental and developmental disorders that are associated with severe deficits in social interactions (e.g. autism, social phobia, BPD), novel therapeutic approaches combining effective psychotherapy methods with OT or OT agonist administration offer the opportunity to develop a “psychobiological therapy.”

*Note.* From Heinrichs et al. (2008). Neuropeptides and social behaviour: Effects of oxytocin and vasopressin in humans. *Progress in Brain Research*, 170, p. 346.

Attachment theory as a framework offers a deeper understanding of how social approach behaviour and central oxytocinergic make-up contribute to the model of Heinrichs and Domes (2008). Specifically, hyperactivating and deactivating strategies of insecurely attached individuals would be beneficial to understand the negative social interactions, insufficient social support, and difficulties in establishing rapport with the psychotherapist. The earlier assessment of attachment emotion regulation strategies and the evaluation of secure relationships from their past would be opening a new window for the psychotherapist to understand basic coping mechanisms, and to alter social behaviour that may help to change perspectives towards psychopathology. In this process, insecure individuals' central oxytocinergic system, their OT blood/urine levels, and possible ways such as nasal administration to alter this would make the psychotherapy process less overwhelming and shorter.

In the following section, Mikulincer and Shaver's (2007) model of emotion regulation will be considered again by integrating the psychophysiological model suggested by Maunder and Hunter (2001), which focuses on coping mechanisms of secure and insecure individuals in the face of health problems, specifically diabetes. Maunder and Hunter's (2001) model discusses specific coping ways and physiological responses. It helps to clarify certain physiological aspects of attachment and also provides a basis for attachment and emotion regulation in attachment involving coping mechanisms that enables one to examine Heinrichs and Domes's (2008) model from an attachment theory point of view.

### **Attachment system and stress regulation, Maunder and Hunter's (2001) model**

In chapter two, Mikulincer and Shaver's (2007) stress regulation model was discussed in detail to explain how attachment style and traumatic stress coping are related. In the current section, psychobiological findings regarding attachment styles and the stress buffering function of secure attachment will be covered with respect to Maunder and Hunter's (2001) model. This model, even though not specifically tailored to PTSD aetiology, is important because it combines attachment theory, relevant biological systems, and outcomes in adulthood, and it may thus extend Mikulincer and Shaver's (2007) model, and Heinrichs and Domes's (2008) models in explaining possible mechanisms to prevent PTSD.

It is widely known that the formation of attachment relationships is biologically rooted (Bowlby, 1969). Evidence from both animal and human studies have shown both neurological and physiological changes to take place in this process; and these changes have an impact on the individual's social relations and stress coping style (Carter, 1998; Coan, 2008). Genetic studies have shown that there are some precursors for care-giving (Bakermans-Kranenburg & van IJzendoorn, 2008) and attachment (Gillath, Shaver, Baek, & Chun, 2008), such as OT receptors (OXTR), DRD2 dopamine receptor, and the 5HT2A serotonin transporter receptor. Differences in genetic make-up can be a factor for attachment insecurity (Bakermans-Kranenburg & van IJzendoorn, 2008; Gillath et al., 2008). However, in Gilath and colleagues' (2008) study, genetic make-up explained only 20% of the variance, which means that there are substantial environmental factors that influence attachment styles and the individual's physiological stress regulation mechanism such as physiological vulnerability to stress responses, which were derived from early adverse experiences.

Pierrehumbert et al. (2009) conducted a study to reveal whether early abuse can be a contributor in physiological stress responses. Female participants attended a social stress test, and their physiological responses to stress, specifically cortisol levels, were measured. Individuals with an abuse history and unresolved attachment style reported more perceived stress according to the Adult Attachment Interview, which assesses adults' strategies for identifying, preventing, and protecting themselves from perceived dangers, particularly dangers regarding intimate relationships. The Adult Attachment Interview categorizes individuals' attachment styles as avoidant, secure, anxious, and unresolved (George, Kaplan, & Main, 1986, 1996). In addition, participants who had a history of abuse and unresolved attachment had higher salivary cortisol in response to stress. This study demonstrated that an early abuse history and unresolved attachment might lead to dysregulation of HPA reactions to a psychosocial stressor.

Similarly, in the study of Quirin, Pruessner, and Kuhl (2008), awakening cortisol levels were checked in 48 women following a non-attachment laboratory stress procedure, and it was found that attachment anxiety was significantly related to flattened cortisol levels. In another study that focused on perceived stress in healthy subjects, cortisol levels and heart rate variability, which is measured by heart beat intervals, during the stress protocol indicated differences with respect to

attachment styles. It was found that perceived stress (i.e., subjects were asked to add the two most recent digits among a list of 50 numbers within decreasing inter-stimulus intervals) was related to attachment anxiety, but not to attachment avoidance (Maunder, Lancee, Nolan, Hunter, & Tennenbaum, 2006).

In addition, attachment avoidance was found to be associated with lower heart rate variability, which could be a risk factor for cardiac problems such as heart attack (Tsuji et al., 1996). It is also noticeable when couples were given a negotiation task to solve (Powers, Pietromonaco, Gunlicks, & Sayer, 2006). In this study, findings indicated that attachment avoidance was a predictor for females' cortisol trajectories rather than attachment anxiety. Similar findings related to cardiovascular activity are valid for PTSD patients in the meta-analysis of Buckley and Kaloupek (2001).

These studies provide evidence for individual differences to physiological responses to stress and suggest that these differences could be a result of attachment and associated emotion regulation abilities. Maunder and Hunter (2006) explicated in their model how insecure attachment can lead to increased perceived stress and impaired regulation of stress. However, they did not differentiate between anxious and avoidant attachment. Attachment anxiety and attachment avoidance are relevant to understand certain physiological markers as vulnerability factors for traumatic stress and PTSD such as heart rate variability and cortisol differences among people.

The studies conducted with children and assessed attachment styles with the Strange Situation procedure demonstrated that children with fearful attachment experience heightened arousal with increased heart-rate and cortisol and have difficulty regulating their arousal (Spangler & Grossman, 1993). All of these physiological markers could be possible risk factors for the development of psychopathology. Therefore, it is important to center the attention to how insecure attachment strategies could be altered and how the change could be maintained to prevent individuals from both physiological and psychological problems later in life.

It is known that social support may ease coping with stress and can be a protective factor for the regulation of the physiological system. In the study of Ditzen et al. (2007), females with a positive partner physical contact (i.e., neck, shoulder massage) before TSST stress, exhibited significantly less cortisol and heart rate responses to TSST, but they showed no difference in plasma OT levels compared to females with social support or no social interaction. The lowest cortisol

response to stress was found in the physical contact group rather than the no physical contact group, and there were no effects of OT (Ditzen et al., 2007).

There are other studies that showed the impact of physical contact on decreasing heart rate and cortisol levels and increasing saliva OT (Holt-lunstad, Birmingham, & Light, 2008; Light, Grewen, & Amico, 2005). These studies evidenced the importance of actual social support in stress management. However, seeking social support and perceived social support may vary depending on attachment styles. Although secure individuals can call for help and actually benefit from social affiliation, insecure ones may not easily have access to social support figures or memories nor make use of help from social support networks to regulate their stress.

In the study of Ditzen et al. (2007), participants with low attachment anxiety benefited from social support from their spouse, whereas participants with high attachment anxiety did not. Individuals with secure attachment may find it easier to cope with stress and may be comfortable in personally and interpersonally challenging situations.

The studies summarized above contribute to our knowledge in terms of how social bonding can be influential in human life and in stress management. Previously, Mikulincer and Shaver's (2007) model for attachment system activation and functioning in adulthood were discussed in relation with stress management. The model of Maunder and Hunter (2001) is complementary to Mikulincer and Shaver's (2007) model in that it links specific maladaptive coping styles, specific actions, and their links to healthy and unhealthy outcomes. In their review on attachment processes and emotion regulation, Mikulincer and Shaver (2007) suggested that avoidant attachment disrupts social seeking behavior, problem solving, and reappraisal about the stressful event. Avoidant individuals mostly prefer interpersonal distance and self-reliance in times of stress. Because avoidant individuals are more likely to deny and avoid the stressful event, they find it hard to reappraise and cope with a challenging situation. On the other hand, anxious-ambivalent individuals engage in hyperactivating strategies that involve intensifying emotions, exaggeration of stressful event, and feelings of vulnerability, anger, sadness, fear, and shame. In other words, they become easily anxious and disturbed by the event and have difficulty in down-regulating this increasing distress. They do seek help in their social network.

Because anxious-ambivalent individuals become preoccupied and overly sensitive about social support, they can misunderstand or do not sufficiently benefit from offered support. This leads to more distress and to more attempts looking for help. Maunder and Hunter (2001) reviewed the hypothesized mechanisms concerning emotion regulation with respect to the insecure attachment and coping with stress and their health outcomes (see Figure 2.4). These mechanisms would also explain traumatic stress management or parallels that could be drawn to understand the choice of different coping ways and who can benefit from social support and who cannot. Unlike Mikulincer and Shaver (2007), Maunder and Hunter (2001) did not differentiate between attachment anxiety and attachment avoidance, and they explained the overall model with respect to general insecure attachment category. Although the model does not conclude exactly which attachment dimensions are more likely to exhibit certain coping styles, it is still useful for an overview of physiological changes and specific coping methods.

Maunder and Hunter (2001) suggested that insecure individuals experience increased perceived stress (path 1a), which would be associated with perceived traumatic stress, impaired regulation of stress physiology (path 1b), and decreased social modulation of stress (path 1b). Furthermore, they use external regulations of affect such as substance abuse and risky sex (path 2) and altered use of protective factors (path 3).

Maunder and Hunter (2001) reviewed the attachment research and explained their model by just focusing on insecure emotion regulation ways. They considered object relations, the illness, or physiological symptom as relevant articles. In their review, they suggested that social support from attachment figures are more helpful to deal with stress compared to help received in a non-attachment relationship (Maunder & Hunter, 2001). Furthermore, they addressed three mechanisms influential in the process: (a) susceptibility to the stress, (b) increased use of external regulators of affect, (c) and altered help-seeking behaviour. The external regulators would work as a way of avoidance and might be relevant to PTSD avoidance and numbing symptoms. According to Ehlers and Clark (2000), avoidance can inhibit the processing of the traumatic event and relief in symptoms. One of the most important predictors for PTSD is social support, which also helps individuals to cope with the effects of trauma (Ozer et al., 2003).

These coping mechanisms are initially shaped by early experiences (Hazan & Shaver, 1987). According to Kander (1999), while attachment behaviour is shaped, the infant signals needs that are innate and dependent on the response of the stimuli received from the primary caregiver. In other words, in this pre-attachment stage, proper proximity depends on the parental anticipation of infant needs and the sensitivity to infant signals. In the attachment formation, the relationship pattern is shaped by approach and withdrawal behaviours and reinforced by the parents' responsiveness. This operant conditioning is encoded in procedural memory. In this procedural memory, the infant starts to know how to obtain attention from the attachment figure. Because the neurological systems are only developed by the age of 2 to 3 for the declarative memory systems, the behavior patterns learned at this critical stage are not available in conscious recall (Kander, 1999).

These early interaction patterns with parents, the early stress exposure, and the genetic make-up contribute to neurological as well as neuroendocrinological development ( Bakermans-Kranenburg & van IJzendoorn, 2008; Bartz & Hollander, 2006; Fries et al., 2005; Gillath et al., 2008; Taddio, Katz, Lane, & Korean, 1997; Taylor, Nicholas, & Glover, 2000). In other words, the effect of early experiences could be examined later in life by checking individuals' attachment styles and physiology (e.g., oxytocinergic systems) since they contribute to the psychological vulnerability to psychological stress and inability to manage stress. Therefore, it is important to formulate the basic mechanism in which those individuals could overcome or partially change their coping system.

Similar to Mikulincer and Shaver (2007), Maunder and Hunter (2001) suggested that attachment insecurity, specifically the anxiety dimension of attachment, would be related to the perception of increased stress, which was supported by literature findings as well (Mikulincer et al., 1993; Mikulincer & Florin, 1995), whereas, avoidant individuals are more likely to engage in more somatization, hostility, and avoidance (Kanninen et al., 2003; Mikulincer et al., 1993). They may either ignore stress triggers to the attachment system or they may try to suppress it.

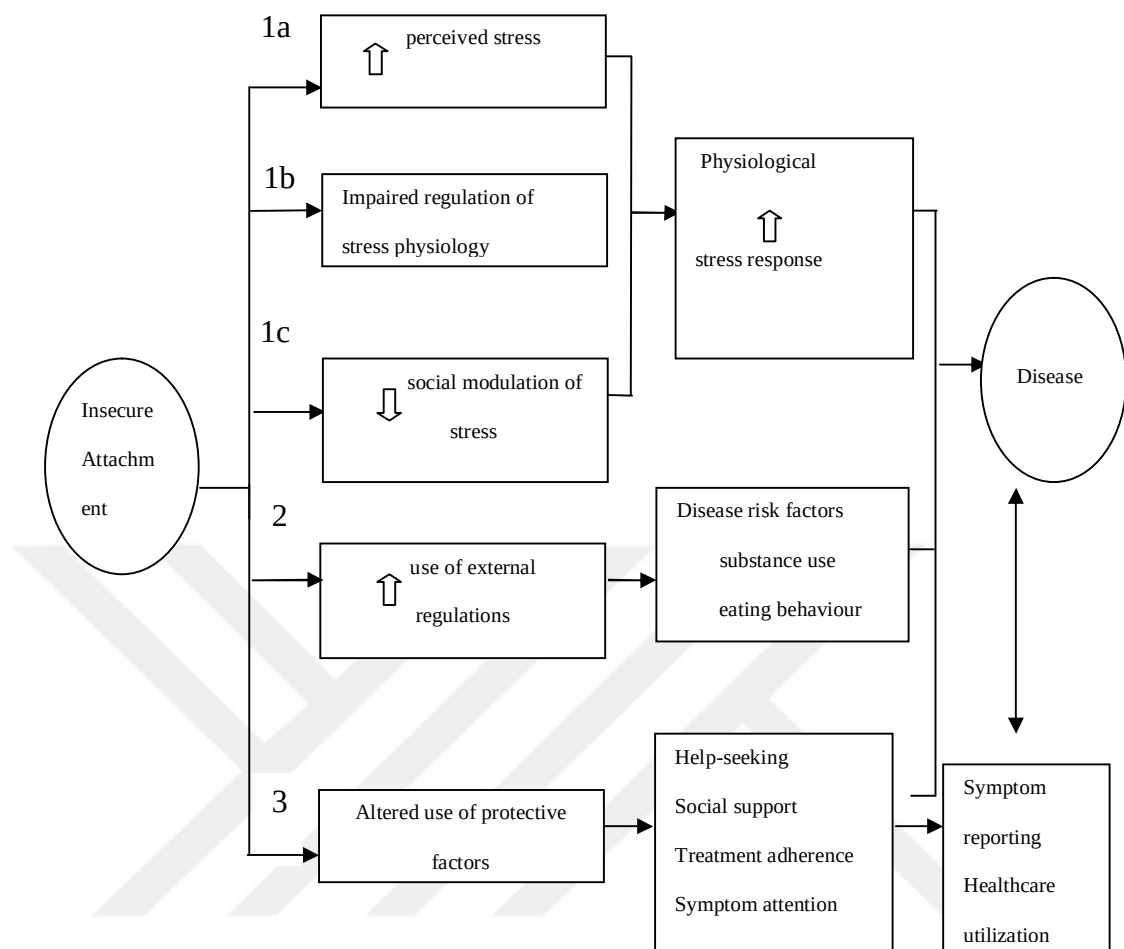


Figure 2.4. Model of hypothesized mechanism by which attachment insecurity could contribute to disease.

Note. From Maunder, R. G., & Hunter, J. J. (2001). Attachment and Psychosomatic Medicine: Developmental Contributions to Stress and Disease. *Psychosomatic Medicine*, 63, 556-567.

According to Maunder and Hunter's (2001) model, attachment insecurity may affect the perception of stress and the psychological and physiological intensity or duration of the stress response. From animal studies, it is known that longer separation between mother and offspring may cause life-long increases in the reactivity of ACTH and cortisol to stress (Levine et al., 1963). Similarly in the

Strange Situation procedure (see chapter 2 for procedure details), all the babies experienced heart rate increase during the separation (Sroufe & Waters, 1977). For anxious and avoidant babies, an elevated heart rate continued much longer compared to secure babies. The studies, which investigated the relationship between attachment and stress reactivity by measuring cortisol levels, showed similar results in adults (Ditzen et al., 2008; Guatella et al., 2008; Pierrehumbert et al., 2009; Power et al., 2006; Quirin, et al., 2008).

In the model, it was also suggested that the attachment pattern might determine the success of social support as a stress buffer (Maunder & Hunter, 2001). Individuals with secure attachment are expected to seek help from others, find ways to reach the significant others in the times of distress, or recall memories related to their secure relationships in their past (Mikulincer & Shaver, 2007). This allows them to feel more competent and enabled regarding coping with stressful events. They can down regulate stress responses and could focus on adaptive ways and strategies to fight with the stress. However, the insecure-avoidant ones remain less capable to seek, facilitate, and benefit from the help they can receive from others, and insecure-anxious ones become preoccupied with social support and could not form a satisfactory relationship with others. On the other hand, the avoidant individuals used deactivating strategies, and they mainly did not consider looking for support at all (Mikulincer & Shaver, 2007). However, the anxious individuals became preoccupied by the support sources and could not make use of help. As a result, they suffered from distress and psychological problems, such as anxiety and depression (Mikulincer & Shaver, 2007). In a student sample, the available social support and the extent to which support is sought vary between the secure and the insecure participants (Florin & Mikulincer, 1995). In addition, the avoidant attachment style is associated with less support seeking than the secure attachment style (Mikulincer, et al., 1995). Moreover, the benefit received from the social support also differs according to the attachment patterns. The participants who scored low on the attachment anxiety reported more benefit from their support source compared to those who are high on attachment anxiety (Ditzen et al., 2008). The second and third paths of the model mainly emphasized how insecure individuals attempt to regulate the stress and how they engage in the maladaptive coping strategies (Maunder & Hunter, 2001).

In this chapter, an alternative explanation to stress response to traumatic event was given with respect to a new theory in cognitive processing of trauma (Brewin, 2003), in addition to accounts on neuroendocrinological developments related to OT and OT's effects on stress-regulation and social interaction. Individual differences in attachment styles and the oxytocinergic system may contribute to an arousal level of trauma survivors while they are encoding the event and after the traumatic event. As a result, this could affect their emotion regulation and they could express the trauma memory verbally, which is one of the most important elements for traumatic stress management according to Brewin (2003). Furthermore, in the current chapter, the research findings from both attachment literature and OT literature were combined to understand the underlying physiological and psychological mechanism of OT and its possible effect on stress management in trauma. The impact of trauma alters both physiology (e.g., heart-rate) and cognitive processing as suggested in Brewin (2003). Whether early experiences and social bonding patterns, attachment styles have an effect on this trauma processing has not been explained, specifically regarding the emotion-regulation mechanism, which might be altered by use of secure attachment priming methods and OT.

There is accumulating literature on OT and its relationship with psychopathology. However, there are not many studies assessing the effect of OT and secure priming on stress management following a traumatic event. The analogue trauma film paradigm offers a framework in which the effect of OT and secure attachment priming could be assessed. By means of OT administration during the analogue trauma induction, it is likely to discover the embedded link between felt-security and OT as well as the physiological underpinnings of positive effect of the imagined social support. Therefore, the second study of the thesis aims to measure the effects of OT and the effect of felt-security due to secure priming on psychological and physiological responses and symptom outcomes.

#### **CHAPTER 4: The Predictors of Positive and Negative Changes in the Aftermath of Adverse Life Events**

In this section, the survey study on predictors of positive and negative changes following adverse life events will be presented. A series of structural models were tested to reveal the associations among early trauma, attachment dimensions, self-esteem, posttraumatic cognitions, PTSD, and PTG. The findings will be discussed with respect to implications at the end of the current chapter.

Individuals following a traumatic event can widely suffer from trauma-related psychological problems due insufficient emotion regulation processes and factors associated with processing the traumatic event. A National Comorbidity Survey in the US showed the estimated lifetime prevalence of PTSD is 7.8% between the ages of 15 and 54 years (Kessler et al., 1995). This is a nationally representative sample of the USA, and prevalence rates for PTSD after having a psychological trauma vary between 65% and 85% (Bernat et al., 1998; Green et al., 2000; Mizuta et al., 2005) and suggest that some individuals may be more at risk than others to develop symptoms after a psychological trauma. Recent theories of PTSD (for a review see Brewin & Holmes, 2003) have argued that the disorder is not the consequence of the traumatic event per se, but of impaired emotional processing of the traumatic event. The individual difference is the most crucial aspect to understand what contributes to negative changes, namely traumatic stress and PTSD, as well as the positive changes conceptualized as PTG (i.e., changing priorities in life and finding positive meaning in life after the traumatic event; Tedeschi & Calhoun, 1999).

Previous research has identified the role of cognitive appraisals after the traumatic event and their relationship with PTSD and psychological problems (Agar, Kennedy, & King, 2006; Birgit, Ehlers, & Gluckman, 2007; Bryant & Guthrie, 2007; Ehling, Ehlers, & Glucksman, 2008; Lommen, Sanders, Buck, & Arnzt, 2009; Ozer et al., 2003). It has been shown that those who have more negative self-views and more negative world-views (see review in Ozer et al., 2003) report more PTSD symptoms. Specifically, negative appraisals about the self were found to be a crucial contributor for PTSD (Agar et al., 2006; Karl et al., 2009; Kelm et al., 2007; Sanders et al., 2009; Startup et al., 2007). This has been accounted for in the cognitive model of PTSD proposed by Ehlers and Clark (2000). The model also

postulated that factors prior to the traumatic event may shape individuals' coping mechanisms with trauma, and there is empirical evidence for increased negative appraisals of the self even prior to trauma exposure that could affect trauma coping (Bryant & Guthrie, 2007).

There is also evidence for posttrauma lower self-esteem in PTSD patients as compared to non-symptomatic trauma controls (Lee, 2008). Although it is not established if these changes in self-esteem might occur after the trauma, it is conceivable that low trait-self esteem might compromise trauma processing (Lee, 2008). Despite pointing out the important role of negative cognitions of the self and the world on PTSD, the Ehlers and Clark's model (2000) does not further specify pretrauma factors and how they might exert their detrimental and protective role in PTSD. Research suggests that previous trauma experience, especially early trauma (Nyea et al., 2008; Stovall-McClough & Cloitre, 2006; Waters et al., 2000) and attachment organization (Besser et al, 2009; Besser et al., 2010; O'Connor & Elklit, 2008) may be of interest and could contribute to Ehlers and Clark's model (see chapter 2).

Trauma experience prior to a traumatic event, specifically when occurring in early years of life (Ozer et al., 2003; Iversen et al., 2008), has been identified as a risk factor for PTSD (Ozer et al., 2003), but little research has explored the exact etiological mechanisms for this. It might be useful to evaluate trauma processing in relation to the developmental processes that shape a positive sense of self and others, namely the process conceptualized within attachment theory (Bartholomew & Horowitz, 1991). The formation of a positive view of self and others is highly associated with a person's relationship experiences with attachment figures (e.g., parents, caregivers, friends, partners; Ainsworth, 1967, 1979; Bowlby, 1969; Hazan & Shaver, 1987). These attachment experiences shape the individual's ability to find a secure base for the self and the world and successfully form close relationships (Hazan & Shaver, 1987). Secure attachment could be one of the sources of social support (Lopez & Brennan, 2000), well-being (Shapiro, & Levendosky, 1999; Stalker, Gebtys, & Harper, 2005) and better adjustment in the aftermath of stressful events (Cozzarelli et al., 1998), which could be a source for posttraumatic psychological well being. It is conceivable that the factors that compromise the acquisition of secure attachment experiences (such as early trauma), and thus compromise an individual's coping and emotion regulation abilities, make a person

more vulnerable to process a subsequent traumatic event negatively, which in turn could facilitate the development of PTSD.

There is evidence that early traumatic events can shape insecure attachment (Schottenbauer et al., 2006; Shapiro & Levendosky, 1999) and negative self-views. Individuals who have insecure attachments basically engage in maladaptive emotion regulation strategies in certain contexts involving stress and for certain relationships, such as hyperactivating and deactivating (Mikulincer & Shaver, 2007), which can contribute to psychopathology and PTSD due to insufficient stress management (Besser et al., 2009; Besser et al., 2010; Mikulincer et al., 1993; Mikulincer et al., 2006) .

Attachment is crucial as a mediator and moderator for psychological well-being in different studies (Aspelmeier et al., 2007; Rosche et al., 2006). Although early traumas such as sexual abuse can manifest distress in different forms, such as somatization among survivors (Waldinger et al., 2007), attachment security experienced in peer and parent relationships could protect against negative effects of female sexual abuse (Aspelmeier et al., 2007). Moreover attachment security may mediate the relationship between child sexual abuse and psychological adjustment (Rosche et al., 2006). The results indicate the importance of attachment relationship and psychological well-being. However the link between self-esteem and posttraumatic cognitions following adulthood trauma have not been studied.

It is possible that in PTSD, low self-esteem and insecure attachment are risk factors for traumatic stress that make individuals process a trauma in a self-demolishing and self-blaming way. The negative view of self and/or negative view of others would be critical for perceived social support and for attempts to receive help from others in order to cope with psychological problems following a traumatic event. Individuals who have a negative view of self may perceive themselves as too worthless to get helped. On the other hand, those who have a negative view of others may find it hard to establish a relationship and they may not demand help from others. In addition, the studies indicated that low self-esteem associated with insecure attachment style (Brennan & Morns, 1997; Bylsma et al., 1997) and individuals who suffer from PTSD report less positive self-view (Ehring et al., 2008). Following the assumptions of self-view and view of others, it can be suggested that low self-esteem, anxiety and avoidance dimensions of attachment may predict posttrauma negative appraisals, which in turn may predict PTSD

severity. Furthermore, early trauma may influence the way in which individuals develop their sense of self-value and of feeling attached. To date, the associations between attachment and negative self-cognitions and PTSD have not been investigated together. Therefore, a better understanding of PTSD could be facilitated by integrating the emotion regulation model of Mikulincer and Shaver (2007) that has been described in detail in chapter 2 with the model of Ehlers and Clark's (2000) PTSD model.

Following a traumatic event, positive change can also take place (Tedeschi & Calhoun, 1999). PTG refers to a positive change in the aftermath of trauma, which may be observed in some individuals (for reviews, see Joseph & Linley, 2005; Linley & Joseph, 2004). Recent research suggests that personality traits such as openness to experience, agreeableness, and conscientiousness are associated with more PTG (Joseph & Linley, 2005). However, little is known about the contribution of self-esteem and attachment style to PTG. Because both high self-esteem and secure attachment might be related to individuals' ways of coping and may influence positive interpretation of the traumatic event, they may contribute to PTG as well. There is limited and controversial evidence about the association between attachment and PTG. Salo, Qouta, and Punamaki (2005) showed that individuals who have secure attachment report more posttraumatic growth following a torture experience, whereas in Dekel's (2007) study, individuals who are high on attachment anxiety reported more growth.

There are not sufficient explanations for the different findings related to the association between attachment and PTG. Apart from these two studies, there are no findings regarding the link between attachment and PTG. To find the association between attachment and PTG, it is important to understand the basic mechanism that plays a role in PTG.

There could be different processes and factors that are associated with individuals' positive re-evaluation of a traumatic event. Joseph and Linley (2005) suggest that assumptions prior to the traumatic event predict whether a person responds to trauma with accommodation (i.e., changing existing schema to make it congruent with upcoming trauma information) or assimilation (i.e., changing upcoming trauma information to fit into existing schema) processes. However, the authors did not specify what might form these pretrauma assumptions. But it can be

argued that, if an individual is insecurely attached and has low self-esteem, forming a positive new assumptive world might be difficult. However, the association between self and negative cognition have not been investigated for PTG following a traumatic event. As a result, the second part of the empirical chapter focuses on the association between early traumatic events, attachment dimensions, self-esteem, posttraumatic cognitions, and PTSD and their impact on PTG.

There are number of studies (see review of Ozer et al., 2003) that focus on risk factors for PTSD, and there are correlation studies investigating underpinnings of PTG. There were no attempts to refer to attachment theory or formulate a model to understand the self-related factors such as early traumas, attachment dimensions, self-esteem, and posttraumatic cognitions and their impact on PTSD and PTG. Also, there have been no attempts to formulate the relationship between these factors with respect to emotion regulation mechanism of attachment, negative changes as in PTSD, and positive changes as in PTG in a model. As suggested in the literature, there is an association between early traumatic events and insecure attachment organization (Nyea et al., 2008; Stovall-McClough & Cloitre, 2006; Waters et al., 2000). These factors could both be important for psychological well-being (Aspelmeier et al., 2007; Waldinger et al., 2007). It is also known that self-esteem and posttraumatic cognitions play role in development of PTSD (Agar et al., 2006; Karl et al., 2009; Kelim et al., 2007; Lee, 2008; Sanders et al., 2009; Startup et al., 2007). The main focus of this chapter is to establish the missing link between the impact of early experiences such as early traumas and attachment, and self-esteem and posttraumatic cognitions, as well as PTSD and PTG (see Figure 2.5 and Figure 2.6).

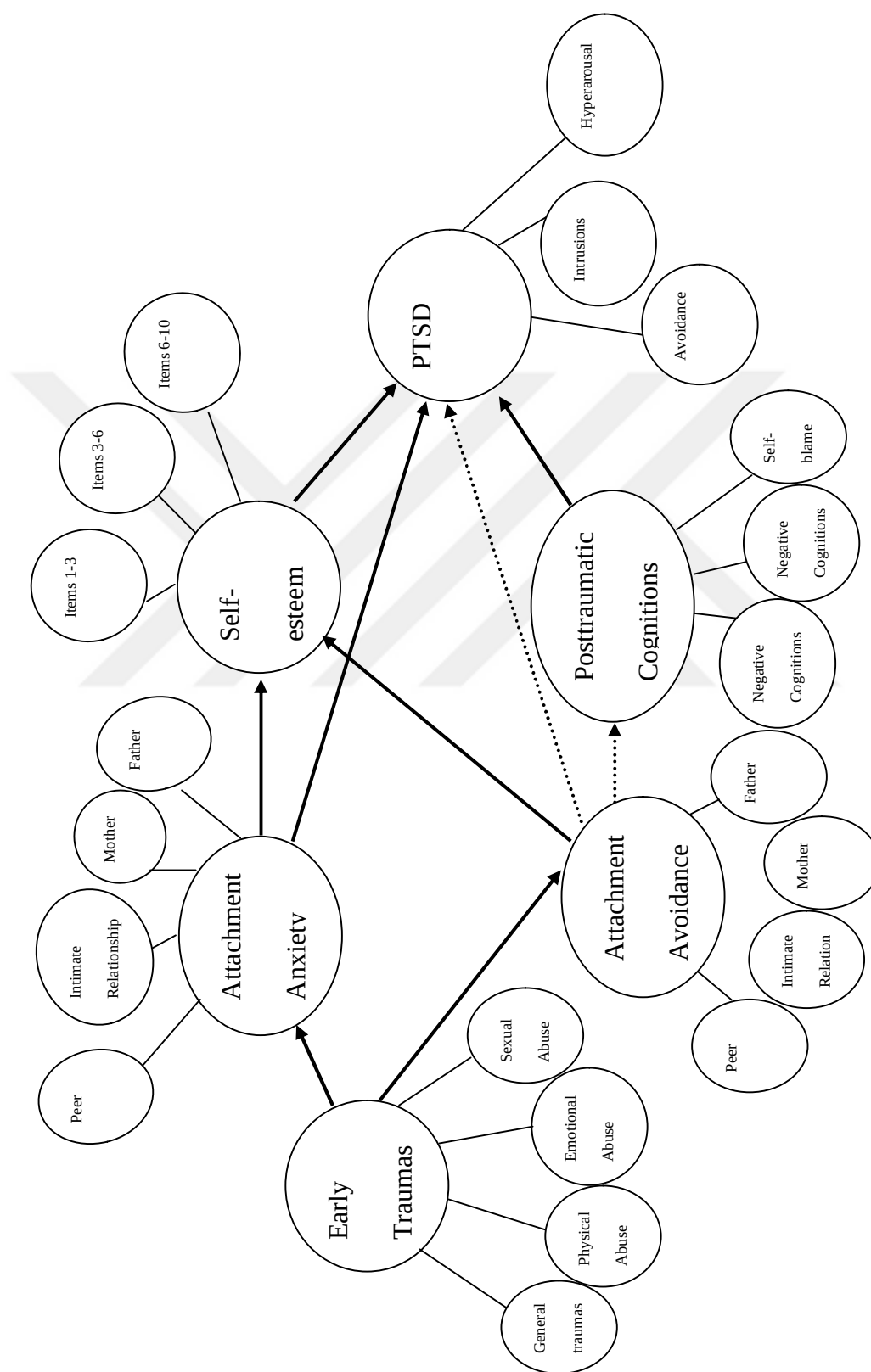


Figure 2.5. The suggested PTSD SEM model. Dashed lines indicate paths that are expected to be non-significant.

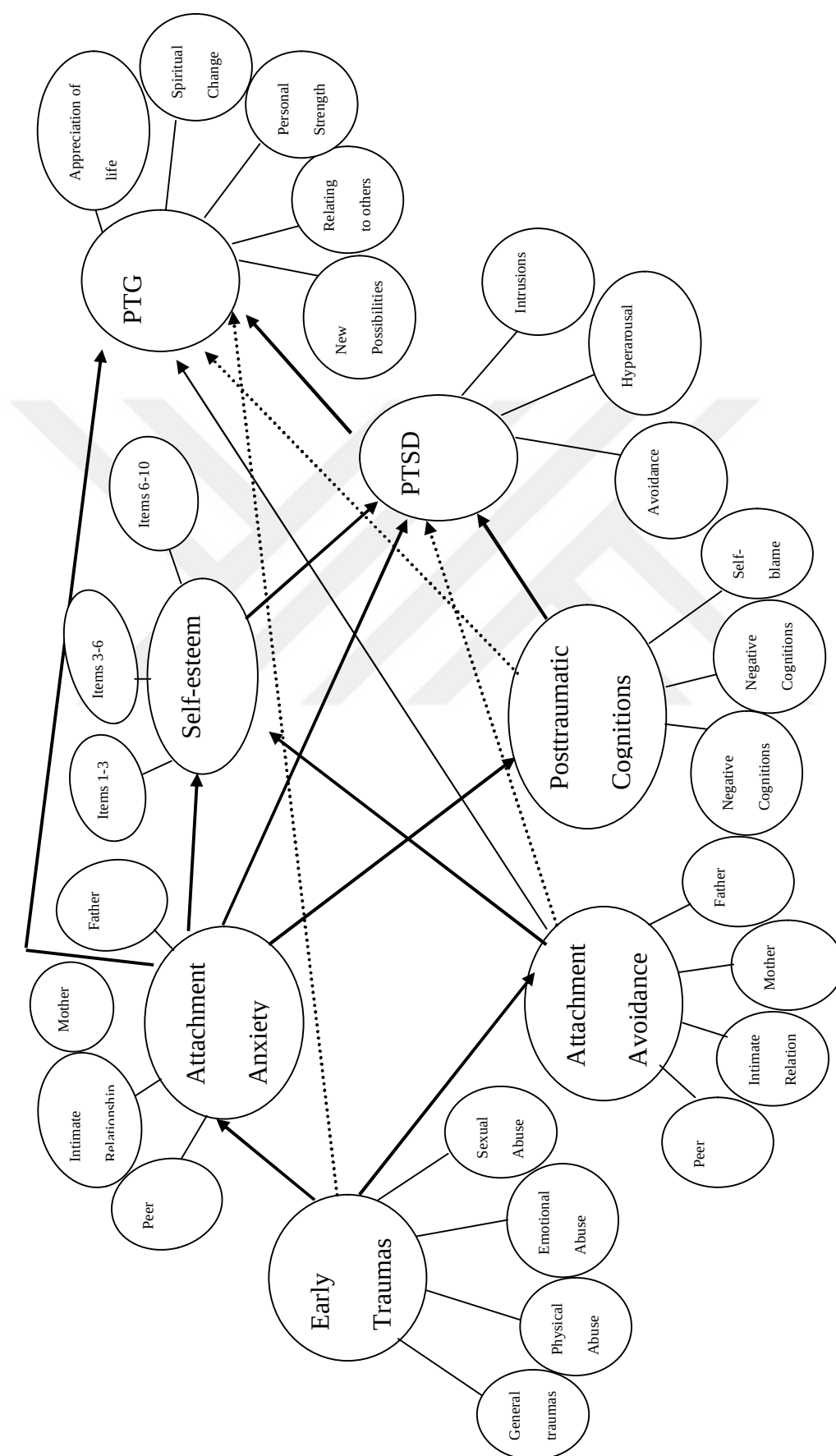


Figure 2.6 The suggested PTG SEM model. Dashed lines indicate paths that are expected to be non-significant.

A series of structural models were tested in order to understand individual differences for PTSD symptom severity in relation to attachment theory (Bowlby, 1969), models about the self (Bartholomew & Horowitz, 1991; Collins & Read, 1994; Hazan & Shaver, 1987; Main et al., 1985), emotion regulation regarding attachment (Mikulincer & Shaver, 2007), and the cognitive model of PTSD (Ehlers & Clark, 2001). Moreover, the risk factors for PTSD were also investigated to reveal their associations with PTG (Tedeschi & Calhoun, 1996), a positive consequence of trauma.

In the literature, there have been findings which would suggest that the attachment avoidance dimension might be associated with the avoidance symptom cluster of PTSD, and that the anxiety dimension of attachment might be associated with the hyperarousal symptom cluster (Kanninen et al., 2003; Kemp & Neimeyer, 1999; Mikulincer et al., 1993; O'Connor & Elklit, 2008). Therefore, avoidance and hyperarousal symptom clusters and their relationship with different attachment dimensions were tested first in structural models (See Appendix A).

In the first part of the model, it was hypothesized that individuals with higher exposure to early traumatic events will report more attachment anxiety and attachment avoidance. Those who report more early traumatic events and more insecure attachment will have lower self-esteem and more negative posttraumatic cognitions.

It was also hypothesized that attachment avoidance and attachment anxiety would mediate the relationship between early trauma and self-esteem, and early trauma and posttraumatic cognitions. Furthermore, self-esteem and posttraumatic cognitions would mediate the relationship between the attachment anxiety and PTSD, and the attachment avoidance and PTSD. The early traumatic events, attachment dimensions, self-esteem, and posttraumatic cognitions direct effect on PTSD were also tested in SEM.

The same model proposed for PTSD was tested for PTG. It was hypothesized that an early traumatic event would predict attachment anxiety and attachment avoidance, and that attachment avoidance and attachment anxiety would mediate the relationship between early trauma and PTG. Also, it was hypothesized that posttraumatic cognitions would mediate the relationship between attachment anxiety and PTG, and that PTSD would mediate the relationship between self-esteem and PTG, and posttraumatic cognitions and

PTG. The direct effects of attachment anxiety, attachment avoidance, and posttraumatic cognitions on PTG were tested as well in SEM to reveal whether there are direct associations with PTG.

## **Method**

### **Participants.**

The participants were 516 University of Southampton students and staff who signed up for the study. They were recruited via mass e-mailing and advertisement flyers across the campus. Participants were included in the study if they had experienced an adverse life event and were native English speakers. They all gave informed consent before participating, and the School of Psychology Ethics Committee approved the study (See Appendix C). Participants who did not answer more than four questionnaires and participants who did not meet criterion A of the *DSM IV* PTSD diagnosis (i.e., having experienced a severe traumatic event which was either life-threatening or associated with helplessness and horror) were excluded. This left a total sample of 408 participants. The participants' ages varied from 18 to 49 ( $M = 20.30$ ,  $SD = 3.67$ ), and 15% of the participants were male and 85% of the participants were female.

The associations between the attachment avoidance and the attachment anxiety dimensions, as well as avoidance and the hyperarousal symptom clusters were similar to the model that used the total PTSD score (See Appendix A). Therefore, the PTSD total score was used for further analysis. In addition, I conducted regressions and checked the findings to reveal interactions between attachment anxiety and attachment avoidance on slope tests to find out whether those who are high on both the anxiety dimension and the avoidance dimension report more avoidance, hyperarousal, and intrusion symptoms. However, there were no interactions of attachment anxiety and attachment avoidance for different symptom clusters of PTSD.

### **Design and procedure.**

The study used a cross-sectional correlational design. Participants completed the "Negative and positive changes after adverse life events" online survey ( $N = 408$ ), which assessed demographic characteristics; information about trauma and PTSD; posttraumatic cognitions; parental, peer and intimate

relationship attachment; posttraumatic growth; and self-esteem (See Appendix E). Questionnaires were always presented in the same order.

There are two different views regarding the measurement of attachment (Mikulincer & Shaver, 2007). Developmental psychologists are using interview techniques to assess attachment style. However, social psychologists adopt the dimensional perspective which focuses on two insecure emotion regulation strategies, namely, deactivating or avoidance, and hyperactivating anxious-ambivalent (Mikulincer & Shaver, 2007). Particularly for this study and the second study of the thesis self-report attachment measures and dimensional attachment assessment method were used. The main attachment model of the thesis was built on self-report measurement Mikulincer and Shaver (2007). In addition, to obtain a large sample required a more time efficient attachment measurement rather than interview techniques which could take a 3-hour assessment for each participant. Still, to provide more information about the general attachment pattern of individuals, attachment style with different attachment figures was included.

## **Instruments.**

### ***Demographics.***

Participants answered questions about gender, age and education level (see Table 1.1).

### ***Early trauma inventory self-report short form (ETISR-SF).***

This inventory screens participants for trauma history before the age of 18 (Bremner, Bolus, & Mayer, 2007). It has four parts assessing general traumas (e.g., Did you ever suffer a serious personal injury or illness? Did you ever experience the death or serious injury of a friend? Did anyone in your family ever suffer from mental or psychiatric illness or have a “breakdown”?), physical punishment (e.g., Were you ever slapped in the face with an open hand? Were you ever burned with hot water, a cigarette, or something else? Were you ever pushed or shoved?), emotional abuse (e.g. Were you often ignored or made to feel that you didn’t count? Were you often told you were no good? Did your parents or caretakers often fail to understand you or your needs?), and sexual events (e.g. Did you ever experience someone rubbing their genitals against you? Did anyone ever have genital sex with you against your will? Were you ever forced or coerced

to perform oral sex on someone against your will?). The participant writes “yes” or “no” next to the traumatic events listed. Yes responses were coded as 1 and totaled scores were used in the analysis.

*Relationship structures questionnaire (RSQ).*

The Relationship Structures Questionnaire (RSQ; Fraley, Niendenthal, Marks, & Vicary, 2006) consists of 40 questions that are derived from the Experiences in Close Relationships-Revised (ECR-R; Fraley, Waller, & Brennan, 2000) to assess two attachment dimensions in four different relational contexts: mother, father, romantic partner, and best friend. The scale provides composite indices of global attachment scores for the anxiety and avoidance dimensions of attachment. The participants responded to items on a 7-point Likert type scale (1 = “strongly disagree”; 7 = “strongly agree”). Those who scored low on the anxiety dimension of attachment and on the avoidance dimension of attachment are conceptualized as secure individuals. The alpha coefficients for both the anxiety and the avoidance scales were greater than or equal to 0.89 in Fraley and colleagues’ (2006b) study, and in the current study, they varied between .85 and .92. In the current study, I calculated global attachment scores for the anxiety dimension of attachment and the avoidance dimension of attachment by taking means of anxiety and avoidance averages from each relationship context (mother, father, peer, romantic) following the suggestions by Fraley (n.d.).

*Rosenberg self-esteem scale (RSES).*

This scale consists of 10 items measuring global self-worth (Rosenberg, 1965). It has a 4-point Likert-type response format (0=“strongly agree”, 3=“strongly disagree”). In a recent study, the Cronbach’s alpha for the scale was 0.87 (Bosson, Swann, & Pennebaker, 2000). In the current study, the Cronbach’s alpha for the scale was .90.

*Posttraumatic cognitions inventory (PTCI).*

This scale assesses posttraumatic cognitions. It consists of 37 questions yielding three factors (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999), namely, negative cognitions about the self, negative cognitions about the world, and self-blame. The items were administered in a 7-point Likert type scale (1 = “totally disagree”, 7 = “totally agree”). The internal consistency of the three factors varied from 0.86 to 0.97. The scale is also highly correlated with the

Posttraumatic Stress Disorder Diagnostic Scale (PDS) ( $r_s = 0.57-0.78$ ; Foa et al., 1999). The Cronbach's alpha for the scale was .96 and the subscales' Cronbach's alpha varied from 0.82 to 0.92 in the present study.

*Posttraumatic stress disorder diagnostic scale (PDS).*

This scale is a diagnostic tool used to identify the presence and symptom severity of PTSD. It assesses the severity of symptoms, numbers of symptoms, level of impairment, and impairment of functioning in patients according to *DSM-IV* criteria. The questions are in a yes/no format. There are also narrative sections to obtain more information regarding symptoms and the experiences of individuals.

The scale consists of four parts. In the first part, experienced traumatic events are assessed. In the original format of the first part, there are 13 items. In our study, however, eight additional possible traumatic events (e.g., divorce of parents; having an abortion; witnessing a physical attack or physical act of violence) were included. The second part gathers specific information to categorize the traumatic event according to *DSM IV* (2000) criterion A, which is the following: a traumatic stressor should be involving direct personal experience of an event that involves actual or threatened death or serious injury, or other threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate (Criterion A1). The person's response to the event must involve intense fear, helplessness, or horror (or in children, the response must involve disorganized or agitated behavior; Criterion A2). The third part contains 18 items to assess symptoms of PTSD and maintains with PTSD or sub-syndromal PTSD categorization of participants. The PDS has acceptable levels of reliability and validity and shows good diagnostic agreement with the Structured Clinical Interview for *DSM IV* (Foa, Cashman, Joycox & Perry, 1997). It also has high internal consistency for the total score and subscales (.78-.92) and satisfactory test-retest reliability coefficients (.77-.85) (Foa et al., 1997). In the current study, PTSD scoring was done according to Part 3. I only counted traumatic events if they satisfied *DSM IV* criterion A for traumatic events (2000).

The Cronbach's alpha for intrusions was .81, for avoidance was .83 and for hyperarousal was .82 in the present study.

*Post Traumatic Growth Inventory (PTGI).*

The Post Traumatic Growth Inventory assesses perceived positive changes in the aftermath of the traumatic event. It was developed by Tedeschi and Calhoun (1996). It consists of 21 items and five subscales that measure new possibilities (i.e., I have developed new interests.), relating to others (i.e., I have more compassion for others.), personal strength (i.e., I have a greater feeling of self-reliance), spiritual change (i.e., I have stronger religious faith), and appreciation of life (i.e., I have changed my priorities about what is important in life). The PTGI was a 6-point Likert-type scale ranging from 0 (I did not experience this change as a result of trauma) to 5 (I experienced this change to a very great extent) response format. Tedeschi and Calhoun (1996) conducted a reliability study of the PTGI in a university sample. In their study, the PTGI had an acceptable construct validity, internal consistency coefficient (.90), and test-retest reliability over a 2-month interval (.71). The Cronbach's alpha for the scale was .95 and the subscales' Cronbach's alpha varied from .83 to .90 in the present study.

## **Results**

### **Data analysis.**

The Statistical Package for Social Sciences (SPSS) version 17.0 and AMOS 17.0.2 were used for statistical analysis and model testing. A more detailed description of the analytic strategy is outlined in the next section.

### **Analysis strategy.**

Before conducting Structural Equation Modelling (SEM) and testing a series of structural models, all variables were examined for the accuracy of data entry, double entries in the system, systematic missing answers in questionnaires, and univariate and multivariate outliers according to Tabachnick and Fidel (2001). There were 516 participants registered for the study. After checking for double entries and mass missing values in cases, there were 408 participants left. There were 5 univariate and 10 multivariate outliers, and they were eliminated from the analysis after they were detected. As a result, the remaining analysis was conducted with 393 people. The missing values were random, and they accounted

for fewer than 5% of the sample. Therefore, mean substitution was done for every variable (Tabachnick & Fidel, 2001).

First, descriptive statistics for each variable are summarized in Table 1.1 and Pearson correlation coefficients of the variables in the model are summarized in Table 1.1. The main model for PTSD was represented in Figure 2.4. After a series of analysis and testing models for PTSD, further analysis was conducted for PTG. Because there are findings (Lev-Wiesel & Amir, 2003; Powell et al., 2003) regarding the association between PTSD and PTG, PTG was added in the PTSD model as an endogenous variable (See Figure 2.5) and will be discussed following the PTSD structural model in the results.

#### *Analysis of structural equation models for PTSD.*

Before testing the PTSD structural model in Figure 2.4, SEM models for different PTSD symptom clusters such as hyperarousal, intrusions, avoidance, and numbing were investigated to reveal whether attachment anxiety and attachment avoidance contribute to different symptom clusters of PTSD (See Appendix A).

#### ***Structural model for PTSD.***

The four indicators for the early trauma latent variable were the subscales of general traumas, physical punishment, emotional abuse, and sexual events. The indicators for the attachment anxiety were the subscales of mother attachment anxiety, father attachment anxiety, relationship attachment anxiety, and peer attachment anxiety. The indicators for attachment avoidance were mother attachment avoidance, father attachment avoidance, relationship attachment avoidance, and peer attachment avoidance. The self-esteem items were grouped into three indicators and composed of a self-esteem latent variable. The posttraumatic cognitions latent variable consists of negative worldview, negative self-view, and self-blame subscales as indicators. Finally, the intrusion subscale, the hyperarousal subscale, and the avoidance subscale were the indicators for the PTSD endogenous latent variable (See Figure 2.4).

The exogenous and endogenous variables consisted of validated subscales of questionnaires. Therefore, confirmatory factor analysis was not conducted for the scales since the scales used in the study have been validated in earlier studies in the literature.

***PTSD structural model for testing mediated variables.***

A series of structural models were used to test the hypothesized structural model in Figure 2.7. In Model A, both non-significant (dashed lines) and significant paths (solid lines) were included. In Model B, a direct path from attachment avoidance to PTSD was restricted as a result of a prior SEM analysis; regressions and slope analysis were conducted on PTSD symptom clusters and attachment avoidance. According to the current literature (Besser et al., 2009; Besser et al., 2010) and the slope tests (See Appendix A) conducted prior to the structural PTSD model, rather than attachment avoidance, attachment anxiety seemed to be the driving force for PTSD. Therefore, in Model C, direct paths from attachment avoidance to PTSD and attachment avoidance to PTCI were restricted. When all three models were compared, Model C yielded significantly better model fit ( $\Delta\chi^2(2, 393) = 19.2, p < .001$ ) than Model A and Model B ( $\Delta\chi^2(1, 393) = 18.5.2, p < .001$ ; See Table 1.2).

***Testing the significance of direct and indirect effects for PTSD.***

The standardized path coefficients for Model C are shown in Figure 2.7. The only significant direct effect on PTSD was self-esteem (standardized coefficient =  $-.11$ ) and posttraumatic cognitions (standardized coefficient =  $.52$ ).

In order to test the indirect effects of early trauma and attachment anxiety, AMOS' bootstrap procedure was administered according to Shrout and Bolger (2002). The estimates of each path coefficients were used to calculate mean indirect effects for 1000 times with respect to 95% confidence interval for the indirect effect. According to percentile-based confidence intervals, the early trauma indirect (mediated) effect on self-esteem was not significant ( $p = .06$ ), the early trauma indirect effect (mediated) on PTCI was significant ( $p = .002$ ), the early trauma indirect effect (mediated) on PTSD was significant ( $p = .002$ ), and the attachment anxiety indirect effect (mediated) on PTSD was significant ( $p = .002$ ). Because AMOS 17 provides the total indirect effect of the early trauma and the attachment anxiety, the Sobel Test was used to reveal specific indirect effects in the model according to Kenny's (2009) suggestions (See Table 1.3).

In the PTSD model, the total variance was explained as follows: attachment avoidance 20%, attachment anxiety 17 %, self esteem 62%, and posttraumatic cognitions 29%.

A fully mediated model in which the exogenous latent variables (early trauma, attachment anxiety, and attachment avoidance) as mediator latent variables for latent variables (self-esteem and posttraumatic cognitions) and mediator latent variables (self esteem, posttraumatic cognitions), and the latent variable PTSD predicted the endogenous latent variable PTG was tested (See Figure 2.6).

The four indicators for the early trauma latent variable were the subscales of general traumas, physical punishment, emotional abuse, and sexual events. The indicators of the attachment anxiety were the subscales of mother attachment anxiety, father attachment anxiety, relationship attachment anxiety and peer attachment anxiety. The indicators for attachment avoidance were mother attachment avoidance, father attachment avoidance, relationship attachment avoidance and peer attachment avoidance. The self esteem items were grouped into three indicators and composed self-esteem latent variable. The posttraumatic cognitions latent variable consists of negative world view, negative self view and self blame subscales as indicators. Finally, the intrusion subscale, hyperarousal subscale and avoidance subscale were the indicators for the PTSD exogenous latent variable. The PTG subscales, changed perception of self, new possibilities, personal strength, spiritual change and appreciation of life were the indicators for the PTG endogenous latent variable. The exogenous and endogenous variables consisted of the validated subscales of the questionnaires.

*Table 1.1. Correlations and Descriptives for Variables Used in SEM Models*

|                              | 1 | 2     | 3      | 4      | 5       | 6       | 7       | 8       | 9       | Mean  | SD    |
|------------------------------|---|-------|--------|--------|---------|---------|---------|---------|---------|-------|-------|
| 1. Gender                    | 1 | -0.06 | -0.11* | 0.08   | -0.18** | -0.07   | 0.01    | 0.05    | 0.11*   | 1.86  | 0.34  |
| 2. Age                       |   | 1     | 0.27** | 0.08   | 0.12*   | -0.01   | 0.12*   | 0.01    | 0.17**  | 19.98 | 2.75  |
| 3. Early Trauma              |   |       | 1      | 0.24** | 0.26**  | -0.22** | 0.30**  | 0.20**  | 0.10*   | 4.52  | 3.50  |
| 4. Attachment Anxiety        |   |       |        | 1      | 0.59**  | -0.51** | 0.41**  | 0.30**  | 0.05    | 1.95  | 0.82  |
| 5. Attachment avoidance      |   |       |        |        | 1       | -0.41** | 0.29**  | 0.17**  | -0.14** | 2.66  | 0.98  |
| 6. Self-esteem               |   |       |        |        |         | 1       | -0.43** | -0.34** | -0.00   | 20.89 | 5.37  |
| 7. Post-traumatic cognitions |   |       |        |        |         |         | 1       | 0.55**  | 0.17**  | 1.78  | 0.86  |
| 8. PTSD                      |   |       |        |        |         |         |         | 1       | 0.31**  | 5.99  | 7.21  |
| 9. PTG                       |   |       |        |        |         |         |         |         | 1       | 31.24 | 23.41 |

\*, Correlation is significant at the 0.05 level (2-tailed), \*\*, Correlation is significant at the 0.01 level (2-tailed)

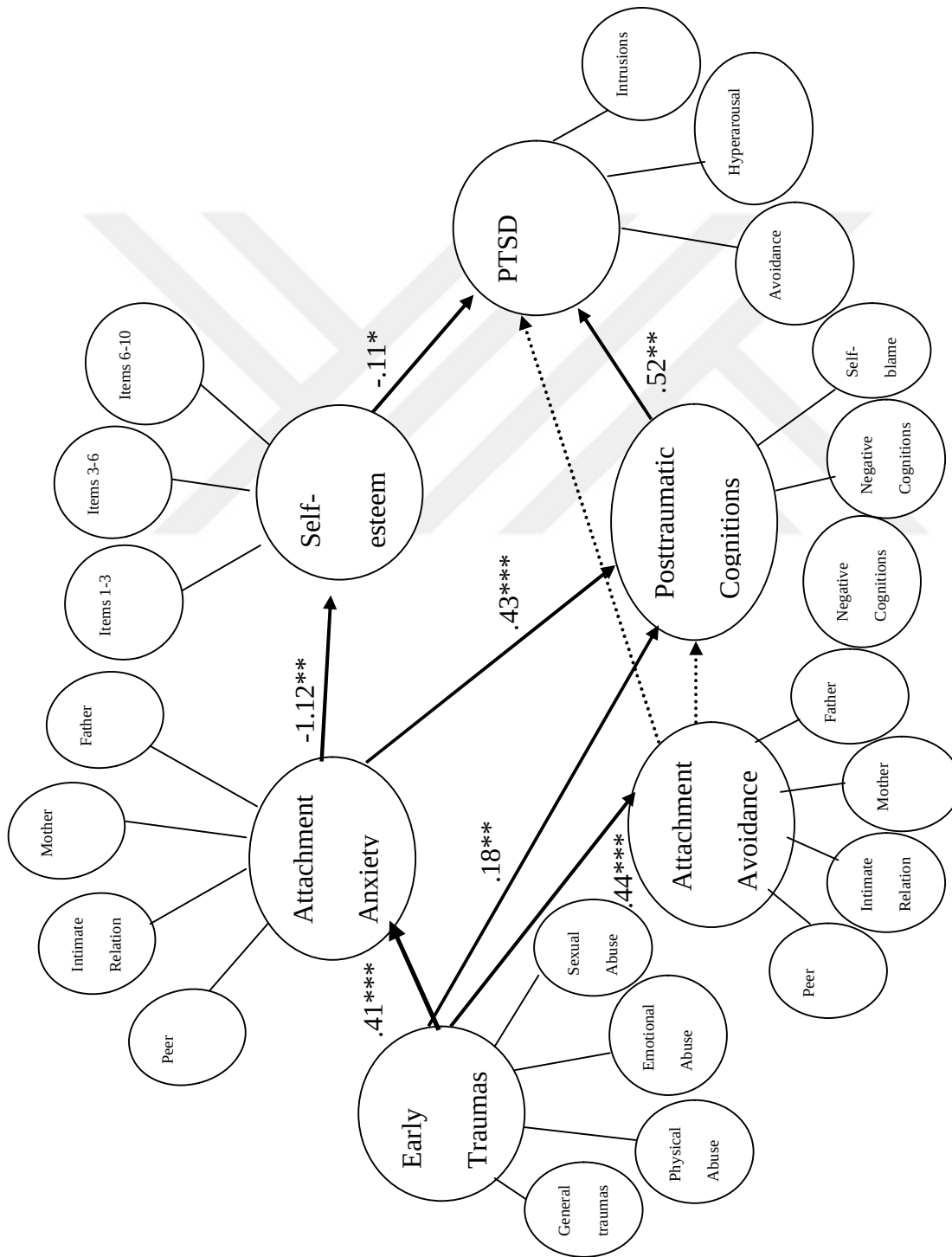


Figure 2.7. The final PTSD SEM model. Dashed lines indicate paths that are restricted or non-significant

***PTG structural model for testing mediated variables.***

Since there were no previous studies that examined the associations between early traumas, self esteem, posttraumatic cognitions, PTSD, and PTG, the paths to PTG in the structural model were determined according to the past research (See Chapter 2) of the variables and Ehlers and Clark's (2000) PTSD model. Two structural models were tested according to the hypothesized structural model in Figure 2.8. In the Model A (CFI = .85, SRMR = .07, RMSEA = .08,  $\chi^2(285) = 1149.93$ ,  $p < .001$ , both insignificant (dashed lines) and significant paths (solid lines) were included. In Model B, a direct path from early trauma to PTG and a direct path from posttraumatic cognitions to PTG were restricted. However, model B was not significantly better than model A,  $\Delta\chi^2(29, 393) = 3.7$ ,  $p > .05$  (See Figure 2.8). Therefore, the first model was retained to check the direct and indirect effects.

***Testing the significance of indirect effects for PTG.***

The standardized path coefficients for Model A are shown in Figure 2.8. There was significant negative direct effect of attachment avoidance (standardized coefficient =  $-.31$ ,  $p < .001$ ) and PTSD (standardized coefficient =  $.36$ ,  $p < .001$ ) on PTG.

For testing the indirect effects of early trauma and posttraumatic cognitions, the bootstrap procedure was conducted according to Shrout and Bolger (2002). The estimates of each path coefficient were used to calculate mean indirect effects for 1000 times with respect to 95% confidence interval for the indirect effect. According to percentile-based confidence intervals, the early trauma indirect (mediated) effect on attachment avoidance was not significant ( $p = .46$ ), the early trauma indirect effect (mediated) on PTCI was significant ( $p = .004$ ), and the early trauma indirect effect (mediated) on PTSD was significant ( $p = .002$ ).

Attachment avoidance 19%, attachment anxiety 18%, self-esteem 59%, posttraumatic cognitions 29%, and PTSD 36% explained the variance in the PTG.

Table 1.2. Model Fit Indices for Three Tested PTSD Models

| Model | CFI | SRMR | RMSEA | %90 CI for RMSEA | X <sup>2</sup> | Df  | Models  | $\Delta\chi^2$ |
|-------|-----|------|-------|------------------|----------------|-----|---------|----------------|
| A     | .84 | .071 | .094  | .087-.101        | 786.70         | 176 |         |                |
| B     | .84 | .071 | .094  | .087-.101        | 787.39         | 177 |         |                |
| C     | .83 | .074 | .095  | .088-.102        | 805.9          | 178 |         |                |
|       |     |      |       |                  |                |     | A vs. B | .69            |
|       |     |      |       |                  |                |     | A vs. C | 19.2***        |
|       |     |      |       |                  |                |     | B vs. C | 18.5***        |

*Table 1.3. Statistical Significance of Indirect Effects in the PTSD Model*

| Independent Variable | Mediating Variable | Dependent Variable | $\beta$ (Standardized path coefficient and | Sobel Test Result | Significance Level in |
|----------------------|--------------------|--------------------|--------------------------------------------|-------------------|-----------------------|
| Early Trauma         | Attachment         | Self-esteem        | (.41) X (-1.12) = -.46                     | 2.63              | NS                    |
|                      | Anxiety            |                    |                                            |                   |                       |
| Attachment anxiety   | Self-esteem        | PTSD               | (-1.12) X (-.11) = .12                     | 1.71              | NS                    |
|                      |                    |                    |                                            |                   |                       |
| Early Trauma         | Attachment         | Posttraumatic      | (.41) X (.43) = .17                        | 3.65              | .001                  |
|                      | Anxiety            | Cognitions         |                                            |                   |                       |
| Early Trauma         | Posttraumatic      | PTSD               | (.18) X (.52) = .09                        | 2.50              | .05                   |
|                      | Cognitions         |                    |                                            |                   |                       |
| Attachment Anxiety   | Posttraumatic      | PTSD               | (.43) X (.52) = .22                        | 5.04              | .001                  |
|                      | Cognitions         |                    |                                            |                   |                       |

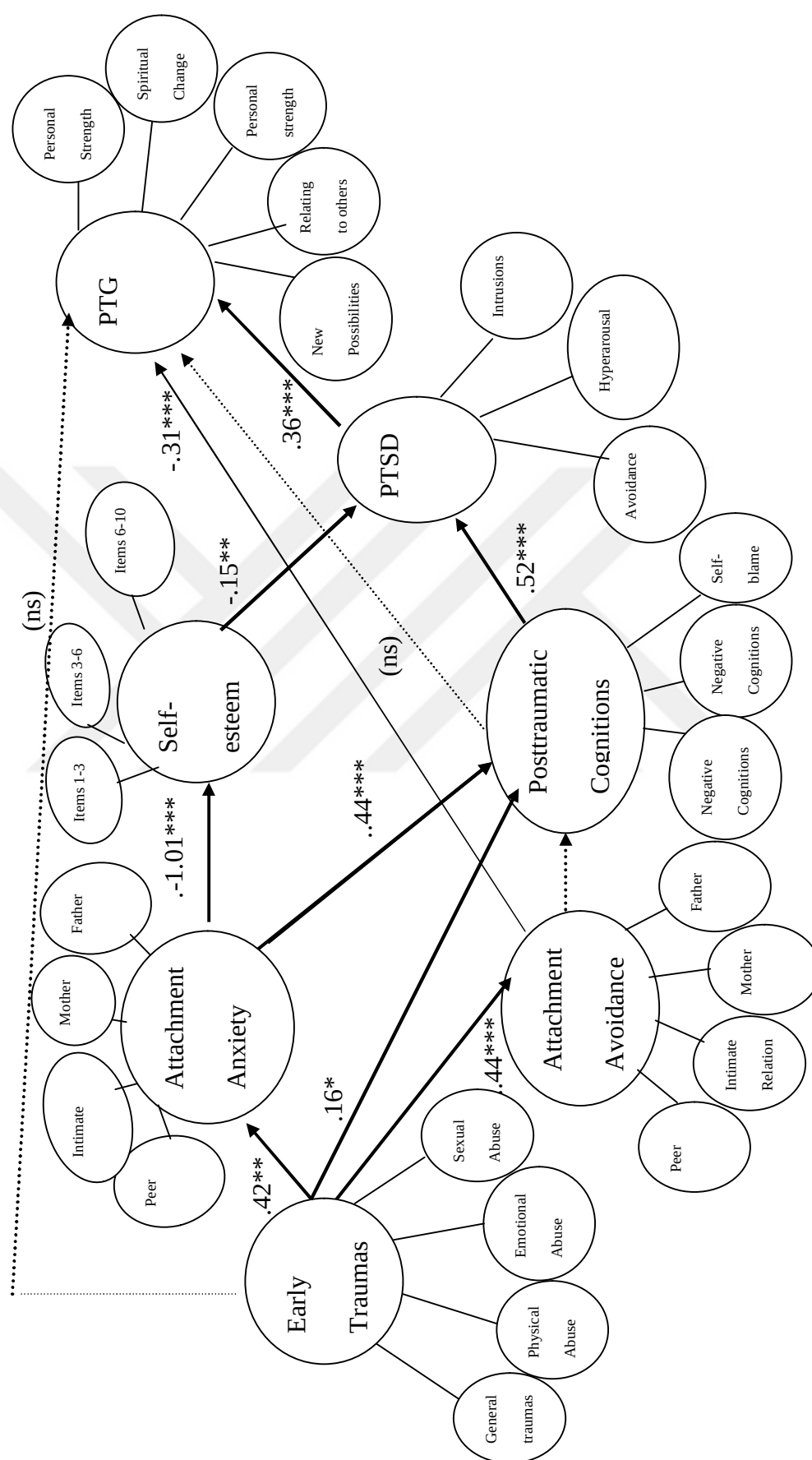


Figure 2.8. The final PTG SEM model. Dashed lines indicate paths that are expected to be non-significant

The model fit criteria for the models of PTSD and PTG were not satisfactory according to recent advances in the understanding of fit indices for SEM (Hu & Bentler, 1999). Specifically, when the ratio between the chi square and df is considered, some researchers allow values as high as 5 to consider a model adequate fit, according to Schumacker and Lomax (2004). In all tested structural models in the current study, all chi square and df ratios of three models were below 5 and acceptable according to Schumacker and Lomax (2004). Although the models have lower CFI than conventionally suggested, the CFI should be equal to or greater than .90 (Fan, Thompson, & Wang, 1999), the SRMR (Hu & Bentler, 1999) and RMSEA (Browne & Cudeck, 1993) model fit indices were in acceptable ranges. The current study followed recent recommendations to take into account more than one model fit (Schumacker & Lomax, 2004; Kenny, 2003) and also tested different models for significant differences in their model fit (Kenny, 2003; Kline, 1998; Schumacker & Lomax, 2004) in order to adhere to a good practice of SEM (Shrout & Bolger, 2002).

## **Discussion**

The aim of the study was to test a comprehensive model of risk factors for PTSD based on assumptions derived from attachment theory (Bowlby, 1969), models about the self (Bartholomew & Horowitz, 1991; Collins & Read, 1994; Hazan & Shaver, 1987; Main et al., 1985), emotion regulation strategies (Mikulincer & Shaver, 2007), and the cognitive model of PTSD (Ehlers & Clark, 2000). In addition, I was interested in whether these risk factors were negatively associated with PTG (Tedeschi & Calhoun, 1996), which is a positive consequence of trauma. A series of structural models were tested to learn more about the specific contributions of pre-trauma factors, self-esteem, and negative posttraumatic cognitions to PTSD and then to PTG.

In the first part of the structural model, I tested if early trauma predicts attachment anxiety and attachment avoidance. Secondly, I tested whether early trauma, attachment anxiety, and attachment avoidance predict posttraumatic negative cognitive cognitions and self-esteem. Then, it was tested if attachment anxiety, posttraumatic cognitive appraisals, and self-esteem predicted PTSD. In other words, the study also investigated whether these factors predict PTSD directly or not. In a last step, PTG (a positive outcome after trauma) was incorporated into the model to test whether the absence of early trauma, the

attachment dimensions, posttraumatic cognitions, high self-esteem, and PTSD symptom severity predicted PTG. Moreover, the indirect and the direct effects of these factors on PTSD and PTG were checked.

### **Discussion of the PTSD model.**

#### ***The effect of early trauma on insecure attachment.***

The start of the model is the link between early traumatic events' impact on attachment anxiety and attachment avoidance. In the current study, early traumatic events including general traumas, physical abuse, sexual abuse, and emotional abuse that occurred before the age of 18 predicted higher levels of attachment anxiety and attachment avoidance as measured in the structural model. Since attachment measures included four relationship scores, namely, mother, father, peer, and relationship, it could be assumed that they reflected the individuals' general level of attachment insecurity in relationships. The association between early traumas and attachment insecurity is in line with previous research (Kobak & Madsen, 2008; Mikulincer & Shaver, 2007), which highlights the detrimental impact that early trauma can have on a person's attachment relationships or his or her capability to form secure attachments. The link between early traumas and attachment insecurity is also in line with models that explain how beliefs about the self and the world can be challenged by a traumatic event, as conceptualized in the shattered assumption theory (Horowitz, 1976, 1986; Janoff-Bulman, 1992; Janoff-Bulman & Frieze, 1983). The early traumas could change individuals' positive views towards themselves and towards others, and it could also change their emotion regulation mechanisms.

According to the theory, a traumatic event shatters a person's basic beliefs and assumptions about the self and the world (Horowitz, 1976, 1986; Janoff-Bulman, 1992; Janoff-Bulman & Frieze, 1983). Prior to the trauma, individuals believe that the self is worthy and that the world is a safe place to live in (Horowitz, 1976; 1986). These basic assumptions might be damaged by the occurrence of a traumatic event. An accident, an earthquake, abuse, a rape, a war, and similar experiences can negate and challenge these basic beliefs and lead to a change in the content of these basic assumptions. In addition, with the effect of early traumatic events on individuals, trauma survivors may evaluate a current traumatic event more negatively due to their previous negative experiences in

childhood and their maladaptive coping strategies derived from insecure attachment.

Therefore, the current finding, which indicates the positive association between early traumatic events and attachment anxiety and attachment avoidance, showed that this relationship could be a vulnerability factor and could contribute to developing psychological problems following an adulthood trauma.

In the literature, early traumatic events not only have an impact on attachment relationships (Kobak & Madsen, 2008) they also have an effect on psychological adjustment (Roche, Runtz, & Hunter, 1999), somatisation (Waldinger, Schultz, Barsky, & Ahern, 2006), and trauma-related symptoms in adult life (Aspelmeier, Elliot, & Smith, 2007). In accordance with these studies, Lopez and Brennan (2000) suggested that experiences in early life that promote either threat or security can result in either an individual's vulnerability to stress or to resilience. The early traumatic experiences may also influence the sense of self-worth and adulthood psychological problems. Individuals who have negative view of self (as in fearful and preoccupied attachment style) and who are high on attachment anxiety report more adverse life events, emotional problems (Allanson & Astbury, 2010), more psychological problems (Benoit et al., 2010; Ghafoori, Hierholzer, Howsepian, & Boardman, 2008; Kemp et al., 1999), higher anxiety sensitivity (Watt, McWilliams, & Campbell, 2005), more parent and peer alienation (Aspelmeier et al., 2007), and less perceived social support (Besser, & Neria, 2010)

Since the impact of early trauma is not only related to attachment insecurity, but also has an impact on current psychological problems, social support, and anxiety proneness, it may also negatively affect posttraumatic cognitions and self-esteem. Therefore, in the second part of the structural model, posttraumatic cognitions and self-esteem were investigated together, and the contribution of early trauma and attachment insecurity were evaluated. The impact of early trauma and attachment following a traumatic event may be related to increased negative view of self, which can be evidenced in lower self-esteem and more posttraumatic cognitions.

***Paths to posttraumatic cognitions and self-esteem.***

In the present study, attachment anxiety and early traumas were positively associated with posttraumatic cognitions. The only predictor for self-esteem was attachment anxiety rather than attachment avoidance and early trauma. It was hypothesized that attachment avoidance and self-esteem, based on the emotion regulation model of Mikulincer and Shaver (2007), would contribute to posttraumatic cognitions. Since those who have dismissing attachment and are high on avoidance would have a positive model of self and a negative model of others, there should be a positive relationship between avoidance and self-esteem. On the other hand, those who have fearful attachment and are high on avoidance would have a negative model of self and negative model of others, there should be a negative relationship between avoidance and self-esteem. However, in the structural model, the path from attachment avoidance to self-esteem was non-significant.

The finding was in the same line with the previous regressions and slope analysis conducted to reveal the associations between different symptom clusters of PTSD and attachment dimensions (See Appendix A). In the slope tests, rather than attachment avoidance, attachment anxiety seems to be related to symptom clusters of PTSD. In other words, the results showed that PTSD is mainly driven by the anxiety dimension of attachment and a negative model of self. Avoidant individuals may either not have reported the symptoms, or they may have avoided the impact of trauma in the current study.

In the literature, there are contradictory results regarding the role of attachment anxiety and attachment avoidance in PTSD (Besser et al., 2009; Besser et al., 2010; O'Connor & Elklit, 2008). In some studies, either attachment anxiety (Besser et al., 2009; Besser et al., 2010) or attachment avoidance (O'Connor & Elklit, 2008) is the precursor for PTSD, whereas in others, *insecure attachment* is a general umbrella term (Ghafoori et al., 2008; Leskela et al., 2001; Renaud, 2008) is associated with PTSD. O'Connor and Elklit (2008) found an association between attachment avoidance and PTSD in university students whereas similar to the present study revealed the association between attachment anxiety and PTSD (Besser et al., 2010). The association of different attachment dimensions might be due to the trauma type. Besser and colleagues (2010) present findings from university students who experienced a missile fire in the Israel-

Gaza border. On the other hand, O'Connor and Elklit (2008) investigated university students who reported various traumatic events. Some of the traumas may have long-lasting and devastating effects such as wars. Furthermore, the different results in the literature regarding the relationship between trauma and attachment might be a reflection of different assessment methods.

The studies cited do not use the same questionnaires or interviews. As a result, they may not actually tap the same concepts, which is a general problem in the attachment literature where attachment researchers can be divided into two, those who administer interviews and those who use self-report questionnaires. Even among researchers who use self-report measures, some prefer using the categorical measures, whereas others report dimensions as in the current study (for a detailed review, see Mikulincer & Shaver, 2007, pp. 81-115). Another explanation for the different findings in the literature might be caused by different samples or different trauma types. The studies conducted in Israel focusing on war trauma reported the same association between attachment anxiety and PTSD that was found in the current study (Besser et al., 2009; Besser et al., 2010), whereas O'Connor and Elklit (2008) reported an association between attachment avoidance and PTSD in Danish university students. In developmental studies conducted in Israel, it was found that children are less likely to develop avoidant attachment (Van IJzendoorn & Sagi, 1999). Therefore, it is likely that they may not report avoidance at the same level as in western cultures. In the present study, the association between attachment anxiety and PTSD was significant, and attachment anxiety seems to be the main determinant for post-traumatic well-being, which is similar to studies from Israel (Besser et al., 2009; Besser et al., 2010).

There are three important conclusions related to those who scored high on attachment anxiety. They have a negative self-view, a hyperactivated attachment system after a stressful cue, and they are mostly likely to misinterpret the social support that they receive.

Firstly, in different studies, the role of negative self-view has been emphasized as an important risk factor for the course of PTSD. Specifically, the influence of negative self-view on PTSD was evidenced prior to the traumatic event (Bryant & Guthrie, 2007), following the traumatic event (Agar, Kennedy & King, 2006; Lommen, Sanders, Buck, & Arnzt, 2009), and in the long-term with

follow-up PTSD studies for (Birgit et al., 2007; Ehring et al., 2008). As a result a negative view of self prior to the traumatic event could be a risk factor for chronic PTSD and for long-lasting psychological problems (Bryant & Guthrie, 2007).

Secondly, apart from having a negative view of self, individuals with high attachment anxiety might find it difficult to engage in efficient coping and might focus on negative emotions and become sensitive to stress-provoking cues (Mikulincer & Shaver, 2007). The trigger of trauma is assumed to initiate the vicious circle of maladaptive coping, increased stress level, and preoccupation with stress as a result; in other words, trauma hyperactivates the attachment system, and individuals might not be problem-focused and not capable to utilize ways to deal with PTSD.

Lastly, those who are high in attachment anxiety either could be unable to receive support or they could misinterpret the extent of the received support by becoming preoccupied with social support resources and feel themselves abandoned while dealing with PTSD. Anxious-ambivalent individuals over-emphasize their deficiencies and imperfections, and they continuously seek others' approval and support, which is usually never perceived as sufficient by anxiously attached individuals (Lopez & Brennan, 2000). In the literature, low self-esteem in patients with PTSD has been reported previously (Bradley, Schwartz, & Kuslow, 2005; Lee, 2008). It has also been found to be a mediator between the traumatic event and PTSD symptoms (Bradley et al., 2005). Since I evaluated attachment style as a protective factor for PTSD, the negative view of self and the anxiety dimension of attachment were found to be the important precursors in terms of the persistent low self-esteem and more negative posttraumatic cognitions.

Individuals who have a negative view of self (e.g. those with an anxious attachment style) may engage more in negative appraisals about the traumatic event and may view themselves more negatively following this event. It is likely that interpersonal traumas such as abuse, rape, or assault lead to more negative self-related cognitions, and this influences individuals' self-esteem (Ozer et al., 2003). Therefore, in the structural model, self-esteem was taken into consideration at the same level as posttraumatic cognitions. The cross-sectional nature of the study eliminated the option of having self-esteem as a pretrauma factor. Consistent with the discussed literature, early traumas, high attachment anxiety

with negative view of self, having a low self-esteem and more negative cognitions may contribute to PTSD

***Mediation of self esteem and posttraumatic cognitions for PTSD.***

In the current model, the direct link between attachment anxiety and PTSD was not significant. Instead the effect of trauma was mediated by self-esteem and posttraumatic cognitions. In other words, the trauma was a stress cue activating the attachment system and, probably, intensified the individual's negative view of self and increased the negative cognitions about self and the world following the traumatic event. According to Bowlby (1980), internal working models serve as regulatory mechanisms and function according to previous experiences in appraising and managing negative emotions. Zimmerman (1999) suggested that the emotional dysregulation might also be derived from rigid appraisals of situations, intense sudden emotions, poor access to emotions, and lack of evaluation regarding the consequences of acts.

When all of these findings are put together, secure individuals are more likely to evaluate experience openly and confront themselves with the traumatic event. Individuals with secure attachment are characterized as flexible in how they use a variety of cues to interpret the event, which leads to more appropriate appraisals of emotions, and they can also benefit from using social support networks (Charuvastra & Cloitre, 2008). In line with these explanations, constructive thinking, reality-based processes, and appraisals were found to be associated with secure attachment (Lopez, 1996). During the Adult Attachment Interview (Kaplan, & Main, 1986, 1996), in which individuals are assessed according to their narrative responses with respect to their attachment relationship with parents, secure individuals are able to monitor their speech and coherently explain their experiences whilst recognizing their and others' mental states and different perspectives (Fonagy et al., 1996). This suggests that secure individuals might appraise the traumatic event as manageable and might have fewer negative posttraumatic cognitions and would have higher self-esteem to deal with the effects of stress. Furthermore, they might be able to call on support, share traumatic events with others, and make meaning out of traumatic experience by putting it into a narrative form, which is crucial for trauma processing (Brewin, 2003).

In this process, positive views of the self carried from past experiences would not be affected by the traumatic event and could shield against negative cognitions. On the other hand, insecurely attached trauma survivors, especially anxious-ambivalent individuals, are disadvantaged because they have a negative self view prior to the event. Their negative self-view and hyperactivating strategy to cope with stress make them vulnerable to have lower self esteem and suffer from negative posttraumatic cognitions. The finding that posttraumatic cognitions predict PTSD severity is in line with recent work on PTSD (Ehlers & Clark, 2000) and is also consistent with the theory of shattered assumptions related to self and the world suggested by Horowitz (1976, 1986) and Janoff-Bulman (1992). The current results are also similar to numerous studies in which PTSD severity was predicted by post-traumatic cognitions in different trauma samples such as rape survivors (Foa & Rauch, 2004), accident survivors (Beck et al., 2004; Karl et al., 2009), mixed samples (Startup et al., 2007), and non-clinical university students (Moser, Hajcak, Simons, & Foa, 2007).

In the current study, self-esteem and negative posttraumatic cognitions were associated with PTSD symptom severity, which emphasizes the importance of self-view and cognitions in the maintenance of PTSD. In treatment, it might be important to intervene in these two aspects and help individuals to resolve some issues with self-esteem and negative posttraumatic cognitions. Further inspection of research into posttraumatic cognitions as a predictor revealed that, across studies, the most consistent predictor was the self-related negative cognitions subscale of PTCI (Foa et al., 1999; Karl et al., 2009; Startup et al., 2007). As a result, those who are low in self-esteem and high in negative self-related posttraumatic cognitions are likely to have more psychological problems following the traumatic event.

Recently, it was found that theory driven predictors, which aim to reveal processes of traumatic stress such as cognitive variables, are better predictors than meta-analysis predictors for PTSD and depression in the aftermath of trauma (Ehring et al., 2008; Kleim et al., 2007). Therefore, the structural model was formed according to the cognitive model of Ehlers and Clark (2000) and specifically emphasized the importance of attachment as an emotion regulation mechanism as suggested by Mikulincer and Shaver (2007), as well as the importance of self-view subsequent to adverse life events. The present study

considered traumatic events as a stress cue for the attachment system, which would activate emotion regulation strategies. These findings suggest that aetiological approaches to PTSD may benefit from the incorporation of attachment and stress regulation models into Ehlers and Clark (2000) model. One of the most important aims of clinical psychology is to find out mediators for PTSD to intervene the processing of trauma and to ease the suffering period of trauma survivors. Therefore, the current model of PTSD would enable us to formulate PTSD by applying attachment theory.

Specifically, attachment anxiety was associated with PTSD, and it has an impact on posttraumatic cognitions and self-esteem, which contribute to PTSD in the structural model. Inspection of the structural model displayed the attachment anxiety as a driving source that shapes a negative view of self leading to a lower self-esteem, and this association related to more negative posttraumatic cognitions and then to PTSD. Posttraumatic cognitions and self-esteem in the current study mediated the association between attachment anxiety and PTSD symptom severity. This would be a reference point for further investigation with respect to negative view of self. Furthermore, the hyperactivation of an attachment system as a maladaptive emotion regulation mechanism for those who are high on attachment anxiety has helped to exemplify the basic underpinning of trauma vulnerability. In the following section, the structural model for PTG will be discussed in the light of PTSD model findings and associations.

### **Discussion of the PTG model.**

The present study was not only novel for incorporating the attachment stress regulatory mechanism to explain the severity of PTSD, but also to examine PTG in relation to Ehlers and Clark's (2001) model. In many studies, PTSD and PTG were associated and co-exist (Lev-Wiesel & Amir, 2003; Morrill et al., 2007; Petrzak et al., 2010; Powell et al., 2003). Since finding positive meaning is a continuum rather than a finished process, in the current sample, it was expected to find similar co-occurrence with respect to traumatic stress and growth. Therefore, the PTG structural model was developed as an extension to the PTSD model to reveal the factors that contribute to PTG.

### ***Posttraumatic growth and associated paths.***

Initially, correlations with PTG showed that early traumatic events, attachment avoidance, and PTSD were all significantly associated with growth.

Therefore, direct and indirect paths from early trauma, attachment avoidance, and PTSD were tested in the extended model. The only significant path in the PTG model was the direct path between attachment avoidance and PTG, the association was negative, and the direct path from PTSD to the association was positive.

According to posttraumatic growth theory, PTG is both a cognitive process of change that starts with coping and an outcome from processing the traumatic event (Tedeschi et al., 1998). The trauma coping necessarily occurs as a result of the traumatic event to adjust to the new conditions and to assimilate the trauma-related information. During this process, individuals may engage in re-framing the traumatic event positively while they are accommodating the new trauma information (Joseph & Linley, 2008). In support of this idea, PTG has been associated with more uses of positive re-interpretation (Widows, Jacobsen, Booth-Jones, & Fields, 2005) and acceptance (Linley & Joseph, 2006). Following a traumatic event, individuals may want to view the traumatic event as less destructive by finding positive meaning in it. This may be an attempt to alleviate their psychological disturbance. In our study, the finding that PTG was predicted by PTSD needs further explanation.

In their review, Zoellner and Maercker (2006) suggested that PTG may have two components. In the illusionary component, individuals reported more growth as a defense and as a way of coping with the traumatic event. Moreover, in reviews, there are contradictory results regarding the association between posttrauma psychological problems and PTG (Linley & Joseph, 2004; Zoellner & Maercker, 2007). This may indicate either that the illusionary component of PTG exists in the reports of trauma survivors or that it may reflect the process of growth that can take place concurrently with PTSD and other psychological problems.

The positive transformation in posttraumatic growth theory is what remains from the positive re-framing of the event and the amount of change that occurs in the survivors' lives. In the constructive component, individuals are enabled to re-evaluate the traumatic event and find a positive meaning while reflecting on positive changes in their lives as well as changing their priorities and engaging in more social interactions with significant others. In other words, they change their lifestyle. The only study that taps the problem of the real and

illusionary sides of PTG was measuring perceived PTG and actual PTG by changing PTGI items into state items with a 6-month follow up (Frazier et al., 2009).

The results of this study have showed that perceived growth was related higher distress level, and actual growth was associated with decreased stress. In other words, the published version of the PTGI was not sufficient for measuring the actual growth, and the relationship between actual and perceived growth was small (Frazier et al., 2009). However, the PTGI has been used very widely to measure positive transformation following a traumatic event, and the mixed findings reported in the literature may be explained by this methodological and conceptual discussion controversy. Frazier and colleagues' (2009) study is novel in terms of making the differentiation between perceived and actual growth, but requires further replications, especially in clinical samples, to disentangle the problem in the literature.

In the current study, individuals who reported positive change following the traumatic event were those who were low in attachment avoidance. Since attachment avoidance is associated with a negative view of others, it is not likely that those who are high on attachment avoidance to report positive changes in relationships or feeling closer to others. The only study that shows a positive association between insecure attachment and PTG (Dekel, 2007) indicated an association between attachment anxiety and PTG, which might be reflecting the illusionary side of PTG, whereas the positive association between secure attachment and PTG might reflect the real long lasting positive transformation (Salo et al., 2005). Since there are no studies that measure pretrauma resilience to stress and that measure PTG following a traumatic event, it is difficult to make conclusions related to stress-resilience, secure attachment, and PTG. Nevertheless the avoidant ones might be more reserved in terms of dealing with a traumatic event and may not be willing to cope with the effects of a trauma or to find positive meaning in the aftermath. The lack of association between the anxiety dimension of attachment and PTG could be interesting at first instance, when Dekel's (2007) study suggests a link between attachment anxiety and post-traumatic growth. However, the impact of attachment anxiety shows itself by affecting traumatic stress via decreased self-esteem and negative posttraumatic cognitions. Attachment anxiety through negative self-view and posttraumatic

cognitions had an effect on PTG via PTSD. In other words, attachment anxiety has an effect on PTG via PTSD, and attachment avoidance has a direct effect on PTG.

### **Limitations**

The study has several limitations. First of all, this study did not recruit a clinical sample, but rather a sample of university students, which may limit the generalizability of the findings in several ways. First, although all participants fulfilled criterion A of the *DSM-IV* criteria for trauma, there were only 80 participants who met criteria for sub-syndromal or full PTSD. This precluded testing the validity of the model in the symptomatic subsample. Second, including a university student sample into research about attachment may warrant some caution because the time of university signifies a stressful transition to adulthood and may entail some difficulties in establishing new relationships. However, since four relationships (i.e., that with mother, father, peer, and romantic partner) were taken into consideration to assess attachment anxiety and attachment avoidance, the results of the attachment dimensions that were measured are very likely to reflect the participants' general tendency regarding their relationship dynamics.

The second limitation involves the data collection method. The participants in the study answered the questionnaires online. One of the advantages of this procedure is that it obtains large sample sizes, but the experimenter has no control over how participants filled in the questionnaire. There are also missing answers, erroneous data, and double registrations, which are common problems in online surveys (Brinbaum, 2000; Reips, 2002). However, to measure complex structural models as in the present study, it is crucial to reach enough statistical power by recruiting a large number of individuals (Byrne, 2009).

A third limitation is that this study adopted a cross-sectional design. This included the retrospective assessment, but I cannot rule out the possibility that trauma and related coping influenced how participants reported their pre-trauma experiences (i.e., memory bias, mood congruency of recall). Also, the sample consisted of people who had experienced a variety of traumatic events at different time points with different levels of impact. Since there are many ways to categorize the data, and there were not many PTSD or sub-syndromal PTSD in

the current study individuals included regardless of their trauma type, trauma duration, multiple traumas and time passed from traumatic event. These factors limited my ability to make causal conclusions about the influence of attachment as a way of coping. It would be useful to check attachment and coping at different periods prior to and following trauma in longitudinal studies, which would enhance our understanding of the ways in which emotion regulation strategies in insecurely attached individuals contribute to acute and persistent PTSD.

The fourth limitation of the current study is related to the assessment of attachment via a self-report questionnaire. The use of a self-report measure for measuring attachment has been criticized because self-report measures do not tap unconscious processes and mostly focus on intimate relationships to formulate attachment dimensions and attachment styles (see Mikulincer & Shaver, 2007, p. 107). However, researchers who administer interviews emphasize the importance of early experiences with parents and unconscious processes that could only be revealed during interviews. Since the aim of the current project was to recruit a reasonably sized sample of trauma survivors in order to test structural models for PTSD and PTG, self-report questionnaires (Fraley et al., 2006) were administered rather than the Adult Attachment Interview (George et al., 1986, 1996).

There is an ongoing debate on self-report and narrative evaluation of attachment (for review see Mikulincer & Shaver, 2007, pp. 107-115). Most clinical studies in the literature administer the Adult Attachment Interview (George et al., 1986, 1996) to determine attachment styles. This interview requires highly trained experts and involves a time commitment of approximately 4-6 hours per participant, including transcribing and coding. Also, it gives a categorization rather than a dimensional score. In the present study, dimensional scores rather than attachment classification attachment dimensions were of interest. Since the primary objective of the study is to integrate the emotion regulation element of attachment, as stated in Mikulincer and Shaver's model (2007), into Ehler and Clark's (2001) PTSD model, the primary focus was the hyperactivating, and deactivating strategies. Therefore, attachment dimensions were used as in their models and evaluated accordingly.

This may have contributed to the unexpectedly high correlation between attachment anxiety and attachment avoidance, which are two dimensions that are

conceptualized as independent emotion regulation strategies in current attachment theories (Fraley et al., 2006). These two constructs are not collinear and are supposed to measure the different dimensions of insecure attachment, and the measure I used had good statistical properties in previous research (Fraley et al., 2006). In our sample, the Cronbach's alpha values of the attachment scale (Fraley et al., 2006) varied between .85 and .92, therefore indicating that the measure for attachment dimensions in four relationships were reliable and in line with the reported psychometric properties of the scale. However, the attachment anxiety and attachment avoidance were highly correlated. Since they were two distinct dimensions, the high correlation was not expected.

Participants with high attachment anxiety and high attachment avoidance were expected to report more PTSD symptoms. Therefore, a series of regressions and slope analysis were conducted (see Appendix A). However, the slope analysis revealed that PTSD symptom clusters were basically associated with attachment anxiety. There were no interaction effects between the two attachment dimensions except for numbing symptoms, which is in the line of the studies that found association between avoidant attachment and somatisation (Kanninen et al., 2003; Mikulincer et al., 1993). In other words, individuals who have both negative view of self and negative view of others (fearful individuals) did not report more PTSD symptoms in the current study. Specifically, with negative view of self, the anxiety dimension of attachment was the only important factor with respect to attachment in the present study. The link between the avoidance dimension of attachment and avoidance symptoms was only supported for avoidance symptoms in the present study's preliminary analysis. The ones who have an avoidant attachment style may be likely to avoid and repress the traumatic event. But avoiding the traumatic event may not necessarily be a way to deal with traumatic events, and unconsciously, their bodies may react to the effects of the traumatic event as Mikulincer and colleagues (1993) suggested.

The final limitation of the study is related to the SEM models and their statistical properties. The variables included in the structural model were theory driven. This approach is in line with recent research recommendations for PTSD, which suggested the superiority of theory-driven predictors based on cognitive models over data-driven predictors for PTSD (Ehring et al., 2008; Kleim et al., 2007). However, the structural model may elicit different results when data-driven

predictors such as gender, type of trauma, and relationship status are included. In the present study, the primary focus was to understand the link between the trajectories of attachment emotion regulation strategies and their influence on cognitions, which result in PTSD and PTG. Therefore, the structural models were determined by the theory.

My findings indicate that future work may include social support and coping styles into the theoretical model, and the measurement of the constructs (e.g., attachment) may be necessary, although I have carefully considered the possible link of the constructs based on theoretical and empirical literature. It is conceivable that the model fit of the models may be determined by sample characteristics and PTSD severity as well as by trauma type and trauma characteristics. However, due to the small sample size of the symptomatic subsample that was not possible. Therefore, the models considered in the study should be tested in a clinical, possibly treatment-seeking sample. In addition, there are number of critical factors shown to predict PTSD and PTG, such as perceived social support and coping styles (Joseph & Linley, 2005; Linley & Joseph, 2004), which may explain further variance if they had been assessed along with other variables. Changes in predictors and their relationships should also be assessed in longitudinal studies on PTSD and PTG with regard to attachment models.

### **Conclusion and Implications**

The present study was an initial attempt to test an extended version of Ehlers and Clark's (2000) model regarding pre-trauma factors contributing to PTSD with a particular focus on the role of attachment. In addition, the present study concentrated on both negative and positive changes in the aftermath of a traumatic event. The research provides useful information about vulnerability factors related to psychopathology after a traumatic event. It showed that individuals who have experienced early traumatic events; are high in attachment anxiety, have low self-esteem, and reported more negative post-trauma cognitions can be more vulnerable to PTSD. In response to subsequent trauma, attachment avoidance contributed to PTG negatively, whereas to PTSD positively. The impact of attachment anxiety and self-esteem were more prominent in PTSD and contributed to PTG via PTSD.

The role of insecure attachment and low self-esteem for PTSD may have important therapeutic implications. Overall, the models presented in this chapter provide information regarding the possible mediators for PTSD. Revealed mediators in for PTSD and PTG could help clinical psychologists and psychotherapists who work with trauma survivors by changing the negative view of self and posttraumatic cognitions. As a result, different intervention routes could be established with respect to different attachment styles and vulnerabilities carried from childhood experiences. Providing a secure base in the process of treatment and dealing with attachment-related problems while dealing with trauma-related problems actually may alter the individual's felt security as in the studies discussed before (Elkhit, 2009; Muller & Rosenkranz, 2009). The therapeutic process could offer a change in dealing with trauma-related problems as well as with attachment-related issues and could help individuals to face a traumatic event when a trusting and secure relationship between the therapist and trauma survivor could be established.

The variables tested in the present study should be included in assessment and formulation before decisions are made regarding the therapeutic interventions to be used with these individuals. Individuals who have these vulnerability factors may need to receive additional help aimed at strengthening those characteristics which may contribute to a good treatment outcome.

The current study had a large sample size and participants reported various traumatic experiences. It provides the evidence for Ehlers and Clark's (2000) cognitive model of PTSD and for integrating the attachment model of Mikulincer and Shaver (2007). In the next chapter, a bio-psychological approach on pretrauma factors will be evaluated with an experimental study.

## **CHAPTER 5: Impact of Secure Attachment and Oxytocin on Psychological and Physiological Reactions to Trauma Films**

The objective of this study is to learn more about the mechanisms of *how* protective factors may prevent the development of PTSD. It has been shown in chapters 2 and 4 that secure attachment can play a role in protecting an individual from developing PTSD symptoms but the mechanism behind this is not fully understood. Mikulincer and Shaver's (2007) and Maunder and Hunter's (2001) models both hypothesized that the anxiety and avoidance dimensions of attachment may produce maladaptive reactions to perceptions of stress, and this may contribute to ineffective emotion regulation strategies and coping.

Furthermore, there is a close functional link between the stress system and the biological affiliative system as presented in chapter 3. Therefore, oxytocin (OT) may play an important role in traumatic stress coping; OT may buffer one from stress and increase one's affiliative state after trauma. Taken together, this research suggests that manipulating one system (i.e., increasing the state of attachment security) has an effect on the other system (i.e., reducing the feeling of threat and reducing the sympathetic and HPA response).

In chapter 3, empirical evidence was reviewed and indicated that intranasal administration of OT increases affiliative behaviour (Domes, et al., 2007; Guestalla, et al., 2008; Kosfeld, et al., 2005) and reduces anxiety and physiological stress responses (Ditzen et al., 2008; Heinrichs, et al., 2003). This is in line with Porges' (1998) suggestion that the impact of traumatic stress may be buffered via OT. Furthermore, another important element for reduction of distress during and after an adverse event could be remembering secure attachment-related cues. There is evidence for a transient effect of attachment priming on PTSD symptoms and accessibility of trauma-related words (Miterany, 2004, cited in Mikulincer et al., 2006). In Miterany's (2004) study implicit trauma responses were measured by the Stroop colour-naming task in which participants were requested to name the colour of trauma-related words. In the first part of the study, it was shown that participants in the PTSD group took longer than those in the non-PTSD group to name the colours of trauma-related words. However, when participants received secure priming subliminally, their accessibility of trauma-related thoughts reduced as indicated by reaction times. The study

suggested that felt security due to secure priming might have a soothing effect on the negative effects of trauma. The impact of secure priming on negative effects of trauma has not been tested in an analogue trauma design with healthy participants; and this is the goal of the current study.

Based on the assumption that the effect of secure attachment priming might interact with the neuroendocrinological system, I suggest that OT might enhance the effect of security. In line with previous findings that OT enhances the effect of social support during a laboratory stress test (Heinrichs et al., 2008), I hypothesize that the combination of secure attachment priming and OT would reduce psychological (i.e., negative mood), and physiological responses (i.e., heart rate) to a trauma-related stressor. A way to test the combined effect of OT and secure attachment priming on reactions to stress is to manipulate stress in the laboratory in order to simulate trauma.

In the current study the trauma film paradigm in which participants watch stressful films to create the effect of trauma and their reactions and symptoms such as intrusions related to films are measured, (Holmes et al., 2004; Holmes & Bourne, 2007) was used in order to understand how nasally administered OT and secure attachment priming would alter the processing of a stressful event that has been designed to provide an analogue of trauma. The film has been shown to induce reliably transient PTSD-like symptoms in the form of intrusions (Holmes & Bourne, 2007). In the present study, both psychological and physiological outcomes were taken into consideration and trauma processing was evaluated. Intrusions, which are characteristic symptoms following traumatic events, were measured across a number of days after the experimental manipulations in order to understand the effects of combining secure attachment priming and OT on trauma-related symptoms.

I hypothesized that individuals in the secure attachment priming condition would have more feelings of security, higher positive affect and happiness scores, and less negative affect, less arousal, fewer intrusions and lower heart rate following the trauma film clips compared to those in the neutral priming condition. I also hypothesized that individuals in the OT group would similarly have more feelings of security and would have higher scores in positive affect and happiness, and less negative affect, less arousal, less intrusions and lower heart rate following the trauma film clips compared to those in the placebo group. In

addition, individuals who received both secure attachment priming and OT would have increased felt security, and would report less negative affect, less arousal, fewer intrusions, lower heart rate, more happiness and more positive affect than the other groups (i.e., placebo and neutral priming, placebo and secure priming, OT and neutral priming groups).

## **Method**

### **Participants**

One hundred undergraduate and post-graduate students from University of Southampton participated in the study in exchange for course credits or a £10 payment. Participants were recruited via flyers around the university campus. Participants were included unless they had any health conditions that would preclude administering OT or completing the measurements (e.g., asthma, breast-feeding, severe skin allergies, possible pregnancy, hormonal abnormalities or any serious diseases). For exclusion criteria determined according to the studies summarized in Heinrichs and Domes (2008) review. In addition, possible participants who experienced a severe traumatic event were excluded. The inclusion criteria were being a native speaker and having competence in English, and being over the age of 18. For ethical approval, there was a three-month extra waiting period to initiate the study due to late response from Research Governance, University of Southampton and evaluation of the study by ethics committee of National Health services for approval. The whole data recruitment took 9 months. All participants gave written informed consent before participating and the study was approved by the Southampton SW Hampshire Research Ethics Committee A (See Appendix D). One of the participants did not receive the priming during the experiment by mistake and there were three outlier cases for the negative mood measure (. Therefore, these cases were excluded from the analysis and there remained 96 participants for the psychological analysis. The participants' ages varied from 18 to 32 ( $M = 21.25$ ,  $SD = 3.33$ ), and 29% of the participants were male, and 71% were female. Due to data recording problems with the heart-rate measure, one of the participant's data could not be analyzed, so the heart-rate measurement was done with 95 participants. When heart-rate measurements were checked for outliers, six outliers were determined and eliminated. Eighty-nine participants remained for the heart-rate analysis.

## **Materials**

### ***Questionnaires.***

#### *Demographics.*

Participants answered questions about gender, age, occupational status, education level. All questionnaires of the study could be found in Appendix F.

#### *Attachment style*

The *Relationship Structures Questionnaire (RSQ ; Fraley et al., 2006b)* consists of 40 questions that were derived from the ECR-R (Fraley et al., 2000 cited in Fraley et al., 2006b) to assess two attachment dimensions in four different relational contexts: mother, father, romantic partner, and best friend (Fraley et al., 2006b). This scale was also used in the first study of the PhD. The scale allows the researcher to create a composite index of global attachment scores regarding the anxiety and avoidance dimensions by taking the means of the attachment anxiety and the attachment avoidance subscales from different relationships. The participants responded to its items on a 7-point Likert-type scale 1 (strongly disagree) and 7 (strongly agree). The alpha coefficients for both the anxiety and the avoidance scales were greater than or equal to 0.89 in Fraley and colleagues' (2006b) study. The Cronbach's alphas for the subscales varied from 0.76 to 0.91 in the present study.

#### *Anxiety*

The *State and Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)* includes separate scales for state and trait anxiety. State anxiety (S-Anxiety) measures the transitory emotional state of anxiety, whereas trait anxiety (T-Anxiety) measures stable individual differences in anxiety proneness. Each subscale consists of 20 items and each item is scored on a 4-point Likert scale (Spielberger et., 1983). The trait anxiety scale has a .90 and state anxiety scale has a .93 alpha score for reliability and Test-retest coefficients ranged from .73 to .86 and .16 to .62 for scores on the trait and state scales, respectively (Spielberger et al., 1983). The Cronbach's alphas for the subscales varied from .74 to .80 for the present study.

#### *Felt security*

The Felt Security Scale consists of four subscales, namely, love, care, feeling safe and self-esteem (Luke, Carnelley, & Sedikides, 2008). There are four statements for each subscale, and participants can rate their feelings on a scale ranging from 1

(not at all) to 6 (very much). The subscales were averaged to obtain the total score. The Cronbach's alphas for the scale varied from .78 and .91 in the current study.

#### *Happiness and arousal ratings*

The Self-Assessment Manikin (SAM) is a non-verbal pictorial assessment tool that measures pleasure, arousal and dominance (Bradley & Lang, 1994). For the current study, pleasure assessment pictures were used to assess happiness and arousal pictures were used to measure the arousal level of participants. Participants could put a cross on the Manikins or in between Manikins to indicate their happiness and arousal levels which gave a score between 1 (calm) to 9 (aroused) and between 1 (sad) to 9 (happy).

#### *Negative and positive mood*

The 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) comprises two mood scales measuring positive affect and negative affect. Each item is rated on a 5-point scale ranging from 1 (very slightly) or (not at all) to 5 (extremely). Watson, Clark and Tellegen (1988) reported that Cronbach's alpha coefficients were ranging from .88 for Positive Affect and .87 for Negative Affect. The Cronbach's alphas for the scales varied from .71 and .83.

#### *Trauma Film Ratings*

Trauma film ratings consist of four questions: attention, distress, personal relevance and perspective taking. Participants were asked to indicate how much attention they paid to the films on a 0 (not at all) to 10 (total attention) Likert-type scale. In addition, they were asked to indicate how distressing the movies were and how personally relevant the movies were on a 0 (not at all) to 10 (extremely) rating scale. They also rated what perspective they took while watching the movies using a scale for which -3 (entirely looking out through my own eye) to 3 (entirely observing myself from an external point of view).

#### *Early traumatic events*

The early trauma inventory self-report short form-ETISR-SF inventory screens participants' trauma history before the age of 18 (Bremner et al., 2007). It has four parts assessing general traumas (e.g., Did you ever suffer a serious personal injury or illness? Did you ever experience the death or serious injury of a friend? Did anyone in your family ever suffer from mental or psychiatric illness or have a "breakdown"?), physical punishment (e.g., Were you ever slapped in the face with an open hand? Were you ever burned with hot water, a cigarette or

something else? Were you ever pushed or shoved?), emotional abuse (e.g., Were you often ignored or made to feel that you didn't count? Were you often told you were no good? Did your parents or caretakers often fail to understand you or your needs?), and sexual events (e.g. Did you ever experience someone rubbing their genitals against you? Did anyone ever have genital sex with you against your will? Were you ever forced or coerced to perform oral sex on someone against your will?). The participant wrote "yes" or "no" next to the traumatic events listed. "Yes" responses were scored as 1 and totalled scores were used in the analysis.

#### *Depression, anxiety and stress*

Depression anxiety and stress scales (DASS-21) assess the presence of depression, anxiety, and stress (Henry & Crawford, 2005). It consists of three 7-item self-report scales: depression, anxiety, and stress. The items assess the extent to which each state has been experienced over the past week. Four-point Likert-type scales were used as an answer format 0 (did not apply to me at all), 3 (applied to me very much or most of the time). The alpha coefficient of the scales varies from .82 to .90. DASS was found to be correlated with Positive and Negative Affect Scales (PANAS;  $r_s = 0.69, 0.40, p < .01$ ). The Cronbach's alphas of the subscales varied from .70 to .75 in the present study

#### *Films*

There were three film clips used in the experimental procedure. The first film clip was 2 minutes of a 6-minute short movie *The Big Shave* (1967) in which a man cuts his face many times. The second movie clip was *The Faster the Speed, The Bigger the Mess* (2007), an Irish road safety advertisement that shows a man speeding and crushing a man while he was hugging his girl-friend. The last movie clip, *Orthopaedic Management of Compound Wounds* (2006) includes graphic images of skin and bone while they are being cleaned. Due to the typical short duration of priming effects, the normal trauma film procedure was reduced and only three short movies were included. The three most distressing film clips were chosen among 11 movies which were used in Holmes et al. (2004) according to the distress ratings of 2 male and 1 female students.

#### *Heart-rate measure*

Heart rates were determined from continuously recorded electrocardiogram (ECG; Coulbourn Bioamplifier, V76-24 channel integrator and V75-04, ECG,

LabLinc). ECG digitised at a sampling rate of 1000 Hz using the following filter settings: time constant =10, gain = 1000 and high frequency cut-off =150Hz. ECG was recorded using custom-made software (BioReader, Jones, 2008) and further processed with the help of related custom-made software (BioAnalyzer, Jones, 2009). The heart rate determination in beats per minute was based on a semi-automatic R-wave detection algorithm second by second according to the following formula:  $HR = (1/\text{interbeat interval}) \times 60000 \text{ ms}$ . For priming, mean heart rates were determined from 1 to 10 minutes post priming starting in 1-minute segments. One minute prior to the prime was taken as baseline. For the film, heart rates were averaged for 1 minute prior to film start and measured for each film in 1-minute segments.

### ***Oxytocin administration***

Participants received a single dose of 24IU OT (Syntocinon-Spray, Novartis, Basel, Switzerland) or a placebo intranasally. The spray was given to participants at the beginning of the experiment, and they were asked to spray 3 times in each nostril (for methodology see Heinrichs, 2000). OT starts to show its effect following 30- 45 minutes from administration (Heinrichs, 2000). Thirty minutes passed while attaching the electrodes and before distributing the questionnaire packs.

### ***Priming***

In the secure attachment priming (Carnelley & Rowe, 2007) condition, individuals were asked to choose a significant other with whom they have experienced a representative secure relationship and they were asked to think of an occasion in which they faced a problematic situation and received help from the person whom they found responsive and sensitive. They were asked to think about and write a scenario for 10 minutes. For neutral priming, individuals were asked to write about their experience at a supermarket and shopping (adapted from Mikulincer & Shaver, 2001).

### ***Intrusion diary***

The intrusion diary includes seven boxes one for each day, and it was divided into three sections for morning, afternoon and evening, in which participants were instructed to write their intrusions (i.e., when they enter a bathroom and remember the scene of shaving man): images, thoughts, and image and thought combinations related to the 3 movie clips they watched in the experiment (Holmes et al., 2004).

### Procedure

Data collection was completed at three time points (see Figure 2.9). After the screening procedure for the exclusion and inclusion criteria, participants were given a pack of questionnaires including: a demographic form; state and trait anxiety questionnaire (STAI-S and STAI-T); and an attachment questionnaire (RSQ) to be filled in at home. In the first session, an appointment was determined and participants were asked not to drink alcohol for 2 days before the experiment, not to smoke, not to drink coffee or tea on the day of experiment and not to eat or drink anything (except for water) for at least 2 hours before the experiment. Before the second appointment, participants were reminded of the requirements (i.e., not drinking alcohol for at least 2 days before the experiment, not eating or drinking 2 hours before the experiment except for water, not drinking tea, coffee or any caffeine-contained drink, not smoking on the day of experiment) a couple of days before the experiment and the appointment dates were confirmed via e-mail. The time between the two appointments varied between 2 days to 20 days.

At the second appointment, participants returned the completed questionnaires and were then assigned to one of the following four-groups: OT and secure priming, OT and neutral priming; placebo and secure priming, or placebo and neutral priming. Each group included 25 participants and a double-blind between-subjects design was used. At the beginning of the experiment, participants received either 3 puffs of 24IU OT intranasal (Syntocinon spray, Novartis, Basel, Switzerland) or a placebo. Then, the experimenter attached electrodes for the physiological measurements. After a 30-minute interval from the administration of the spray, participants were given the instructions for the questionnaires and the movies. Then the experimenter left the room to monitor the participant's physiological responses from an observation room. After OT or placebo administration, participants answered a pack of mood and arousal checklists including the Self-Assessment Manikin (Bradley & Lang, 1994), the Felt Security Scale (Luke, et al., 2008), and the Positive and Negative Affect Scale (PANAS) (Watson, et al., 1998). In the second pack, they either received the secure attachment priming or the neutral priming instructions. Before and after priming, participant pressed a key on the keyboard to indicate the start and end of priming. Following the priming, participants filled in the same questionnaires as in the first pack. After that, participants pressed a key on the keyboard to view 3

short movie clips which took 5 minutes. Following the movie clips, they pressed a key on the keyboard to indicate the end of the films and answered the film ratings questions, the mood questionnaires, the early trauma scale (ETISR-SF) and the depression, anxiety and stress scale (DASS-21). Participants were monitored and recorded for their heart-rate changes.

At the end of the experiment, an intrusion diary was given to participants to keep for a week and a final appointment was made to collect the diary. A few days before the appointment, participants were reminded of the appointment. On the day of collection of the diaries, £10 payment or 10 course credits were given. Then participants were debriefed and thanked.

## **Results**

### **Analytic strategy**

The data was checked for outliers before conducting any further analysis. There were three cases that were both multivariate and univariate outliers according to Tabachnick and Fidel (2001). One of the participants was also discarded from the analysis due to an error that occurred during the priming procedure and therefore the analysis was conducted with 96 people. For the heart-rate analysis, 89 of the participants were tested following screening for multivariate and univariate outliers according to Tabachnick and Fidel (2001).

In order to rule out any pre-experimental group differences in trait anxiety, early traumas, depression, stress, attachment avoidance and attachment anxiety were checked before the experimental procedure. The female and male proportion in the groups were not equal,  $\chi^2 = 0.515$ ,  $p < .05$ , and therefore gender was entered as third between group variable for each analysis. In addition, film ratings for attention paid to the films, distress after the films, personal relevance of the films, and perspective taking during the films were assessed. A 2 (secure priming vs. neutral priming) X 2 (OT vs. placebo) X 2 (males vs. females) ANOVA between-subjects design was used for all outcome measures except for heart rate, film ratings, and intrusions. For insignificant gender effect in ANOVAs conducted see Appendix B. In addition to ANOVAs, to test for the possible moderating effects of the attachment dimension on priming and OT, a series of regressions and simple slope tests were conducted for felt security, negative mood, positive mood, happiness and arousal according to Aiken and West (1991) and Frazier, Tix and Baron (2004).

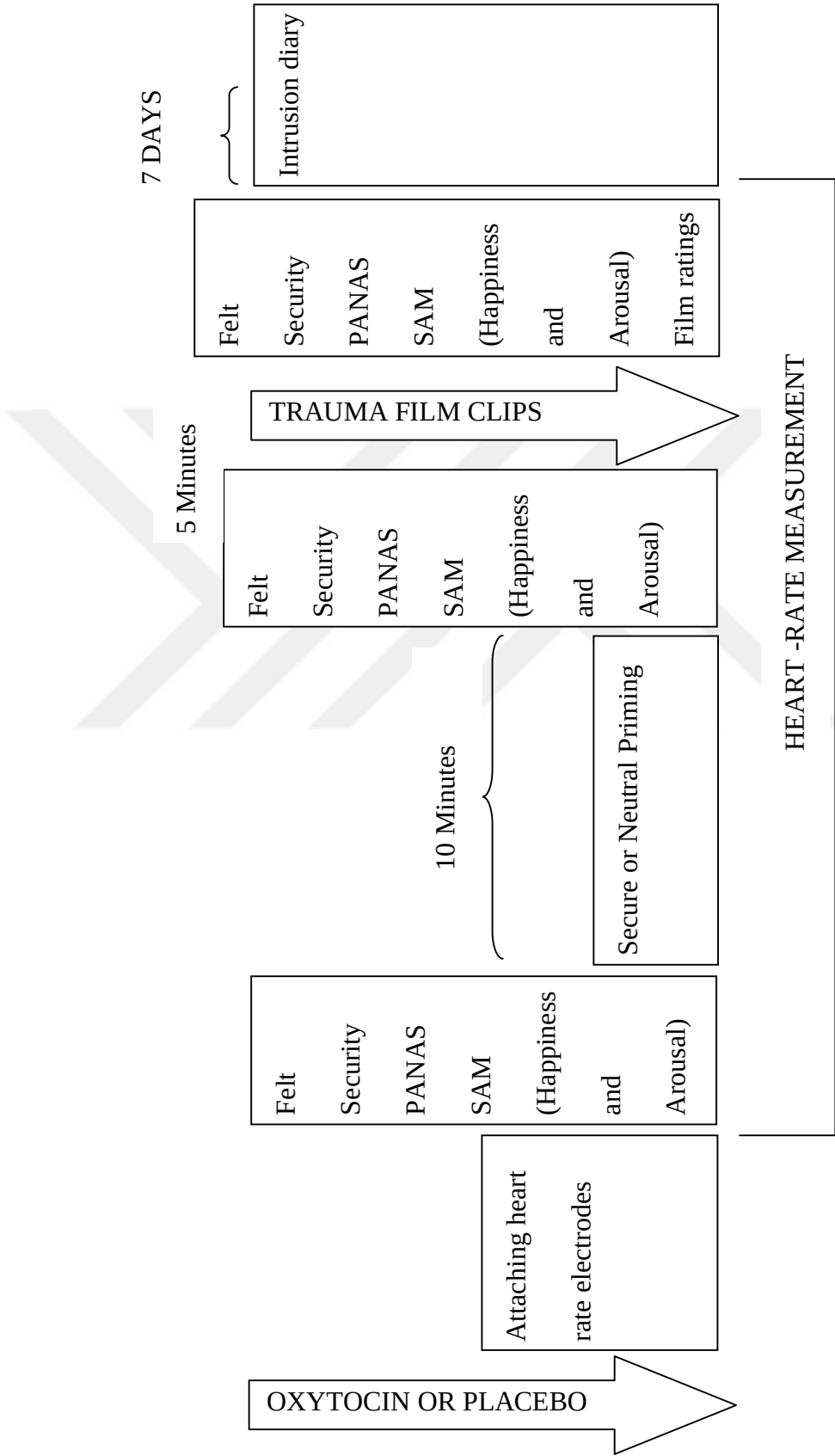


Figure 2.9 Experimental procedure diagram

For heart rate assessment, means of every minute in the experimental procedure were calculated. Then the one-minute duration before priming was taken as a covariate for heart-rate priming and for trauma film heart-rate. For priming and trauma film heart-rate analysis a 2 (secure priming vs. neutral priming) X 2 (OT vs. placebo) X 2 (males vs. females) ANOVA between-subjects design and for film clips and a 2 (secure priming vs. neutral priming) X 2 (OT vs. placebo) X 2 (males vs. females) ANOVA between-subjects design were used. In heart rate analyses, I controlled for the effect of baseline heart rate, 1 minute before the priming by assigning baseline heart-rate as a covariate in 2 (secure priming vs. neutral priming) X 2 (OT vs. placebo) X 2 (males vs. females) ANCOVAs conducted for priming heart rate and trauma film heart rate.

The sample size for the current study was based on the estimates of expected effect sizes for OT (Heinrichs et al., 2003) and secure attachment priming effects (Carnelley & Rowe, 2007; Rowe & Carnelley, 2003) and statistical power using standard procedures (determined using software G\*Power 3.0; Faul, Erdfelder, Lang, & Buchner, 2007).

The secure/neutral priming groups, OT/placebo groups and females/males did not differ in age, or in terms of depression, anxiety, stress, attachment anxiety, attachment avoidance, early traumas, trait and state anxiety. For mean, standard deviations and correlations between the variables see Tables 1.4 and 1.5 .

### ***The effect of priming, oxytocin and gender on felt security and mood***

#### ***Felt security***

Table 1.6 shows the degrees of freedom, F values, effect sizes and significance levels for felt security. There was a main effect of priming on felt security reports. Individuals in the secure prime condition reported significantly more felt security ( $M=4.32$ ) compared to those in the neutral prime condition ( $M=3.57$ ). There was a main effect of time; after the prime ( $M=4.26$ ) individuals reported significantly more felt security than after the film clips ( $M=3.42$ ), but not more than before the prime ( $M=4.28$ ). There was also a time by prime interaction. To consider the time by prime interaction, I examined the effect of prime at three time points; before the prime, after the prime and after the film clips. The simple effects tests showed that before priming, there was no group difference between the secure prime and the neutral prime group,  $F(1, 94) = 0.77, p > .05$ . After priming, individuals in the secure prime condition reported more felt-security than individuals in the neutral prime

condition, suggesting that the secure priming manipulation successfully induced feelings of security,  $F(1,94) = 33.87, p < .001$ . However, after the film clips there were no differences between the secure prime group and the neutral prime group,  $F(1,94) = 2.31, p > .05$ .

There was a 4-way interaction of time prime OT gender. Although some of the cell sizes were somewhat small, as an exploratory measure, I followed-up this 4-way interaction by examining the 3-way interaction of time by prime by OT for women and men, separately. The three way interactions for women,  $F(1, 64) = 0.14, p > .05$ , and for men,  $F(1, 24) = 0.84, p > .05$  were not significant.

### ***Negative mood***

Table 1.6 shows the degrees of freedom, F values, effect sizes and significance levels for negative mood. There was a marginally significant main effect of priming on negative mood. Individuals with secure priming reported less negative mood ( $M = 13.93$ ) than those who received neutral priming ( $M = 15.32$ ). There was no main effect of OT or gender on negative mood. However, there was an interaction effect of gender and of OT for negative mood. To consider the 2-way interaction, first I examined the effect of OT on negative mood for men by conducting a simple effects test. Men who received OT ( $M = 13.69$ ) and who received placebo ( $M = 16.13$ ) were not significantly different from each other in negative mood,  $F(1, 26) = 2.82, p = .10$ . Then I conducted a simple effects test for women and there was no significant difference between those who received OT ( $M = 14.38$ ) and placebo ( $M = 14.07$ ),  $F(1, 66) = 0.16, p > .05$ .

However, this two-way interaction was qualified by a three-way interaction between prime, OT and gender. In order to follow this up, I examined the two-way interaction of prime and OT for women and men, separately. The two-way interaction of prime and OT was significant for women,  $F(1, 64) = 5.88, p < .05$ . Therefore I conducted a simple effects test for women in the OT group and then for the placebo group. Women who received OT and the secure prime reported significantly less negative mood than women who received OT and the neutral prime ( $F(1, 31) = 9.80, p < .01$ ). However, a simple effects test showed that women in the placebo group with the secure prime ( $M = 14.04$ ) and with the neutral prime ( $M = 14.10$ ) did not differ significantly,  $F(1, 33) = 0.01, p > .05$ . The two-way interaction of prime and OT was not significant for men,  $F(1, 24) = 3.21, p > .05$ , (See Figure

3.1). Therefore, the security prime decreased negative mood for women on OT, but not for women on the placebo.

I found a significant 4-way interaction of time by prime by OT by gender for negative mood. In order to follow this up, I examined the 3-way interaction of time by prime by OT for women and men, separately. The 3-way interaction of time by prime by OT for women was significant  $F(1, 64) = 5.46, p < .05$ . Then I examined the 2-way interaction of time by prime for women in the placebo group which was not significant  $F(1, 33) = .01, p > .05$  and in OT group which was significant,  $F(1, 31) = 9.80, p < .01$ . To follow this up I conducted simple effects test by prime for each of the three time points with the following results: before prime,  $F(1, 33) = 11.12, p < .01$ , after prime,  $F(1, 33) = 8.77, p < .01$ , and after the film clips  $F(1, 33) = 3.24, p = .081$  (See Figure 3.1). The difference between secure prime and neutral prime group for females in OT remained same at before prime, after prime and marginally different at after film clips. The three way interaction of time by prime by OT for men was not statistically significant,  $F(1, 24) = .726, p > .05$ .

### ***Positive mood***

Table 1.7 shows the degrees of freedom, F values, effect sizes and significance levels for positive mood. In terms of positive mood, there were no between-subjects effects of priming, OT and gender. However, there was an effect of time. Individuals before priming reported significantly more positive mood ( $M=31.57$ ) compared to after priming ( $M=30.40$ ) and after the film clips ( $M=30.40$ ),  $F(2, 88) = 5.52, p < .05$ . Moreover, this effect of time was qualified by a time prime interaction and a time OT gender interaction.

In order to follow up the time by prime interaction, I conducted simple effect tests of prime at the three time-points: before the prime, after the prime and after the film clips. As expected, there was no difference between the secure prime ( $M = 30.74$ ) and the neutral prime ( $M = 31.95$ ) groups in positive mood reports before priming,  $F(1, 94) = 0.77, p > .05$ . However, contrary to expectations, there were also no differences between the secure prime group ( $M = 30.84$ ) and the neutral prime group ( $M = 29.65$ ) after priming ( $F(1, 94) = 0.62, p > .05$ ) or after the film clips (secure prime group ( $M = 26.72$ ) and neutral prime group ( $M = 28.00$ ),  $F(1, 94) = 0.84, p > .05$ ).

To follow up the time by OT by gender interaction, I examined the two-way interaction of OT and gender at each time-point: before prime, after prime and after

film clips, separately. There was no two-way interaction of OT and gender for before the prime,  $F(1, 94) = .01, p > .05$ , for after the prime  $F(1, 94) = 1.37, p > .05$ , and for after the film clips  $F(1, 94) = 0.88, p > .05$ .

### ***Arousal***

Table 1.7 shows the degrees of freedom, F values, effect sizes and significance levels for arousal. There were no main effects of prime or OT, but there was a main effect of gender on arousal. Women reported ( $M=4.82$ ) more arousal than men ( $M=3.90$ ). There was a prime by gender interaction effect. To follow this up, I conducted simple effect tests by prime for the women and men, separately. Women in the secure prime ( $M = 4.59$ ) and in the neutral prime ( $M = 4.97$ ) conditions did not differ in their arousal reports,  $F(1, 66) = 1.24, p > .05$ . However, men in the secure prime group ( $M = 4.50$ ) reported more arousal than the neutral prime group ( $M = 3.27$ ),  $F(1, 26) = 4.59, p < .05$ .

There was also a main effect of time. The arousal level of participants significantly increased after the film clips ( $M=5.32$ ) compared to before priming ( $M=3.80$ ) and after priming ( $M=3.96$ ),  $F(2, 88) = 21.55, p < .01$ . Individuals did not differ before prime and after prime in terms of their arousal levels.

### ***Happiness***

Table 1.8 shows the degrees of freedom, F values, effect sizes and significance levels. There was no main effect of gender and gender did not interact with the other variables for happiness, therefore, gender was eliminated from the analysis. There was a main effect of priming. Individuals who received secure attachment priming ( $M=6.60$ ) reported more happiness than those who received neutral priming ( $M=6.02$ ). There was no main effect of OT on happiness. There were effects of time and a time by prime interaction. Participants before priming ( $M=6.89$ ) were happier compared to after the film clips ( $M=5.02$ ), and participants were happier after priming ( $M=7.09$ ) compared to before priming,  $F(2, 88) = 79.57, p < .001$ .

To follow up the time by prime interaction, I conducted simple effects tests by prime for the three time-points: before the prime, after the prime and after the film clips, separately (see Figure 3.2). As expected, individuals in the secure prime ( $M = 7.12$ ) and neutral prime ( $M = 6.67$ ) conditions did not differ in happiness before the prime,  $F(1, 94) = 2.64, p > .05$ . Also consistent with hypotheses, participants in the secure prime ( $M = 7.66$ ) condition reported more happiness compared to those in the neutral prime ( $M = 6.53$ ) condition after priming,  $F(1, 94) = 11.25, p < .01$ .

However, contrary to hypotheses, individuals in the secure prime ( $M = 5.02$ ) and neutral prime ( $M = 5.01$ ) conditions did not differ significantly,  $F(1, 94) = 0.01, p > .05$ .

### ***Heart- rate***

To measure the effect of priming and OT on heart-rate during priming and the trauma films, I conducted a 2 (secure vs. neutral prime) X 2 (OT vs. placebo) X 2 (male vs. female) Analysis of Covariance (ANCOVA) with baseline heart rate (1 minute before priming) as the covariate for heart-rate during priming and during the trauma film, separately. For the details see Table 1.9 and Table 2.1. There were no significant main effects or interaction effects of prime, OT and gender for heart-rate during the priming and during the trauma films. There was a significant main effect of time on heart rate during the prime as depicted in Figure 3.3, and during the trauma films as demonstrated in Figure 3.4.

### ***The effect of priming, oxytocin and gender on the trauma film processing***

For trauma film ratings where gender was not significant, it was eliminated and the analyses were conducted without gender (See Table 2.2). Individuals who received a placebo ( $M=9.12$ ) reported that they paid more attention to the films compared to individuals who received OT ( $M=8.55$ ) after the films. Individuals who received secure attachment priming ( $M=6.82$ ) found the movies more distressing compared to those who received neutral priming ( $M=5.61$ ). There was a marginal effect of OT on distress. Individuals who received OT ( $M=5.71$ ) found the film clips marginally less distressing compared to those who receive the placebo ( $M=6.73$ ). Women ( $M=6.88$ ) found the film clips more distressing compared to men ( $M=5.56$ ) following the films. For details of the analysis see Table 2.2. There was a marginal effect of secure priming on personal relevance of film clips. Participants in the secure priming condition ( $M=3.65$ ) found films more personally relevant than participants in the neutral priming condition ( $M=3.52$ ). There was a marginal effect of OT on perspective taking. Individuals who received OT reported that they viewed the films from an external point of view ( $M=-0.41$ ) compared to those who received the placebo who reported that they viewed films through their own eyes ( $M=-1.16$ ).

### ***Effect of priming, oxytocin and gender on intrusions.***

There were no effects of priming, OT or gender on intrusions in the week following the experiment (see Table 2.3). There were also no significant interactions

between these variables. The only effect on intrusions was time. Individuals reported fewer intrusions as time passed (See Figure 3.5). When total one-week scores of the intrusion diary were examined, there were no effects of prime, OT or gender.

***Moderation effect of attachment dimensions on priming and on drug.***

To investigate the potential moderating effects of attachment anxiety and attachment avoidance on the effects of priming and OT, a series of regression analyses were conducted to predict felt-security, negative mood, positive mood, arousal, and happiness. The significant moderation effects were followed up with simple slope analyses.

Neither attachment anxiety nor attachment avoidance moderated the effect of priming (see Table 2.4) on felt security following priming ( $\Delta R^2=0.001$ ,  $p>.05$ ) and following the film clips ( $\Delta R^2=0.005$ ,  $p>.05$ ). Also neither attachment anxiety nor attachment avoidance moderated the effect of drug on felt security ( $\Delta R^2=0.01$ ,  $p>.05$ ) and after film clips ( $\Delta R^2=0.002$ ,  $p>.05$ ) on drug manipulation (See Table 2.5).

To know whether attachment anxiety and attachment avoidance moderated the effect of priming and the effect of drug on negative mood, a series of regressions were conducted. Both attachment anxiety and attachment avoidance moderated the priming effect on negative mood after priming ( $\Delta R^2=0.03$ ,  $p < .05$ ), as is depicted in Table 2.6. Then the effect of attachment anxiety was investigated in a simple slope test (see Figure 3.6), and it was found that participants with high attachment anxiety in the secure priming group reported less negative mood compared to those in the neutral priming group (*Simple slope*= 1.14, *Standard error* = 0.43,  $t = 2.62$ ,  $p < .05$ ). Attachment anxiety and attachment avoidance did not moderate the effect of priming on negative mood following the films ( $\Delta R^2 = 0.008$ ,  $p>.05$ ), as shown in Table 2.6.

After priming, there was a marginal moderating effect of attachment anxiety and attachment avoidance on OT for negative mood ( $\Delta R^2=0.02$ ,  $p = .06$ ; see Table 2.7). When simple slope tests were conducted for attachment anxiety and attachment avoidance, participants with high attachment anxiety in the OT group reported less negative mood after priming compared to those who were in the placebo group (*Simple slope* = -0.05, *Standard error* = 0.44,  $t = 1.96$ ,  $p=.05$ ; see Figure 3.7). Attachment anxiety did not moderate OT for the negative mood for participants with low attachment anxiety (*Simple slope* = 0.76, *Standard error* = 0.44,  $t = 1.63$ ,  $p > .05$ ). Simple slope tests for moderating effect of the attachment avoidance and OT was not significant for those who were high in attachment avoidance (*Simple slope* = 0.43 ,

*Standard error* = 0.34,  $t = 1.26$ ,  $p > .05$ ) and low in attachment avoidance (*Simple slope* = -0.54, *Standard error* = 0.35,  $t = 0.53$ ,  $p > .05$ ) after priming. The moderating effects of attachment anxiety and attachment avoidance were not significant after the film clips ( $\Delta R^2 = 0.01$ ,  $p > .05$ ; see Table 2.7).

For positive mood after priming and after the film clips, attachment anxiety and attachment avoidance did not moderate the effect of priming ( $\Delta R^2 = 0.005$ ,  $p > .05$ ), ( $\Delta R^2 = 0.02$ ,  $p > .05$ ; see Table 2.8 ). There was no moderating effect of attachment avoidance on OT for positive mood ( $\Delta R^2 = 0.009$ ,  $p > .05$ ) after priming (See Table 2.9). However, there was a moderating effect of attachment avoidance on OT for positive mood following the film clips ( $\Delta R^2 = 0.03$ ,  $p = .05$ ; see Table 2.9). When a simple slope test was conducted, participants with high attachment avoidance reported more positive mood in the OT group than in the placebo group (*Simple slope* = 2.18, *Standard error* = 0.44,  $t = 2.59$ ,  $p < .05$ ) following film clips. There was no moderation effect of attachment avoidance on OT for individuals with low attachment avoidance regarding positive mood (*Simple slope* = -0.96, *Standard error* = 0.87,  $t = 1.10$ ,  $p > .05$ ) (see Figure 3.8).

There were no moderating effects of attachment dimensions on priming ( $\Delta R^2 = 0.02$ ,  $p > .05$ ) during priming or during the film clips ( $\Delta R^2 = 0.02$ ,  $p > .05$ ) for arousal (see Tables 3.1). Also, attachment dimensions had no moderating effect on OT for arousal during priming ( $\Delta R^2 = 0.02$ ,  $p > .05$ ), as well as after the film clips ( $\Delta R^2 = 0.001$ ,  $p > .05$ ) (see Tables 3.2).

For happiness, there were no moderating effects of attachment dimensions on priming after the priming procedure ( $\Delta R^2 = 0.01$ ,  $p > .05$ ) or following the film clips ( $\Delta R^2 = 0.06$ ,  $p > .05$ ; see Table 3.3). However, there were moderating effects of attachment dimensions on OT during priming ( $\Delta R^2 = 0.07$ ,  $p < .01$ ) (see Table 3.4). When a simple slope test was conducted for testing if attachment anxiety moderated the effect of OT, those who were high on attachment anxiety and in the OT group reported more happiness compared to those in the placebo condition (*Simple slope* = 0.59, *Standard error* = 0.22,  $t = 2.63$ ,  $p < .01$ ) after priming. Those who were low in attachment anxiety reported less happiness if they were in the OT group (*Simple slope* = -0.60, *Standard error* = 0.21,  $t = -2.35$ ,  $p < .01$ ) compared to those in the placebo group (see Figure 3.9). When attachment avoidance was considered, individuals with low attachment avoidance and in the OT condition reported more happiness compared to those in the placebo condition (*Simple slope* = 0.58, *Standard*

$error = 0.24, t = 2.38, p < .05$ ) after priming (See Figure 4.1). Those who were high in attachment avoidance and in the OT group reported less happiness compared to those in the placebo condition during priming (*Simple slope* = -0.59, *Standard error* = 0.23,  $t = -2.51, p < .05$ ; See Figure 4.1). Moderation of attachment dimensions on OT for happiness scores during the film clips were not significant ( $\Delta R^2 = 0.01, p > .05$ ).

## **Discussion**

I will start the discussion by evaluating the effect of secure priming on felt-security, negative mood, arousal, happiness, and trauma film ratings. Then I will focus on the effect of OT and its interaction with priming and gender on negative mood and positive mood as well as on trauma film ratings. I will cover the outcome measures of heart rate during priming and during the film clips, and finally intrusions. Later, I will explain the moderating effect of the attachment dimensions. In the last part, I will present possible implications of the current findings.

### **The effect of secure attachment priming on felt security, negative, positive mood, arousal and happiness**

In accordance with previous studies (Carnelley & Rowe, 2007; Rowe & Carnelley, 2003), in the present study, I hypothesized that secure attachment priming would increase felt security after priming, and this hypothesis was confirmed. However, the effect of the secure prime on felt-security did not continue till the end of films and it remained significant only after priming. The main contribution of the current finding on secure attachment priming shows that it is a robust and sufficient way of increasing feelings of felt security that involves self-esteem, love, care and feeling safe after the priming but not after the films.

It was further hypothesized that secure attachment priming would reduce negative mood following the priming procedure, which was not confirmed. Although individuals in the secure attachment priming condition reported less negative mood compared to the neutral priming condition, the 4-way interaction showed that there was a negative mood difference between the secure and neutral prime groups before the priming procedure. This difference remained after the prime and after the trauma films. This indicates OT and temporary activation of the secure prime did not specifically influenced participants' post-prime and post-film negative mood reports. The finding is important because the film ratings showed that the secure prime group found the movies more stressful and more personally relevant than the neutral prime

group and the effect of the secure prime and OT did not facilitate coping with stress after the films for females. Previous studies showed that OT can improve encoding and retention of positive social stimuli by activating social reward neural networks (Guastella, Mitchell, & Mathews, 2008; Hollander et al., 2007). Strathearn, Fonagy, Amico and Montague (2009), showed that mothers' brain regions associated with reward and pleasure become activated when they view their own children and their oxytocinergic regions become active. However, the current study showed that the temporary activation of security and the use of OT may not have had the same effect and activated the reward mechanism. It might be due to the use of trauma film which is a different stressor compared to what has been used in previous studies (Heinrichs & Domes, 2008). Therefore, the rewarding mechanism of the brain may not have been activated by the effect of OT due to films.

Moreover, neither secure priming nor OT had an effect on positive mood after priming or after the film clips. These findings were not in line with the hypotheses and happiness reports of participants. It was hypothesized that priming would increase the happiness reports and this was confirmed. Nevertheless, the effect of secure priming was not maintained when the trauma films were presented. The effect of the stressful film clips decreased the impact of secure attachment on happiness scores after the trauma films. The difference between the positive mood scale and happiness measure might be due to the composite score of the positive mood scale, which includes different positive emotions and states rather than specifically measuring happiness. The effect of priming might be valid for certain emotional states in the positive scale such as happy, joyful, but not for others such as proud, content. According to Gilbert, McEwan, Franks, Richter and Rockliff (2008), presenting a wide-range of positive emotions in a scale assumes that there is a single underlying affect regulation system for all positive emotions. However, some emotions may actually relate to a different affect regulation. Being happy or cheerful might be related to activation of reward circuit in brain and might be associated with different physiology such as dopaminergic and serotonergic systems, whereas being proud and content are slightly long-lasting emotional states. Therefore the difference between the positive mood and happiness after the films could be due to use of compound scale to measure positive mood.

There was no effect of priming on arousal scores, contrary to the hypothesis that the secure prime group would report less arousal after priming and trauma films

compared to the neutral prime group. Men in the secure prime group reported more arousal than men in the neutral prime group. However, this interaction effect of prime by gender was not qualified by time indicating that it did not make a difference to men's arousal levels.

I also hypothesized that the secure prime group would have lower heart rate both during the priming and the trauma films and combined effect of secure prime and OT would lead to decreased heart-rate post-prime and post-film. The secure priming and OT had no effect on arousal. This could explain why there was no change in heart rate after the prime and after the film clips. Secure priming did not affect heart-rate although it did not reduce negative mood and increase felt security. Heart rate only differed according to time: heart rates slightly increased in the middle of priming and then remained at similar levels until the end of priming. The heart rate changes during priming might be due to attention differences at different time points, and the rise of heart-rate at the end of priming could be related to an attention shift from focusing on a task. Even though there are studies which investigated the effect of attachment styles on physiological responses showing that secure attachment helps individuals to regulate stress physiologically (Carpenter & Kirkpatrick, 1996; Maunder & Hunter, 2001; Spangler & Grossman, 1993). Nevertheless, the effect of secure priming on heart rate responses has not yet been investigated. A longer priming procedure might decrease the heart-rate of the individuals which should be tested in future studies.

One of the main predictors for intrusions in Holmes et al.'s (2004) study was heart-rate changes during the trauma films. The absence of an effect of priming on arousal and heart rate after the priming and after the trauma films showed that secure priming had no effect on the encoding of the trauma films. In other words, increasing happiness and felt security as a result of the secure prime did not influence participants cognitive processing of the films. As a result, individuals who received secure priming did not differ from individuals who received neutral priming in terms of their intrusions.

Interestingly, the secure priming group found the movies more distressing compared to those who got neutral priming. The distress rating was an assessment regarding distress from all 3 film clips. However, the duration of the films and number of films showed in the procedure was less than the original procedure (Holmes et al., 2004; Stuart et al., 2006) and film ratings were not for individual

movies but for the total effect of the three films. The original trauma film set which includes 11 short films may induce more stress. In addition, in the current study the effect of each film has not been assessed for mood and trauma ratings except from heart-rate. Therefore, individuals' reactions to each film might be different. Nonetheless, individuals with secure priming may have had higher reports on film distress due to the second movie's content which showed an accident involving a couple and grief of parents and the lover. Secure primed individuals recalled attachment memories with their boyfriends or girlfriends. As the second movie involves loss of a loved one, people may have engaged in more empathetic feelings and may have found this movie more distressing which is why they might have rated the movies more personally relevant as well. The first and last film which involves disgusting scenes may not have the same effect of second movie which is more attachment related.

In summary, the effect of secure priming was sufficient to make a positive change on the felt-security and the happiness ratings after the prime but the combined effect of secure prime and OT did not change heart rate and intrusions. The secure priming group found the films more stressful and personally relevant. In the next section, I will review the results for the effect of OT on negative mood, positive mood, and happiness after the films.

### ***The effect of oxytocin***

In line with other studies that demonstrated the potential effects of nasally administered OT on enhancing affiliative (e.g., increasing trust) and reducing anxiety (Heinrichs & Domes, 2008), I hypothesized that the OT group would report less negative mood, lower arousal, and would report more felt-security, positive mood and happiness after priming, and after the films, compared to the placebo group. Moreover, I hypothesized there would be an interaction between OT and the secure prime for felt-security, negative and positive mood and happiness after the prime and after the films. I also hypothesized that OT would boost the effect of secure priming.

There was no main effect of OT on felt security or on any of the mood measures after prime and after films, contrary to the hypothesis. There are two past studies that focus on the effect of OT on felt-security. The first study was conducted among university students and used the same felt-security measure as in the present study (Theodoridou, personal communication, July 17, 2010). They found no effect of OT on felt security (Theodoridou, personal communication, July 17, 2010).

However, Bucheim and colleagues (2009) showed that nasal OT increased attachment security. Nonetheless, it is possible that methodological differences between their study and the current one may account for the difference. Bucheim et al.'s (2009) study is subject to criticisms regarding how they measured attachment and attachment security. The first concern is that they altered the measure of attachment style, i.e. the Adult Attachment Projective Picture System (AAP) without conducting any validation and reliability study. AAP is a projective method of assessing attachment, and individuals are expected to create stories for the ambiguous pictures so that attachment style assignment can be done with a special coding system. In the study, the researchers violated the nature of the projective test assessment technique by offering participants options under the pictures. After inserting these options, the projective method became a multiple-choice assessment. The second and more substantial concern is that the assessment of felt security (i.e., state attachment) was also conducted with the same measure. Attachment style and felt security are two different concepts. The former is the general pattern in specific relationships, whereas the latter is a changing construct according to the manipulation or state of individuals. Therefore, both require different measurement questions as used in other studies (Carnelley & Rowe, 2007; Rowe & Carnelley, 2003). Thus results of Bucheim and colleagues' (2009) study are questionable.

The priming manipulation consisted of recalling a memory with a secure attachment figure in which participants received social support; individuals were not forming a new relationship with someone and the actual presence of the social support figure was not in the room. Being present in the same place and having physical contact may actually facilitate the effect of OT by increasing plasma OT (Bick & Dozier, 2009). In one of the recent studies conducted with mothers, an examination of their urine OT levels indicated that interaction with other people's children increased mothers' OT more than interaction with their own children (Bick & Dozier, 2009). In the current study, plasma OT levels were not measured and it is hard to conclude whether secure priming would have been sufficient to increase plasma OT. Furthermore, in the study of Heinrichs and colleagues (2003), the effect of nasal administration of OT was less influential than the effect of social support when individuals were put through a social stress test and could receive social support in the preparation phase from their best friend. Still it is not known how plasma OT and nasal OT administration interact. In most studies on the effect of

nasal OT, researchers do not measure plasma OT and its effect on nasal administration of OT (Heinrichs & Domes, 2008).

In the present study, the body OT levels of participants were not measured or controlled for statistically. However, to eliminate the difference in terms of early adverse experiences and its negative effects on the oxytocinergic system (Fries et al., 2008; Heim et al., 2008), early traumatic events were assessed before the experimental procedure and participants in the different groups did not differ with respect to their number of early traumatic events.

The effect of OT might be influenced by the state anxiety of the participants in the present study. Tops, Van Peer, Korf, Wijers and Tucker (2007) reported that attachment could be a suppressor for the relationship between plasma OT and state anxiety. Tops, Van Peer, Korf, Wijers and Tucker (2007) gave cortisol pills to females and measured plasma OT levels in order to understand the relationship between plasma OT and state anxiety. They hypothesized a positive association between attachment and plasma OT and a negative association between attachment and state anxiety. However, they did not use an attachment scale, but instead used a subscale of temperament, Temperament and Character Inventory (TCI), which measures individual's likelihood to form bonding and attachment. The results showed that plasma OT and state anxiety were modulated by the attachment subscale score, which involves items related to sharing emotions and feelings with others. They found that the attachment subscale was positively associated with both plasma OT and state anxiety. When the attachment subscale score was included as a mediator in the relationship between OT and state anxiety, it cancelled out the negative association between OT and state anxiety. In other words, the attachment subscale mediated a negative association between OT and state anxiety indicating that it serves as a suppressor between OT and state anxiety. However, the attachment measure in Tops et al.'s (2007) study did not measure dispositional attachment. It basically measured the individuals' openness to bonding. In the current study exposure to stressful films may have changed individuals' OT levels as reported in Tops et al. (2007). As a result, both OT and placebo participants may have had plasma OT levels above a threshold leading to the nonsignificant effect of nasal OT on mood measures, heart-rate and intrusions. In other words, nasal administration of OT may not have shown its effects because individuals' plasma OT levels were already high and an additional contribution of nasal OT could not make the

difference in reports of arousal and heart rate as well as intrusions after trauma films. It is important to measure plasma level of OT, effect of stress on OT and to reveal how attachment style rather than individual's openness to bonding alters this relationship.

Intrusions following trauma films decreased only as time passed. The hypotheses regarding the influence of OT on heart-rate and intrusions were not confirmed. It seems that both the effects of secure priming and of OT did not contribute to the encoding of the trauma films. Nonetheless, it is important to emphasize that these results came from an experimental manipulation of trauma and temporary activation of secure attachment, whereas for trauma survivors the effects of secure priming and OT might be more influential. Social support is a key determinant for coping with traumatic stress (Ozer et al., 2003), therefore activation of secure attachment might be beneficial for trauma survivors. The current findings on the effect of OT on negative mood is not consistent with the anxiolytic effects of OT in different studies (Gordon, Zagoory-Sharon, Schneiderman, Leckman, Weller & Feldman, 2008; Heinrichs, et al., 2003). Gordon et al. (2008) measured blood plasma levels of participants and there was a negative association between general distress level participants' blood OT levels. This suggests that individuals with higher OT in their systems are protected against stress, and that the effects of stress on the psychological and physiological system of individuals might be lower. However, in the current study, peripheral OT levels of participants were not checked prior to the experiment. This is why differences in peripheral OT levels of the participants may have had an impact on individuals' responses to priming and trauma films.

Interestingly individuals in the placebo condition paid more attention to films compared to those who were on OT. OT has been used in autism spectrum disorders, to increase attention to interpersonal cues, such as eye contact, facial expressions and vocal expressions (Bartz & Hollender, 2006). In addition, OT is positively associated with facial recognition and discrimination of different emotional states on faces (Guestella et al., 2009; Petrovic, et al., 2008). The reason why participants with OT showed less attention to films might be related to the films' content. The first movie was a disgusting scene of a shaving man who at the end cuts his face. The third movie was a knee surgery scene, which included many scenes with blood as well. The only movie that involved social interaction and attachment was the second

movie in which a girl witnesses a terrible car crash in which her boyfriend dies. The movie proceeded with family crying scenes and the funeral. I did not measure attention to different movies, but the total attention paid to all three movies.

Therefore, I cannot demonstrate the differential effect of OT for each movie. For future research, it is important to consider the type and content of films chosen.

OT's suggested anxiolytic effect (Heinrichs & Domes, 2008) seemed to become significant for distress ratings of films. Individuals who received OT found movies less distressing compared to those who received the placebo. In other words, participants in the OT condition changed perceptions of adverse stimuli, which was an important finding regarding the perception of trauma. It might be that individuals with higher levels of OT in their system may be less affected by traumatic events compared to those who have insufficient OT. Changed stress perceptions regarding the films in the study may contribute to our understanding of how OT could function in times of stress and trauma. Individuals who have higher plasma-level OT may be protected against trauma and its effects (for review see Heinrichs & Domes, 2008) because in the present study they did not find the film as distressing as the placebo group. In other words, OT might be a neuroendocrinological vulnerability factor which is relevant both to cognitions related to trauma and to post-trauma coping while dealing with flashbacks and intrusions (Heinrichs & Domes, 2008).

Regarding the specific symptom of PTSD, which was tested with an intrusion diary, there were no effects of priming, OT or gender. Despite analysing intrusions on the first day, there were still no effects of the experimental manipulations on the scores of each day of the week and week-based total score. This suggests that OT and secure priming did not influence the encoding process of the trauma film. As a result there were no significant differences between groups in terms of intrusions. Guestella, Mitchell and Mathews' (2008) study showed that nasal OT administration enhanced the encoding of positive social information, and happy faces, by making faces more memorable. However, the same effect was not valid for angry and neutral faces (Guestella et al., 2008) specifically when focused on recalling and remembering the stimuli that were shown previously. In the present study, recall process is not a voluntary attempt, but it takes place in the form of intrusions due to stressful content of the films. It can be assumed that OT or secure priming have not altered individuals' encoding processes during the film presentation. As a result, the only

significant effect on intrusions was time. All groups had intrusions, but there were no differences between groups.

***The effect of gender.***

Being female is a risk factor for PTSD (Ozer et al., 2003). Therefore the current study recruited females as well as males. However to avoid the effects of gender most recent studies have recruited only male participants (Domes et al., 2007a; Kirsch et al., 2005). Theodoridou, Rowe, Penton-Voak and Rogers (2009) examined both men and women and found no effect of gender on judgements of facial attractiveness.

The main effect for gender was significant for arousal as in other studies in the literature (Codispoti et al., 2008). There was a main effect of gender on arousal, women reported more arousal compared to men. As expected from the arousal results and from the literature (Codispoti et al., 2008), females found films more distressing compared to males. However, it is important to note that during participation, men reported that they like to watch horror movies, and play station games that involve worse scenes than the films in the study. Therefore, they become used to being exposed to such stimuli and could become desensitized. Females, on the other hand, might be less likely to share the same interest with males in film and game preferences, thus reducing their threshold for finding the films stressful.

***The effect of time.***

Time has an effect on heart rate. In the first minutes of priming there is no abrupt change in heart rate, in the middle, a rise is observable, and in the last part there is a decline. As their attention diffuses in the last minutes of priming, their heart rate reduces to baseline levels. When heart rate during film clips were considered, in the first film, "Shaving Man", that involves self-mutilation scenes, there is an abrupt decline in the second minute, which is similar to the results in the literature on heart rate decrease and disgust for mutilation (Kreibig, 2010). Then there is a slight increase in the second movie which contains social scenes. During the last film, the increase continues till the end. It seems that content of the films make a difference with respect to heart-rate changes and the effect of time could be reflecting that difference.

***The moderating effect of attachment anxiety and attachment avoidance on priming and oxytocin.***

In order to understand the impact of attachment dimensions on felt security, negative mood, positive mood, happiness and arousal, the moderating effects of attachment anxiety and attachment avoidance on priming and on OT were examined. The moderating effects of the attachment dimensions on priming and the OT for psychological outcome measures after the prime and after the film clips revealed that individuals with high attachment anxiety benefited more from the secure prime than individuals in the neutral prime group. In addition, individuals with high attachment anxiety in OT group reported less negative mood than individuals with high attachment anxiety in the placebo group. Attachment avoidance was moderated the effect of positive mood after films and happiness after prime.

***The moderating effect of attachment dimensions on priming***

Secure attachment priming seems to work for those who are high on attachment anxiety rather than for those who are high on attachment avoidance, as suggested in previous studies (Miterany, 2004, cited in Mikulincer et al., 2006). In Miterany's (2004) study, individuals with high attachment anxiety benefited more from secure priming compared with those with high attachment avoidance (cited in Mikulincer et al., 2006). In the current study, there was a moderating effect of attachment anxiety on priming for negative mood following priming. Individuals who were high on attachment anxiety and received secure attachment priming reported less negative mood compared to those who were high in attachment anxiety and who received neutral priming. In other words, individuals with high attachment anxiety could reduce their negative mood by means of secure attachment figures and their memories related to these figures. Attachment anxiety is related to posttraumatic cognitions. Although attachment anxiety could be a risk factor for negative cognitions after a trauma, which could contribute to PTSD, secure priming could buffer the negative effects by decreasing negative mood. This is an important finding and optimistic outcome of the present study for both those who are high on attachment anxiety and for psychotherapists dealing with clients who are having trouble due to their attachment anxiety in the course of treatment. Secure attachment priming could open a new window to influence individuals' negative views of self (Carnelley & Rowe, 2007) and influence the relationship between psychotherapist and client, while dealing with negative emotions from a traumatic event.

***The moderating effect of attachment dimensions on oxytocin.***

A similar effect of attachment anxiety was found on OT in the moderation analysis. Individuals who were high on attachment anxiety and received OT reported less negative mood after priming than those in the placebo condition and with high attachment anxiety. The moderation of attachment anxiety on the effect of OT has been reported in the studies of Bartz (2009, 2010, in press), and specifically the negative association between attachment anxiety and plasma OT (Tops et al., 2007). However, the specific effect of OT on different mood and emotion ratings has not been examined before. Similar to the finding of a moderation effect of attachment anxiety on secure priming, in the present attachment anxiety played a crucial role in OT. Individuals with high attachment anxiety, who were in the OT group, reported less negative mood and more happiness after the prime. This suggests that OT and secure priming can decrease individuals' negative mood, specifically in those who have high attachment anxiety. It is important to note that people with high attachment anxiety could benefit from OT use. By reducing their stress and providing them more social contact, there might be a possibility to alter their negative view of their self and relationships. This would help them to establish a more effective social support network and as a result it could help them to cope with stressful life events more easily.

Attachment anxiety is associated with negative self-views (Mikulincer & Shaver, 2007), and previously it was demonstrated that secure attachment priming leads to increased positive self-views (Carnelley & Rowe, 2007). This is remarkable when the first study of the thesis is considered. In that study attachment anxiety was positively associated with posttraumatic cognitions which predicted PTSD. The second study showed that individuals with high attachment anxiety could benefit from OT and this may help them to decrease their distress, especially while coping with the effects of a traumatic event by reducing their negative self-view which is important in Ehlers and Clark's (2000) model. Even though attachment anxiety seems to be a risk factor for PTSD as suggested in the first study, individuals who are high on attachment anxiety can regulate their negative emotional state and can cope with distress as a result of secure priming and OT.

There was a moderating effect of attachment anxiety on OT for happiness after priming. Individuals who were high on attachment anxiety benefited from OT and reported more happiness after priming, compared to those who were high on attachment anxiety and in the placebo condition after priming. There was also an

effect of attachment avoidance: those who were low in attachment avoidance and in the OT group reported more happiness after priming, compared to those who were low in attachment avoidance and in placebo group. It seems that after priming individuals who were high in attachment anxiety, low in attachment avoidance and in OT group reported more happiness compared to those who were high in attachment anxiety, low in avoidance and in placebo group after priming. This shows again OT could be an alternative mood alteration method for those who are anxiously attached and its effect may temporarily cause happiness for individuals with high attachment anxiety.

There was a moderating effect of attachment avoidance on OT for positive mood after the film clips. Individuals with high attachment avoidance who received OT reported more positive mood following the trauma film clips compared to those with high attachment avoidance in the placebo group. There are no reported findings regarding the association between OT and attachment avoidance in previous research. In the present study, individuals with high attachment avoidance may have engaged in an avoidance strategy while watching the films. The stress-buffering effect of OT might have helped them to avoid the distressing content as well. As a result, they may have reported more positive mood compared to those with high attachment avoidance who were in the placebo group. In other words, the combined effect of attachment avoidance and OT may have led participants with high attachment avoidance to be less affected by the film content. The marginal effect of OT on perspective taking indicated that some individuals in OT group adopted the point of view of a third person rather than viewing the films from their own perspective. This could be important to explain the association between attachment avoidance and OT. There are no studies which investigated perspective taking and OT.

Furthermore, individuals who received OT reported that they viewed the film from an external point of view rather than their own point of view. This may indicate avoidance and a tendency to dissociate during films. There are no studies that focus on the effect of OT on dissociation; therefore it is difficult to conclude how attachment avoidance and nasal OT are associated and they serve high positive mood scores following films via dissociation. It might be associated with dissociation tendencies of the participants as well as empathy. Nevertheless, in the present study whether empathy or dissociation caused this perspective taking have not been

explored. For future studies the effect of OT on perspective taking might lead to a better understanding regarding its effect on interpersonal relationships and stress management.

In line with previous studies (Fries et al., 2008; Heim et al., 2008), the present study showed that negative early experiences and their effect on attachment could have an impact not only on oxytocinergic system and peripheral OT. In addition, negative early experiences could have an effect on susceptibility to nasal OT or processing it. The moderating effect of dispositional attachment demonstrated that attachment styles and relationship characteristics could have an impact between OT and its stress-buffer effect and should be considered for its effect on emotion regulation after trauma.

Another important issue is that the measured effects of OT are not for actual trauma but for trauma films in the current study. Whether adulthood traumas could alter neuroendocrinological system as it is capable of making neuroanatomical changes (Karl, 2009) has not been investigated and is crucial to understand the physiological impact of traumatic events.

### **Limitations**

The current study, examined the combined effect of priming and OT on psychological and physiological effect of trauma with the use of analogue trauma stimuli in an experiment for the first time. The results revealed that secure priming and OT could have an effect psychological on reactions and evaluations of trauma films. Furthermore, the moderating effect of attachment styles indicated that early experiences could have an impact on individual's responses to both secure priming and to OT. Although the present study provided important information regarding the effect of attachment and OT during and after the trauma stimuli, there were some limitations.

First, all the participants were all university students, which makes it hard to generalize the findings to general population. Even though the stimulus material has been validated and successfully induced intrusions in numerous previous studies (Holmes et al., 2004; Stuart et al., 2006), there were participants who were exposed to aggression, horror scenes in movies, in computer games and there were a small group of participants who received first-aid or medical training in the current study. These participants could be more used to scenes such as the third film which includes surgery scenes. These participants may not react to disgusting or adverse

scenes as the other participants who did not have medical background. Therefore, in future studies, a screening measure could be used to understand the link between frequency of exposure to aversive stimulus in films and computer games and their impact on responses to the films in the experimental procedure.

A second issue was that the sample in the present study was predominantly female. The studies in the literature either do not consider menstrual cycle as a confounding factor (Holt-Lunstad et al., 2008; Rockliff et al., in press; Theodoridou et al., 2009; Theodoridou, 2010; Tops et al., 2007) or they reported no effect of having participants at different menstrual phases. In addition, Light, Grewen and Amico (2005) found that menstrual cycle period did not influence the effect of nasal OT. However, some female participants had early or late menstruations or irregular periods in the course of experiment.

Third, in the heart-rate measurement, baseline heart-rate was recorded after participants received the drug. Even though, OT takes 30 to 45 minutes to take effect (Heinrichs, 2001), individuals may experience stress due to nasal administration of sprays. Therefore, future studies should take the baseline heart-rate measurement before the nasal administration.

### ***Implications.***

In therapy; facing memories of a traumatic event and dealing with it effectively requires effort from both parties: the client and psychotherapist. Relapse rates in psychotherapies for PTSD are high and residual symptoms are common (Bradley, Greene, Russ, Dutra, & Westen, 2005; Van Etten & Taylor, 1998). Using secure attachment priming and OT may help individuals who have trouble facing the effects of traumatic events in psychotherapy by increasing their felt-security. Secure priming and OT might be helpful in retrieving trauma-related memories following remembering positive attachment-related memories. In addition, to facilitate remembering positive attachment-related memories might be useful especially for those who are high on attachment anxiety. That way they may be able to manage their hypervigilance to stress cues and preoccupation with social relationships. By activation of many other security enhancing attachment-related memories, a person can improve his or her mood and similar memories may become more accessible as well. Studies show that secure attachment figures and remembering them in times of stress enhance individuals' positive self-views and their views of relationship with others as well (Carnelley & Rowe, 2007). The impact of positive self-views and

having positive expectations in relationships could facilitate their coping following a real traumatic event and this may help them to seek efficient support from others.

Psychotherapists could make use of secure attachment priming in the form of giving cognitive home-work while individuals are trying to write their memories related to traumas coherently. They may first think and elaborate on their secure attachment memories which would decrease their stress and then do cognitive home-works related to trauma memories. In addition, it is important to use the effect of secure priming during psychotherapy. Psychotherapists who are having difficulties in establishing a secure relationship and rapport could seek ways to integrate secure priming into their treatments by means of which patients would be comforted and could feel more open to discuss trauma-related issues.

Although the effect of OT was not pronounced often in the present study, its anxiolytic effect could be used in treatment programmes which focus on trauma-related psychological problems and attachment-related problems. Individuals who receive OT may feel themselves more competent to tackle problems in their relationships and could become more relaxed while they are forming new relationships.

*Table 1.4. Means and Standard Deviation of Variables*

| Variable                           | Mean  | SD    |
|------------------------------------|-------|-------|
| 1. Age                             | 21.25 | 3.33  |
| 2. Early trauma                    | 4.55  | 3.24  |
| 3. State Anxiety                   | 36.11 | 10.68 |
| 4. Trait Anxiety                   | 38.56 | 8.99  |
| 5. Depression                      | 0.55  | 0.43  |
| 6. Anxiety (DASS-21)               | 0.42  | 0.43  |
| 7. Stress                          | 0.89  | 0.53  |
| 8. Felt security before prime      | 4.29  | 0.79  |
| 9. Felt security after prime       | 4.30  | 1.32  |
| 10. Felt security after film clips | 3.43  | 1.28  |
| 11. PANAS-N before prime           | 13.75 | 3.50  |
| 12. PANAS-N after prime            | 12.58 | 3.16  |
| 13. PANAS-N after film clips       | 17.02 | 5.57  |
| 14. PANAS-P before prime           | 31.32 | 6.40  |
| 15. PANAS-P after prime            | 30.27 | 7.36  |
| 16. PANAS-P after film clips       | 27.33 | 6.81  |
| 17. Arousal before prime           | 3.88  | 1.68  |
| 18. Arousal after prime            | 4.17  | 1.96  |
| 19. Arousal after film clips       | 5.63  | 2.19  |
| 20. Happiness before prime         | 6.91  | 1.35  |
| 21. Happiness after prime          | 7.13  | 1.72  |
| 22. Happiness after film clips     | 5.01  | 1.62  |
| 23. Intrusions                     | 5.23  | 5.61  |
| 24. Heart rate during prime        | 77.24 | 0.52  |
| 25. Heart rate during film clips   | 71.87 | 0.68  |
| 26. Hear rate baseline             | 77.70 | 9.87  |
| 27. Attention (films)              | 8.85  | 1.19  |
| 28. Distress (films)               | 6.55  | 2.48  |
| 29. Relevance (films)              | 3.58  | 2.82  |
| 30. Perception (films)             | -0.80 | 2.02  |
| 31. Attachment anxiety             | 1.87  | 0.68  |
| 32. Attachment avoidance           | 2.64  | 0.78  |

Table 1.5. Correlations for Variables Used in Experimental Design

|                                    | 1 | 2    | 3    | 4     | 5     | 6     | 7     | 8     | 9     | 10     | 11     | 12     | 13    | 14     | 15     | 16     |
|------------------------------------|---|------|------|-------|-------|-------|-------|-------|-------|--------|--------|--------|-------|--------|--------|--------|
| 1. Age                             | 1 | -.11 | -.08 | -.01  | -.15  | -.18  | -.08  | -.17  | .04   | .12    | .20    | .26*   | -.15  | -.27** | -.22*  | .09    |
| 2. Early Trauma                    |   | 1    | .25* | .07   | .15   | .17   | .09   | .28** | .23*  | -.23*  | -.40** | -.33** | .07   | .10    | -.21*  | -.31** |
| 3. Trait Anxiety                   |   |      | 1    | .69** | .57** | .49** | .47** | .37** | .24*  | -.68** | -.45** | -.44** | .25*  | .30**  | .23*   | -.37** |
| 4. State anxiety                   |   |      |      | 1     | .56** | .29** | .30** | .18   | .10   | -.47** | -.31** | -.24*  | .33** | .35**  | .22*   | -.26*  |
| 5 . Depression                     |   |      |      |       | 1     | .50** | .56** | .19   | -.01  | .51**  | -.24*  | -.28** | .35** | .30**  | .28**  | -.21*  |
| 6. Anxiety                         |   |      |      |       |       | 1     | .51** | .17   | -.04  | -.33** | -.19   | -.30** | .37** | .33**  | .31**  | -.06   |
| 7. Stress                          |   |      |      |       |       |       | 1     | .14   | .02   | -.31** | -.09   | -.22*  | .42** | .26*   | .41**  | -.05   |
| 8. Attachment Anxiety              |   |      |      |       |       |       |       | 1     | .50** | -.33** | -.27** | -.23*  | .09   | .22*   | .19    | -.08   |
| 9. Attachment avoidance            |   |      |      |       |       |       |       |       | 1     | -.27** | -.29** | -.09   | -.09  | .03    | -.07   | -.06   |
| 10. Felt security before prime     |   |      |      |       |       |       |       |       |       | 1      | .64**  | .64**  | -.11  | -.15   | -.06   | .48**  |
| 11. Felt security after prime      |   |      |      |       |       |       |       |       |       |        | 1      | .66**  | .02   | -.20   | -.01   | .33**  |
| 12. Felt security after film clips |   |      |      |       |       |       |       |       |       |        |        | 1      | .01   | -.02   | -.32** | .38**  |
| 13. PANAS-N before prime           |   |      |      |       |       |       |       |       |       |        |        |        | 1     | .71**  | .48**  | .02    |
| 14. PANAS-N after prime            |   |      |      |       |       |       |       |       |       |        |        |        |       | 1      | .35**  | -.01   |
| 15. PANAS-N after film clips       |   |      |      |       |       |       |       |       |       |        |        |        |       |        | 1      |        |
| 16. ANAS-P before prime            |   |      |      |       |       |       |       |       |       |        |        |        |       |        |        | 1      |

Table 1.5. Continues

|                               | 17     | 18     | 19    | 20   | 21   | 22     | 23     | 24     | 25   | 26   | 27    | 28   | 29     | 30     | 31   | 32   |
|-------------------------------|--------|--------|-------|------|------|--------|--------|--------|------|------|-------|------|--------|--------|------|------|
| 1. Age                        | .12    | .19    | -.20  | -.04 | -.13 | -.10   | .02    | .09    | .05  | -.03 | -.07  | -.01 | .12    | -.13   | -.03 | -.01 |
| 2. Early Trauma               | -.31** | -.23*  | -.08  | -.04 | -.18 | -.15   | -.19   | -.15   | .14  | .04  | .07   | -.01 | -.09   | -.07   | -.07 | -.09 |
| 3. Trait Anxiety              | -.40** | -.36** | .15   | -.01 | -.01 | -.43** | -.38** | -.21*  | .10  | .10  | .14   | .11  | -.21*  | .08    | -.15 | -.12 |
| 4. State anxiety              | -.25*  | -.18   | .25*  | .05  | .05  | -.37** | -.29** | -.13   | .07  | .03  | .06   | .07  | -.09   | .01    | -.08 | -.12 |
| 5 Depression.                 | -.25*  | -.27** | .18   | .03  | -.05 | -.38** | -.31** | -.32** | .01  | .08  | .11   | .13  | -.08   | .14    | -.05 | -.16 |
| 6. Anxiety                    | -.09   | -.27** | .36** | .11  | .04  | -.03   | -.13   | -.15   | -.06 | .19  | .28** | .24* | -.36** | .29**  | -.07 | .08  |
| 7. Stress                     | -.04   | -.21*  | .28** | .12  | .16  | -.21*  | -.17   | -.33** | .13  | .11  | .20   | .18  | -.14   | .21*   | .04  | -.12 |
| 8. Attachment anxiety         | -.09   | .01    | -.02  | .03  | -.10 | -.04   | -.12   | -.01   | .09  | .13  | .16   | .09  | -.15   | -.12   | .02  | -.13 |
| 9. Attachment avoidance       | -.11   | .09    | -.13  | -.05 | -.19 | .01    | -.13   | .17    | .08  | -.08 | -.13  | -.11 | .08    | -.27** | -.16 | -.14 |
| 10 Felt security before prime | .50**  | .35**  | -.09  | .06  | .12  | .37**  | .45**  | .15    | .01  | .01  | .02   | .02  | .15    | -.02   | .22* | .07  |
| 11. Felt security after prime | .43**  | .19    | -.05  | -.04 | .03  | .29**  | .56**  | .11    | -.08 | -.05 | -.02  | .07  | .17    | .10    | .23* | .02  |
| 12. Felt security after film  | .35**  | .55**  | -.15  | .01  | -.11 | .10    | .23*   | .45**  | -.09 | .08  | .05   | .01  | .30**  | -.34** | .02  | -.03 |
| 13. PANAS-N before prime      | .02    | .01    | .19   | -.06 | -.10 | -.07   | -.05   | -.04   | .12  | -.01 | .02   | .01  | -.06   | -.04   | .01  | -.08 |
| 14. PANAS-N after prime       | .02    | .02    | .09   | .05  | -.12 | -.03   | -.26*  | .03    | .07  | .17  | .13   | .14  | -.06   | -.10   | -.03 | .03  |
| 15. PANAS-N after film clips  | .15    | -.15   | .24*  | .02  | .27* | .08    | .10    | -.41** | .16  | -.04 | .16   | .04  | -.25*  | .42**  | .20  | .09  |
| 16. PANAS-P after prime       | .79**  | .66**  | .19   | .06  | .17  | .35**  | .22*   | .20    | -.01 | -.05 | -.04  | -.04 | .19    | .04    | .17  | .05  |

\*, Correlation is significant at the 0.05 level (2-tailed), \*\*, Correlation is significant at the 0.01 level (2-tailed)

Table 1.5. Continues

|                               | 17 | 18    | 19  | 20    | 21    | 22    | 23    | 24    | 25   | 26   | 27    | 28    | 29    | 30     | 31    | 32   |
|-------------------------------|----|-------|-----|-------|-------|-------|-------|-------|------|------|-------|-------|-------|--------|-------|------|
| 17. PANAS-P after prime       | 1  | .65** | .15 | .16   | .20   | .48** | .45** | .22*  | -.03 | .01  | .05   | .04   | .22*  | .09    | .15   | .13  |
| 18. PANAS-P after films       |    | 1     | .01 | .05   | .06   | .22*  | .08   | .44** | -.05 | .07  | .11   | -.03  | .39** | -.30** | -.01  | .01  |
| 19. Arousal before prime      |    |       | 1   | .46** | .31** | .06   | .07   | -.02  | -.06 | .02  | .05   | .09   | -.19  | .31**  | .06   | -.03 |
| 20. Arousal after prime       |    |       |     | 1     | .37** | .21*  | .11   | -.01  | .01  | .08  | -.04  | .14   | -.20  | .25*   | .07   | .15  |
| 21. Arousal after films       |    |       |     |       | 1     | .17   | .07   | -.12  | .04  | -.11 | .03   | .25*  | -.07  | .44**  | .04   | .09  |
| 22. Happiness before prime    |    |       |     |       |       | 1     | .64** | .28** | -.06 | .01  | -.12  | .05   | .02   | .07    | .09   | .18  |
| 23. Happiness after prime     |    |       |     |       |       |       | 1     | .20   | -.02 | -.01 | -.08  | -.01  | .05   | .12    | .20   | .01  |
| 24. Happiness after films     |    |       |     |       |       |       |       | 1     | -.02 | .11  | .07   | -.05  | .19   | -.53** | -.21* | -.05 |
| 25. Intrusions                |    |       |     |       |       |       |       |       | 1    | -.10 | .04   | -.14  | -.14  | .11    | .06   | -.10 |
| 26. Heart during prime        |    |       |     |       |       |       |       |       |      | 1    | .90** | .94** | -.02  | .02    | -.06  | .05  |
| 27. Heart rate during films   |    |       |     |       |       |       |       |       |      |      | 1     | .90** | -.15  | .14    | -.01  | .30  |
| 28. Heart-rate baseline       |    |       |     |       |       |       |       |       |      |      |       | 1     | -.04  | .07    | -.04  | .03  |
| 29. Attention ratings (film)  |    |       |     |       |       |       |       |       |      |      |       |       | 1     | -.16   | .04   | -.09 |
| 30. Distress ratings (film)   |    |       |     |       |       |       |       |       |      |      |       |       |       | 1      | .20*  | .13  |
| 31. Personal relevance (film) |    |       |     |       |       |       |       |       |      |      |       |       |       |        | 1     | .11  |
| 32. Perspective taking (film) |    |       |     |       |       |       |       |       |      |      |       |       |       |        |       | 1    |

\*, Correlation is significant at the 0.05 level (2-tailed), \*\*, Correlation is significant at the 0.01 level (2-tailed)

Table 1.6. ANOVA for Felt Security and for PANAS-N

| Source                       | df | F     | $\eta_p^2$ | P    |
|------------------------------|----|-------|------------|------|
| <b>DV: Felt security</b>     |    |       |            |      |
| Between Subjects             |    |       |            |      |
| Priming                      | 1  | 6.55  | .06        | .012 |
| OT                           | 1  | 1.20  | .01        | .275 |
| Gender                       | 1  | 0.64  | .00        | .600 |
| Priming X OT                 | 1  | 1.17  | .01        | .282 |
| Priming X Gender             | 1  | 1.06  | .01        | .306 |
| OT X Gender                  | 1  | 0.00  | .00        | .953 |
| Priming X OT X Gender        | 1  | 0.50  | .00        | .479 |
| Within Subjects              |    |       |            |      |
| Time                         | 2  | 49.17 | .35        | .000 |
| Time X Priming               | 2  | 20.74 | .19        | .000 |
| Time X OT                    | 2  | 1.80  | .02        | .167 |
| Time X Gender                | 2  | 1.02  | .01        | .361 |
| Time X OT X Gender           | 2  | 1.63  | .01        | .198 |
| Time X Priming X OT          | 2  | 0.35  | .00        | .702 |
| Time X Priming X Gender      | 2  | 0.89  | .01        | .409 |
| Time X Priming X OT X Gender | 2  | 3.53  | .03        | .031 |
| <b>DV: PANAS-N</b>           |    |       |            |      |
| Between Subjects             |    |       |            |      |
| Priming                      | 1  | 3.27  | .03        | .074 |
| OT                           | 1  | 2.23  | .02        | .139 |
| Gender                       | 1  | 0.92  | .01        | .340 |
| Priming X OT                 | 1  | 0.08  | .00        | .775 |
| Priming X Gender             | 1  | 0.32  | .00        | .569 |
| OT X Gender                  | 1  | 4.52  | .04        | .036 |
| Priming X OT X Gender        | 1  | 4.03  | .04        | .048 |
| Within Subjects              |    |       |            |      |
| Time                         | 2  | 47.40 | .03        | .000 |
| Time X Priming               | 2  | 0.34  | .01        | .619 |
| Time X OT                    | 2  | 0.20  | .00        | .722 |
| Time X Gender                | 2  | 0.11  | .00        | .801 |
| Time X OT X Gender           | 2  | 0.32  | .00        | .634 |
| Time X Priming X OT          | 2  | 1.67  | .01        | .191 |
| Time X Priming X Gender      | 2  | 0.08  | .00        | .841 |
| Time X Priming X OT X Gender | 2  | 5.45  | .02        | .014 |
| Error                        | 88 |       |            |      |

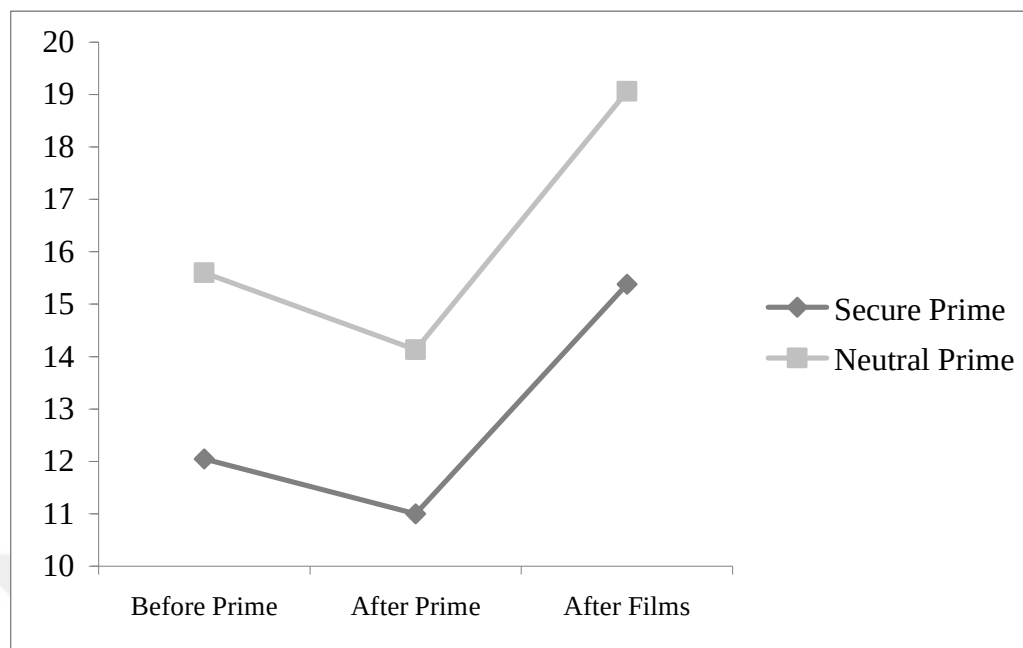


*Figure 3.1* Negative Mood: The time by prime interaction for women on OT.  
Vertical axis represents negative mood scores.

Table 1.7. ANOVA for PANAS-P and Arousal

| Source                       | df | F     | $\eta_p^2$ | p    |
|------------------------------|----|-------|------------|------|
| <b>DV: PANAS-P</b>           |    |       |            |      |
| Between Subjects             |    |       |            |      |
| Priming                      | 1  | 0.22  | .00        | .640 |
| OT                           | 1  | 0.05  | .00        | .819 |
| Gender                       | 1  | 0.13  | .00        | .712 |
| Priming X OT                 | 1  | 0.82  | .00        | .367 |
| Priming X Gender             | 1  | 0.14  | .00        | .701 |
| OT X Gender                  | 1  | 0.48  | .00        | .488 |
| Priming X OT X Gender        | 1  | 2.41  | .02        | .124 |
| Within Subjects              |    |       |            |      |
| Time                         | 2  | 5.52  | .05        | .021 |
| Time X Priming               | 2  | 6.66  | .07        | .011 |
| Time X OT                    | 2  | 0.82  | .00        | .365 |
| Time X Gender                | 2  | 0.20  | .00        | .650 |
| Time X OT X Gender           | 2  | 5.30  | .05        | .024 |
| Time X Priming X OT          | 2  | 2.29  | .02        | .133 |
| Time X Priming X Gender      | 2  | 0.01  | .00        | .897 |
| Time X Priming X OT X Gender | 2  | 0.20  | .00        | .650 |
| <b>DV: Arousal</b>           |    |       |            |      |
| Between Subjects             |    |       |            |      |
| Priming                      | 1  | 1.58  | .01        | .212 |
| OT                           | 1  | 0.20  | .00        | .648 |
| Gender                       | 1  | 8.44  | .08        | .005 |
| Priming X OT                 | 1  | 0.36  | .00        | .547 |
| Priming X Gender             | 1  | 7.00  | .07        | .010 |
| OT X Gender                  | 1  | 0.12  | .00        | .721 |
| Priming X OT X Gender        | 1  | 0.47  | .00        | .493 |
| Within Subjects              |    |       |            |      |
| Time                         | 2  | 21.55 | .19        | .001 |
| Time X Priming               | 2  | 1.03  | .01        | .354 |
| Time X OT                    | 2  | 0.98  | .01        | .372 |
| Time X Gender                | 2  | 1.73  | .02        | .182 |
| Time X OT X Gender           | 2  | 2.02  | .02        | .138 |
| Time X Priming X OT          | 2  | 0.20  | .00        | .807 |
| Time X Priming X Gender      | 2  | 1.49  | .01        | .227 |
| Time X Priming X OT X Gender | 2  | 0.73  | .00        | .474 |
| Error                        | 88 |       |            |      |

Table 1.8. ANOVA for Happiness

| Source              | df | F     | $\eta_p^2$ | P     |
|---------------------|----|-------|------------|-------|
| DV: Happiness       |    |       |            |       |
| Between Subjects    |    |       |            |       |
| Priming             | 1  | 4.68  | .04        | .033  |
| OT                  | 1  | 0.88  | .01        | .349  |
| Priming X OT        | 1  | 0.15  | .00        | .698  |
| Within Subjects     |    |       |            |       |
| Time                | 2  | 79.57 | .46        | <.001 |
| Time X Priming      | 2  | 4.89  | .05        | .013  |
| Time X OT           | 2  | 1.44  | .01        | .239  |
| Time X Priming X OT | 2  | 0.37  | .00        | .652  |
| Error               | 88 |       |            |       |

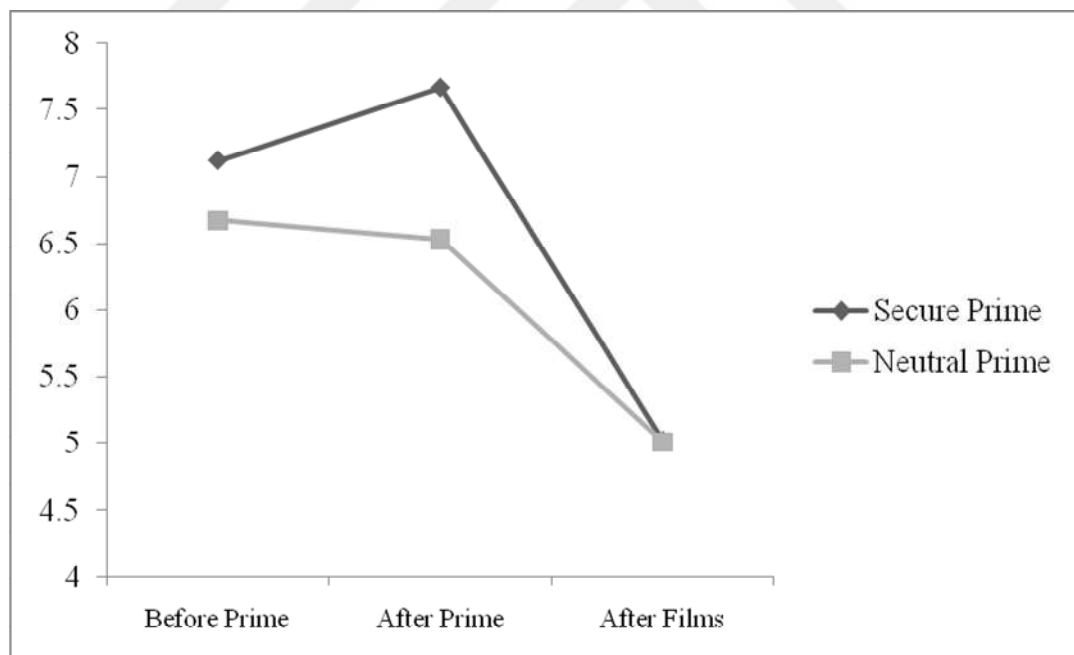


Figure 3.2 Prime by Time Interaction for Happiness. The vertical axis represents the happiness scores.

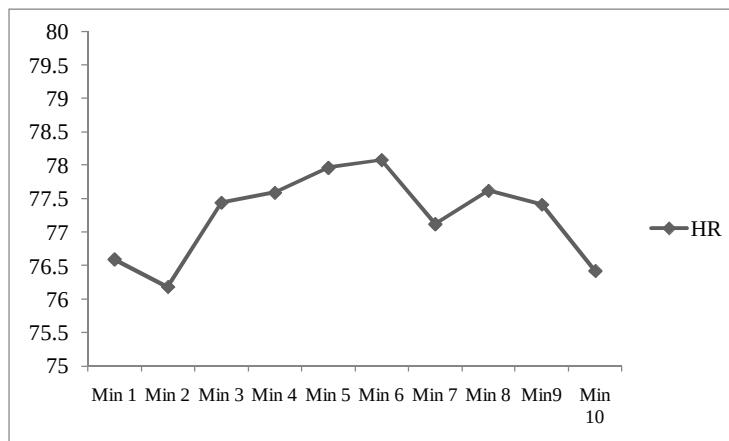


*Figure 3.3* Heart-rate during the priming procedure. The horizontal axis represents time in minutes and the vertical axis represents heart rate when baseline heart rate was the covariate.

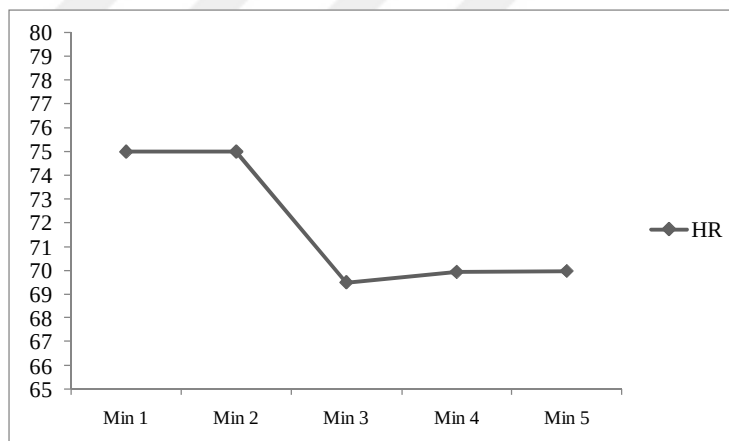


*Figure 3.4.* Heart rate during the film clips. The horizontal axis represents time in minutes and the vertical axis represents heart rate when baseline heart rate was the covariate.

Table 1.9. ANCOVA for Heart-rate during Priming

| Source                       | df | F      | $\eta_p^2$ | P    |
|------------------------------|----|--------|------------|------|
| <b>DV: Heart-rate</b>        |    |        |            |      |
| Between Subjects             |    |        |            |      |
| <b>CV: Baseline</b>          | 1  | 679.74 | .895       | .070 |
| Priming                      | 1  | 24.35  | .03        | .091 |
| OT                           | 1  | 23.08  | .03        | .099 |
| Gender                       | 1  | 0.08   | .00        | .927 |
| Priming X OT                 | 1  | 0.08   | .00        | .770 |
| Priming X Gender             | 1  | 1.97   | .02        | .164 |
| OT X Gender                  | 1  | 0.88   | .01        | .350 |
| Priming X OT X Gender        | 1  | 0.17   | .00        | .681 |
| Within Subjects              |    |        |            |      |
| Time                         | 9  | 4.12   | .04        | .046 |
| Time X Priming               | 9  | 0.81   | .01        | .603 |
| Time X OT                    | 9  | 1.40   | .01        | .181 |
| Time X Gender                | 9  | 0.72   | .01        | .682 |
| Time X OT X Gender           | 9  | 1.11   | .01        | .350 |
| Time X Priming X OT          | 9  | 1.87   | .02        | .108 |
| Time X Priming X Gender      | 9  | 1.02   | .01        | .419 |
| Time X Priming X OT X Gender | 18 | 0.61   | .00        | .901 |
| Error                        | 80 |        |            |      |

Table 2.1 ANCOVA for Heart-rate during Film Clips

| Source                       | df | F       | $\eta_p^2$ | P    |
|------------------------------|----|---------|------------|------|
| <b>DV: Heart-rate</b>        |    |         |            |      |
| Between Subjects             |    |         |            |      |
| <b>CV: Baseline</b>          | 1  | 6063.19 | 475.79     | .000 |
| Priming                      | 1  | 1.86    | .02        | .175 |
| OT                           | 1  | 0.30    | .03        | .100 |
| Gender                       | 1  | 0.26    | .00        | .607 |
| Priming X OT                 | 1  | 0.04    | .00        | .825 |
| Priming X Gender             | 1  | 0.43    | .00        | .513 |
| OT X Gender                  | 1  | 0.11    | .00        | .850 |
| Priming X OT X Gender        | 1  | 1.32    | .01        | .253 |
| Within Subjects              |    |         |            |      |
| Time                         | 4  | 1.21    | .01        | .305 |
| Time X Priming               | 4  | 0.78    | .01        | .510 |
| Time X OT                    | 4  | 0.69    | .00        | .597 |
| Time X Gender                | 4  | 0.59    | .00        | .669 |
| Time X OT X Gender           | 4  | 0.11    | .00        | .976 |
| Time X Priming X OT          | 4  | 0.29    | .00        | .880 |
| Time X Priming X Gender      | 4  | 0.73    | .00        | .566 |
| Time X Priming X OT X Gender | 4  | 0.72    | .00        | .574 |
| Error                        | 88 |         |            |      |

Table 2.2. ANOVA for Film Ratings

| Source                                     | df | F    | $\eta_p^2$ | P    |
|--------------------------------------------|----|------|------------|------|
| Trauma film ratings (after films)          |    |      |            |      |
| <b>DV: Attention paid to the films</b>     |    |      |            |      |
| Secure priming                             | 1  | 0.27 | .00        | .604 |
| OT                                         | 1  | 5.49 | .05        | .021 |
| Priming X OT                               | 1  | 0.27 | .01        | .604 |
| <b>DV: Distress after the films</b>        |    |      |            |      |
| Secure priming                             | 1  | 4.97 | .05        | .028 |
| OT                                         | 1  | 3.59 | .03        | .061 |
| Gender                                     | 1  | 6.00 | .06        | .016 |
| Priming X OT                               | 1  | 0.68 | .00        | .411 |
| Priming X Gender                           | 1  | 2.85 | .03        | .095 |
| OT X Gender                                | 1  | 0.00 | .00        | .967 |
| Priming X OT X Gender                      | 1  | 0.87 | .01        | .352 |
| <b>DV: Personal relevance of the films</b> |    |      |            |      |
| Secure priming                             | 1  | 3.30 | .03        | .072 |
| OT                                         | 1  | 0.03 | .00        | .831 |
| Priming X OT                               | 1  | 1.97 | .02        | .164 |
| <b>DV: Perspective taking</b>              |    |      |            |      |
| Secure priming                             | 1  | 1.42 | .01        | .236 |
| OT                                         | 1  | 3.02 | .03        | .086 |
| Priming X OT                               | 1  | 0.64 | .00        | .424 |
| Error                                      | 88 |      |            |      |

Table 2.3. ANOVA for Total Intrusion for Seven-days

| Source                   | df | F                | $\eta_p^2$ | P    |
|--------------------------|----|------------------|------------|------|
| <b>DV: Felt security</b> |    | Between Subjects |            |      |
| Priming                  | 1  | 0.26             | .00        | .680 |
| OT                       | 1  | 0.43             | .00        | .510 |
| Gender                   | 1  | 0.02             | .00        | .875 |
| Priming X OT             | 1  | 0.05             | .00        | .820 |
| Priming X Gender         | 1  | 2.74             | .03        | .101 |
| OT X Gender              | 1  | 0.37             | .00        | .545 |
| Priming X OT X Gender    | 1  | 1.59             | .01        | .210 |
| Error                    | 88 |                  |            |      |

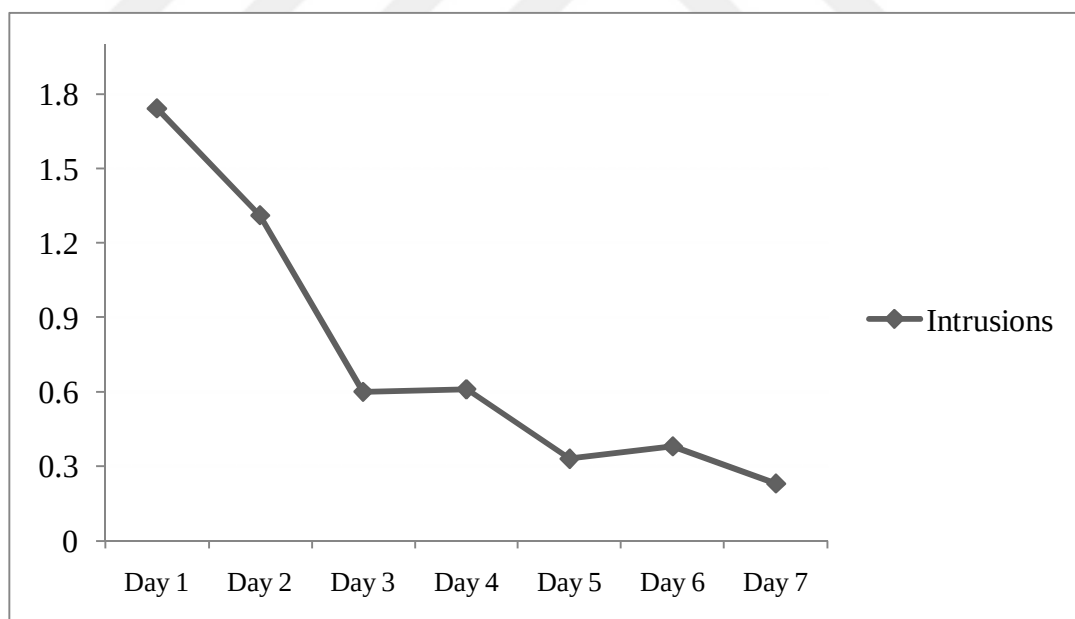


Figure 3.5. Intrusions one week following the experiment. The horizontal axis represents days of the week and the vertical axis represents mean values of intrusions on each day of the week.

*Table 2.4 Regression Analysis Testing Moderation of Attachment Dimensions on Effect of Felt Security after Priming Procedure and After Trauma Films*

| Variable                                         | B      | SE B | $\beta$ | $R^2$   |
|--------------------------------------------------|--------|------|---------|---------|
| <b>DV: Felt security after priming procedure</b> |        |      |         |         |
| Step1                                            |        |      |         | 0.61*** |
| Felts security before priming                    | 0.96   | 0.11 | 0.57    |         |
| OT                                               | -0.12  | 0.08 | -0.09   |         |
| Priming                                          | 0.60   | 0.08 | 0.46*** |         |
| Attachment anxiety                               | 0.11   | 0.14 | 0.06    |         |
| Attachment avoidance                             | -0.26  | 0.11 | -0.16*  |         |
| Step 2                                           |        |      |         | 0.64*   |
| Felt security before priming                     | 0.97   | 0.11 | 0.58*** |         |
| OT                                               | -0.12  | 0.08 | -0.09   |         |
| Priming                                          | 0.60   | 0.08 | 0.46*** |         |
| Attachment anxiety                               | 0.12   | 0.14 | 0.07    |         |
| Attachment avoidance                             | -0.26  | 0.11 | -0.17*  |         |
| Priming X Attachment anxiety                     | 0.08   | 0.14 | 0.04    |         |
| Priming X Attachment avoidance                   | -0.01  | 0.11 | -0.15   |         |
| <b>DV: Felt security after film clips</b>        |        |      |         |         |
| Step1                                            |        |      |         | 0.45*** |
| Felts security before priming                    | 0.91   | 0.11 | 0.64*** |         |
| OT                                               | -0.001 | 0.08 | -0.07   |         |
| Priming                                          | 0.10   | 0.08 | 0.09    |         |
| Attachment anxiety                               | -0.16  | 0.15 | -0.10   |         |
| Attachment avoidance                             | 0.17   | 0.12 | 0.13    |         |
| Step 2                                           |        |      |         | 0.46    |
| Felt security before priming                     | 0.93   | 0.11 | 0.65*** |         |
| OT                                               | -0.001 | 0.08 | -0.00   |         |
| Priming                                          | 0.10   | 0.08 | 0.09    |         |
| Attachment anxiety                               | -0.13  | 0.15 | -0.08   |         |
| Attachment avoidance                             | 0.16   | 0.12 | 0.12    |         |
| Priming X Attachment anxiety                     | 0.11   | 0.14 | 0.07    |         |
| Priming X Attachment avoidance                   | 0.06   | 0.12 | 0.05    |         |

\*p<.05, \*\*p<.001, \*\*\*<.001

*Table 2.5. Regression Analysis Testing Moderation of Attachment Dimensions on Effect of Oxytocin for Felt Security after Priming and After Trauma Films*

| Variable                                  | B     | SE B | $\beta$  | $R^2$ |
|-------------------------------------------|-------|------|----------|-------|
| <b>DV: Felt security after priming</b>    |       |      |          |       |
| Step1                                     |       |      |          | 0.65* |
| Felt security before priming              | 0.96  | 0.11 | 0.57***  |       |
| OT                                        | -0.12 | 0.08 | -0.09    |       |
| Priming                                   | 0.60  | 0.08 | 0.46***  |       |
| Attachment anxiety                        | 0.11  | 0.14 | 0.06     |       |
| Attachment avoidance                      | -0.26 | 0.11 | -0.16*   |       |
| Step 2                                    |       |      |          | 0.65* |
| Felt security before priming              | 0.94  | 0.11 | 0.56     |       |
| OT                                        | -0.11 | 0.08 | -0.08*** |       |
| Priming                                   | 0.59  | 0.08 | 0.45***  |       |
| Attachment anxiety                        | 0.04  | 0.16 | 0.02     |       |
| Attachment avoidance                      | -0.26 | 0.12 | -0.16*   |       |
| OT X Attachment anxiety                   | 0.12  | 0.15 | 0.06     |       |
| OT X Attachment avoidance                 | -0.15 | 0.13 | -0.09    |       |
| <b>DV: Felt security after film clips</b> |       |      |          |       |
| Step1                                     |       |      |          | 0.45* |
| Felt security before priming              | 0.91  | 0.11 | 0.64***  |       |
| OT                                        | -0.00 | 0.08 | -0.00    |       |
| Priming                                   | 0.10  | 0.08 | 0.09     |       |
| Attachment anxiety                        | -0.16 | 0.15 | -0.10    |       |
| Attachment avoidance                      | 0.17  | 0.12 | 0.13     |       |
| Step 2                                    |       |      |          | 0.46  |
| Felt security before priming              | 0.93  | 0.12 | 0.65***  |       |
| OT                                        | -0.01 | 0.09 | -0.00    |       |
| Priming                                   | 0.10  | 0.09 | 0.09     |       |
| Attachment anxiety                        | -0.12 | 0.17 | -0.07    |       |
| Attachment avoidance                      | 0.16  | 0.13 | 0.12     |       |
| OT X Attachment anxiety                   | -0.08 | 0.17 | -0.05    |       |
| OT X Attachment avoidance                 | 0.06  | 0.14 | 0.04     |       |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$

*Table 2.6. Regression Analysis Testing Moderation of Attachment Dimensions on Effect of PANAS-N after Priming and After Trauma Films*

| Variable                            | B     | SE B | B       | R <sup>2</sup> |
|-------------------------------------|-------|------|---------|----------------|
| <b>DV: PANAS-N after priming</b>    |       |      |         |                |
| Step1                               |       |      |         | 0.61**         |
| PANAS-N before priming              | 0.63  | 0.06 | 0.69*** |                |
| OT                                  | -0.01 | 0.21 | -0.00   |                |
| Priming                             | -0.53 | 0.21 | -0.16*  |                |
| Attachment anxiety                  | 0.42  | 0.37 | 0.09    |                |
| Attachment avoidance                | -0.09 | 0.30 | -0.27   |                |
| Step 2                              |       |      |         | 0.64**         |
| PANAS-N before priming              | 0.63  | 0.06 | 0.70*** |                |
| OT                                  | 0.02  | 0.20 | 0.00    |                |
| Priming                             | -0.53 | 0.20 | -0.17*  |                |
| Attachment anxiety                  | 0.33  | 0.36 | 0.07    |                |
| Attachment avoidance                | -0.12 | 0.29 | -0.03   |                |
| Priming X Attachment anxiety        | -0.82 | 0.34 | -0.19*  |                |
| Priming X Attachment avoidance      | 0.77  | 0.28 | 0.20**  |                |
| <b>DV: PANAS-N after film clips</b> |       |      |         |                |
| Step1                               |       |      |         | 0.28***        |
| PANAS-N before priming              | 0.68  | 0.15 | 0.42*** |                |
| OT                                  | -0.08 | 0.51 | -0.01   |                |
| Priming                             | 0.05  | 0.50 | 0.00    |                |
| Attachment anxiety                  | 1.85  | 0.88 | 0.24*   |                |
| Attachment avoidance                | -1.39 | 0.73 | -0.21   |                |
| Step 2                              |       |      |         | 0.29           |
| PANAS-N before priming              | 0.67  | 0.15 | 0.42*** |                |
| OT                                  | -0.07 | 0.51 | -0.01   |                |
| Priming                             | 0.04  | 0.50 | 0.00    |                |
| Attachment anxiety                  | 1.76  | 0.89 | 0.23    |                |
| Attachment avoidance                | -1.40 | 0.73 | -0.21   |                |
| Priming X Attachment anxiety        | -0.80 | 0.84 | -0.10   |                |
| Priming X Attachment avoidance      | 0.49  | 0.70 | 0.07    |                |

\*p<.05, \*\*p<.001, \*\*\*<.001

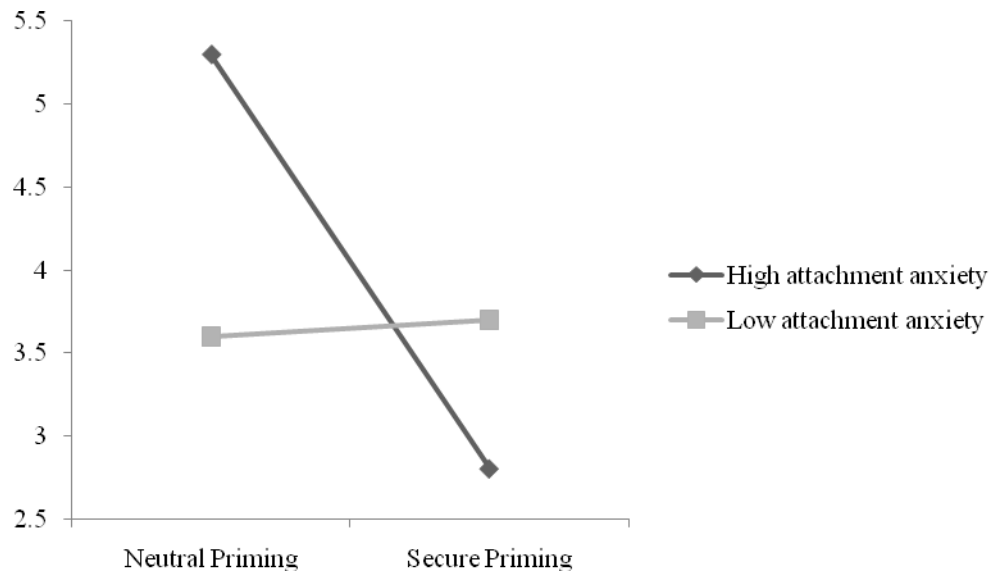


*Figure 3.6.* Moderation effect of attachment anxiety on priming for PANAS - negative mood after priming manipulation. The vertical axis represents negative mood mean scores.

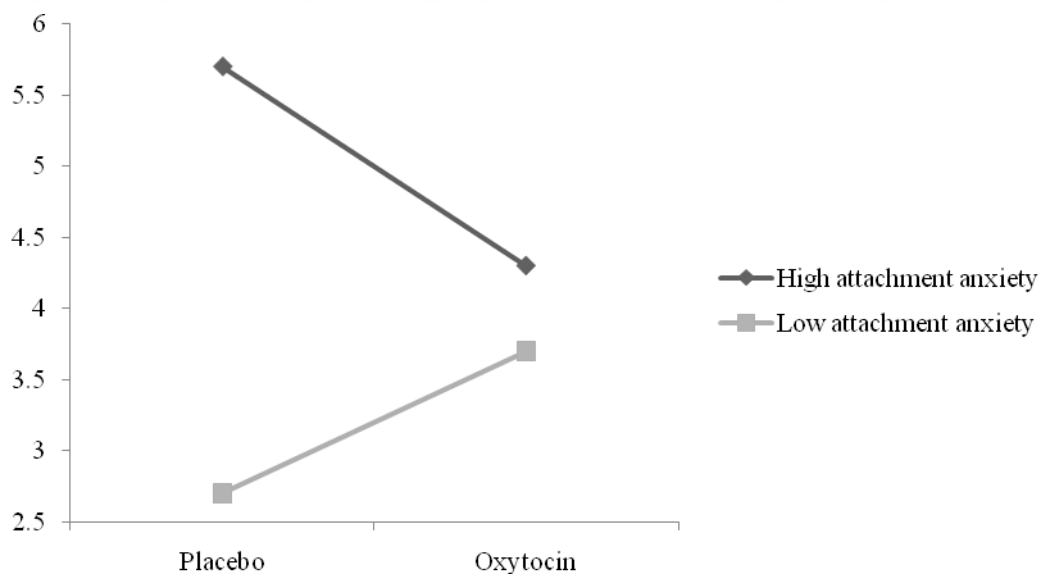


*Figure 3.7* Moderation effect of attachment anxiety on OT for PANAS- Negative mood after priming manipulation. The vertical axis represents negative mood mean scores.

*Table 2.7. Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for Effect of PANAS-N After Priming and After Trauma Films*

| Variable                            | B     | SE B | $\beta$            | R <sup>2</sup>    |
|-------------------------------------|-------|------|--------------------|-------------------|
| <b>DV: PANAS-N after priming</b>    |       |      |                    |                   |
| Step1                               |       |      |                    | 0.60*             |
| PANAS-N before priming              | 0.61  | 0.06 | 0.69***            |                   |
| OT                                  | -0.01 | 0.21 | -0.00              |                   |
| Priming                             | -0.53 | 0.21 | -0.16*             |                   |
| Attachment anxiety                  | 0.42  | 0.37 | 0.09               |                   |
| Attachment avoidance                | -0.09 | 0.30 | -0.02              |                   |
| Step 2                              |       |      |                    | 0.63 <sup>†</sup> |
| PANAS-N before priming              | 0.67  | 0.06 | 0.69***            |                   |
| OT                                  | -0.05 | 0.21 | -0.01              |                   |
| Priming                             | -0.48 | 0.21 | -0.15*             |                   |
| Attachment anxiety                  | 0.85  | 0.40 | 0.19*              |                   |
| Attachment avoidance                | -0.27 | 0.32 | -0.07              |                   |
| OT X Attachment anxiety             | -0.89 | 0.38 | -0.20*             |                   |
| OT X Attachment avoidance           | 0.57  | 0.32 | 0.15 <sup>†</sup>  |                   |
| <b>DV: PANAS-N after film clips</b> |       |      |                    |                   |
| Step1                               |       |      |                    | 0.28***           |
| PANAS-N before priming              | 0.68  | 0.15 | 0.42***            |                   |
| OT                                  | -0.08 | 0.51 | -0.01              |                   |
| Priming                             | 0.05  | 0.50 | 0.00               |                   |
| Attachment anxiety                  | 1.85  | 0.88 | 0.24*              |                   |
| Attachment avoidance                | -1.39 | 0.73 | -0.21 <sup>†</sup> |                   |
| Step 2                              |       |      |                    | 0.29              |
| PANAS-N before priming              | 0.68  | 0.15 | 0.42***            |                   |
| OT                                  | -0.11 | 0.51 | -0.02              |                   |
| Priming                             | 0.00  | 0.51 | 0.00*              |                   |
| Attachment anxiety                  | 2.03  | 0.99 | 0.26*              |                   |
| Attachment avoidance                | -1.72 | 0.79 | -0.26*             |                   |
| OT X Attachment anxiety             | -0.50 | 0.93 | -0.06              |                   |
| OT X Attachment avoidance           | -0.37 | 0.78 | -0.48              |                   |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$ , <sup>†</sup>  $p = .07$ .

*Table 2.8 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Effect of PANAS-P After Priming and After Trauma Films*

| Variable                            | B     | SE B | $\beta$ | $R^2$   |
|-------------------------------------|-------|------|---------|---------|
| <b>DV: PANAS-P after priming</b>    |       |      |         |         |
| Step1                               |       |      |         | 0.65*** |
| PANAS-P before priming              | 0.92  | 0.07 | 0.80*** |         |
| OT                                  | -0.12 | 0.46 | -0.01   |         |
| Priming                             | 1.12  | 0.46 | 0.15*   |         |
| Attachment anxiety                  | 0.20  | 0.77 | 0.02    |         |
| Attachment avoidance                | -0.74 | 0.65 | -0.08   |         |
| Step 2                              |       |      |         | 0.65    |
| PANAS-P before priming              | 0.91  | 0.07 | 0.79*** |         |
| OT                                  | -0.10 | 0.46 | -0.01   |         |
| Priming                             | 1.11  | 0.46 | 0.15*   |         |
| Attachment anxiety                  | 0.07  | 0.78 | 0.00    |         |
| Attachment avoidance                | -0.73 | 0.65 | -0.08   |         |
| Priming X Attachment anxiety        | -0.86 | 0.77 | -0.08   |         |
| Priming X Attachment avoidance      | 0.47  | 0.65 | 0.05    |         |
| <b>DV: PANAS-P after film clips</b> |       |      |         |         |
| Step1                               |       |      |         | 0.47*** |
| PANAS-P before priming              | 0.72  | 0.08 | 0.67*** |         |
| OT                                  | 0.62  | 0.52 | 0.09    |         |
| Priming                             | -0.20 | 0.52 | -0.03   |         |
| Attachment anxiety                  | -0.32 | 0.87 | -0.03   |         |
| Attachment avoidance                | 0.76  | 0.74 | 0.09    |         |
| Step 2                              |       |      |         | 0.49    |
| PANAS-P before priming              | 0.70  | 0.08 | 0.66*** |         |
| OT                                  | 0.70  | 0.52 | 0.10    |         |
| Priming                             | -0.23 | 0.52 | -0.03   |         |
| Attachment anxiety                  | -0.41 | 0.88 | -0.04   |         |
| Attachment avoidance                | 0.68  | 0.73 | 0.08    |         |
| Priming X Attachment anxiety        | -1.10 | 0.86 | -0.11   |         |
| Priming X Attachment avoidance      | 1.49  | 0.73 | 0.18*   |         |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$

*Table 2.9. Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for PANAS-P After Priming and After Trauma Films*

| Variable                            | B     | SE B | $\beta$ | $R^2$             |
|-------------------------------------|-------|------|---------|-------------------|
| <b>DV: PANAS-P after priming</b>    |       |      |         |                   |
| Step1                               |       |      |         | 0.65***           |
| PANAS-P before priming              | 0.92  | 0.07 | 0.80*** |                   |
| OT                                  | -0.12 | 0.46 | -0.01   |                   |
| Priming                             | 1.12  | 0.46 | 0.15*   |                   |
| Attachment anxiety                  | 0.20  | 0.77 | 0.20    |                   |
| Attachment avoidance                | -0.74 | 0.65 | -0.08   |                   |
| Step 2                              |       |      |         | 0.66              |
| PANAS-P before priming              | 0.92  | 0.07 | 0.80*** |                   |
| OT                                  | -0.07 | 0.46 | -0.01   |                   |
| Priming                             | 1.11  | 0.46 | 0.15*   |                   |
| Attachment anxiety                  | -0.32 | 0.86 | -0.03   |                   |
| Attachment avoidance                | -0.34 | 0.71 | -0.04   |                   |
| OT X Attachment anxiety             | 1.19  | 0.85 | 0.11    |                   |
| OT X Attachment avoidance           | -0.28 | 0.71 | -0.03   |                   |
| <b>DV: PANAS-P after film clips</b> |       |      |         |                   |
| Step1                               |       |      |         | 0.47***           |
| PANAS-P before priming              | 0.72  | 0.08 | 0.67*** |                   |
| OT                                  | 0.62  | 0.52 | 0.09    |                   |
| Priming                             | -0.20 | 0.52 | -0.03   |                   |
| Attachment anxiety                  | -0.32 | 0.87 | -0.03   |                   |
| Attachment avoidance                | 0.76  | 0.74 | 0.09    |                   |
| Step 2                              |       |      |         | 0.50 <sup>†</sup> |
| PANAS-P before priming              | 0.71  | 0.08 | 0.67*** |                   |
| OT                                  | 0.61  | 0.51 | 0.09    |                   |
| Priming                             | -0.02 | 0.52 | -0.00   |                   |
| Attachment anxiety                  | 0.10  | 0.96 | 0.01    |                   |
| Attachment avoidance                | 1.08  | 0.79 | 0.13    |                   |
| OT X Attachment anxiety             | -0.67 | 0.95 | -0.07   |                   |
| OT X Attachment avoidance           | 1.84  | 0.80 | 0.23*   |                   |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$ , <sup>†</sup> $p = .05$

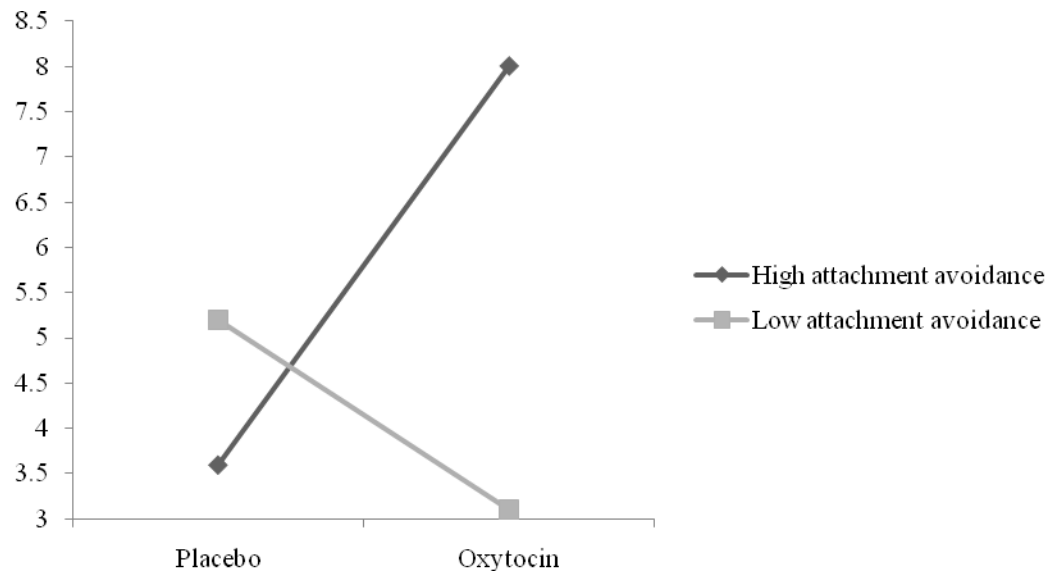


*Figure 3.8* Moderation effect of attachment avoidance on OT for PANAS positive mood after film clips. The vertical axis represents positive mood mean scores.

*Table 3.1 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Arousal After Priming and After Trauma Films*

| Variable                            | B     | SE B | $\beta$ | $R^2$  |
|-------------------------------------|-------|------|---------|--------|
| <b>DV: Arousal after priming</b>    |       |      |         |        |
| Step1                               |       |      |         | 0.21** |
| Arousal before priming              | 0.51  | 0.11 | 0.43*** |        |
| OT                                  | -0.12 | 0.18 | -0.65   |        |
| Priming                             | 0.07  | 0.18 | 0.03    |        |
| Attachment anxiety                  | 0.20  | 0.31 | 0.07    |        |
| Attachment avoidance                | -0.13 | 0.26 | -0.06   |        |
| Step 2                              |       |      |         | 0.23   |
| Arousal before priming              | 0.50  | 0.11 | 0.43*** |        |
| OT                                  | -0.10 | 0.18 | -0.05   |        |
| Priming                             | 0.07  | 0.18 | 0.04    |        |
| Attachment anxiety                  | 0.22  | 0.31 | 0.08    |        |
| Attachment avoidance                | -0.17 | 0.26 | -0.07   |        |
| Priming X Attachment anxiety        | -0.08 | 0.31 | -0.03   |        |
| Priming X Attachment avoidance      | 0.32  | 0.26 | 0.14    |        |
| <b>DV: Arousal after film clips</b> |       |      |         |        |
| Step1                               |       |      |         | 0.15*  |
| Arousal before priming              | 0.33  | 0.13 | 0.26*   |        |
| OT                                  | -0.00 | 0.22 | -0.00   |        |
| Priming                             | 0.05  | 0.22 | 0.02    |        |
| Attachment anxiety                  | 0.01  | 0.36 | 0.00    |        |
| Attachment avoidance                | -0.54 | 0.31 | -0.21   |        |
| Step 2                              |       |      |         | 0.17   |
| Arousal before priming              | 0.32  | 0.13 | 0.25*   |        |
| OT                                  | 0.02  | 0.22 | 0.00    |        |
| Priming                             | 0.05  | 0.22 | 0.02    |        |
| Attachment anxiety                  | -0.01 | 0.37 | -0.00   |        |
| Attachment avoidance                | -0.56 | 0.31 | -0.22   |        |
| Priming X Attachment anxiety        | -0.33 | 0.36 | -0.11   |        |
| Priming X Attachment avoidance      | 0.43  | 0.30 | 0.16    |        |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$

*Table 3.2 Regression Analysis Testing Moderation of Attachment dimensions on Oxytocin for Arousal After Priming and After Trauma Films*

| Variable                            | B     | SE B | $\beta$ | $R^2$  |
|-------------------------------------|-------|------|---------|--------|
| <b>DV: Arousal after priming</b>    |       |      |         |        |
| Step1                               |       |      |         | 0.20** |
| Arousal before priming              | 0.51  | 0.11 | 0.43*** |        |
| OT                                  | -0.12 | 0.18 | -0.06   |        |
| Priming                             | 0.07  | 0.18 | 0.03    |        |
| Attachment anxiety                  | 0.20  | 0.31 | 0.07    |        |
| Attachment avoidance                | -0.13 | 0.26 | -0.06   |        |
| Step 2                              |       |      |         | 0.23   |
| Arousal before priming              | 0.50  | 0.11 | 0.43*** |        |
| OT                                  | -0.10 | 0.18 | -0.56   |        |
| Priming                             | 0.03  | 0.18 | 0.01    |        |
| Attachment anxiety                  | -0.09 | 0.35 | -0.03   |        |
| Attachment avoidance                | -0.01 | 0.28 | -0.00   |        |
| OT X Attachment anxiety             | 0.60  | 0.34 | 0.22    |        |
| OT X Attachment avoidance           | -0.39 | 0.29 | -0.17   |        |
| <b>DV: Arousal after film clips</b> |       |      |         |        |
| Step1                               |       |      |         | 0.11*  |
| Arousal before priming              | 0.33  | 0.13 | 0.26*   |        |
| OT                                  | -0.00 | 0.22 | -0.00   |        |
| Priming                             | 0.05  | 0.22 | 0.02    |        |
| Attachment anxiety                  | 0.01  | 0.36 | 0.00    |        |
| Attachment avoidance                | -0.54 | 0.31 | -0.21   |        |
| Step 2                              |       |      |         | 0.11   |
| Arousal before priming              | 0.33  | 0.13 | 0.25*   |        |
| OT                                  | 0.00  | 0.22 | 0.00    |        |
| Priming                             | 0.04  | 0.22 | 0.02    |        |
| Attachment anxiety                  | -0.03 | 0.41 | -0.01   |        |
| Attachment avoidance                | -0.53 | 0.34 | -0.21   |        |
| OT X Attachment anxiety             | 0.09  | 0.41 | 0.03    |        |
| OT X Attachment avoidance           | -0.11 | 0.34 | -0.04   |        |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$

*Table 3.3 Regression Analysis Testing Moderation of Attachment Dimensions on Priming for Happiness After Priming and After Films*

| Variable                              | B     | SE B | $\beta$ | $R^2$   |
|---------------------------------------|-------|------|---------|---------|
| <b>DV: Happiness after priming</b>    |       |      |         |         |
| Step1                                 |       |      |         | 0.45*** |
| Happiness before priming              | 0.74  | 0.10 | 0.58*** |         |
| OT                                    | -0.03 | 0.13 | -0.01   |         |
| Priming                               | 0.37  | 0.13 | 0.02**  |         |
| Attachment anxiety                    | -0.05 | 0.22 | -0.02   |         |
| Attachment avoidance                  | -0.17 | 0.19 | -0.08   |         |
| Step 2                                |       |      |         | 0.46    |
| Happiness before priming              | 0.74  | 0.10 | 0.58*** |         |
| OT                                    | -0.04 | 0.13 | -0.02   |         |
| Priming                               | 0.37  | 0.13 | 0.22**  |         |
| Attachment anxiety                    | -0.03 | 0.23 | -0.01   |         |
| Attachment avoidance                  | -0.16 | 0.19 | -0.08   |         |
| Priming X Attachment anxiety          | 0.23  | 0.22 | 0.10    |         |
| Priming X Attachment avoidance        | -0.23 | 0.19 | -0.11   |         |
| <b>DV: Happiness after film clips</b> |       |      |         |         |
| Step1                                 |       |      |         | 0.16**  |
| Happiness before priming              | 0.31  | 0.11 | 0.26**  |         |
| OT                                    | 0.34  | 0.15 | 0.21*   |         |
| Priming                               | -0.09 | 0.16 | -0.06   |         |
| Attachment anxiety                    | -0.57 | 0.26 | -0.25*  |         |
| Attachment avoidance                  | 0.55  | 0.22 | 0.29*   |         |
| Step 2                                |       |      |         | 0.22*   |
| Happiness before priming              | 0.31  | 0.11 | 0.26**  |         |
| OT                                    | 0.36  | 0.15 | 0.22*   |         |
| Priming                               | -0.09 | 0.15 | -0.06   |         |
| Attachment anxiety                    | -0.46 | 0.26 | -0.21   |         |
| Attachment avoidance                  | 0.51  | 0.21 | 0.27*   |         |
| Priming X Attachment anxiety          | 0.49  | 0.25 | 0.22*   |         |
| Priming X Attachment avoidance        | 0.08  | 0.21 | 0.04    |         |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$

*Table 3.4. Regression Analysis Testing Moderation of Attachment Dimensions on Oxytocin for Happiness After Priming and After Trauma Films*

| Variable                              | B     | SE B | $\beta$            | $R^2$   |
|---------------------------------------|-------|------|--------------------|---------|
| <b>DV: Happiness after priming</b>    |       |      |                    |         |
| Step1                                 |       |      |                    | 0.45*** |
| Happiness before priming              | 0.74  | 0.10 | 0.58***            |         |
| OT                                    | -0.03 | 0.13 | -0.01              |         |
| Priming                               | 0.37  | 0.13 | 0.22**             |         |
| Attachment anxiety                    | -0.05 | 0.22 | -0.22              |         |
| Attachment avoidance                  | -0.17 | 0.19 | -0.89              |         |
| Step 2                                |       |      |                    | 0.52**  |
| Happiness before priming              | 0.73  | 0.09 | 0.58***            |         |
| OT                                    | -0.00 | 0.13 | -0.00              |         |
| Priming                               | 0.31  | 0.13 | 0.18*              |         |
| Attachment anxiety                    | -0.46 | 0.24 | -0.19 <sup>†</sup> |         |
| Attachment avoidance                  | -0.01 | 0.19 | -0.00              |         |
| OT X Attachment anxiety               | 0.81  | 0.24 | 0.34**             |         |
| OT X Attachment avoidance             | -0.58 | 0.20 | -0.29**            |         |
| <b>DV: Happiness after film clips</b> |       |      |                    |         |
| Step1                                 |       |      |                    | 0.16**  |
| Happiness before priming              | 0.31  | 0.11 | 0.26**             |         |
| OT                                    | 0.34  | 0.15 | 0.21               |         |
| Priming                               | -0.09 | 0.16 | -0.06*             |         |
| Attachment anxiety                    | -0.57 | 0.26 | -0.25*             |         |
| Attachment avoidance                  | 0.55  | 0.22 | 0.29*              |         |
| Step 2                                |       |      |                    | 0.22*   |
| Happiness before priming              | 0.32  | 0.11 | 0.27**             |         |
| OT                                    | 0.34  | 0.16 | 0.21*              |         |
| Priming                               | -0.07 | 0.16 | -0.04              |         |
| Attachment anxiety                    | -0.53 | 0.29 | -0.24              |         |
| Attachment avoidance                  | 0.61  | 0.24 | 0.32               |         |
| OT X Attachment anxiety               | -0.03 | 0.29 | -0.01              |         |
| OT X Attachment avoidance             | 0.22  | 0.24 | 0.11               |         |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$ , <sup>†</sup> $p = .06$

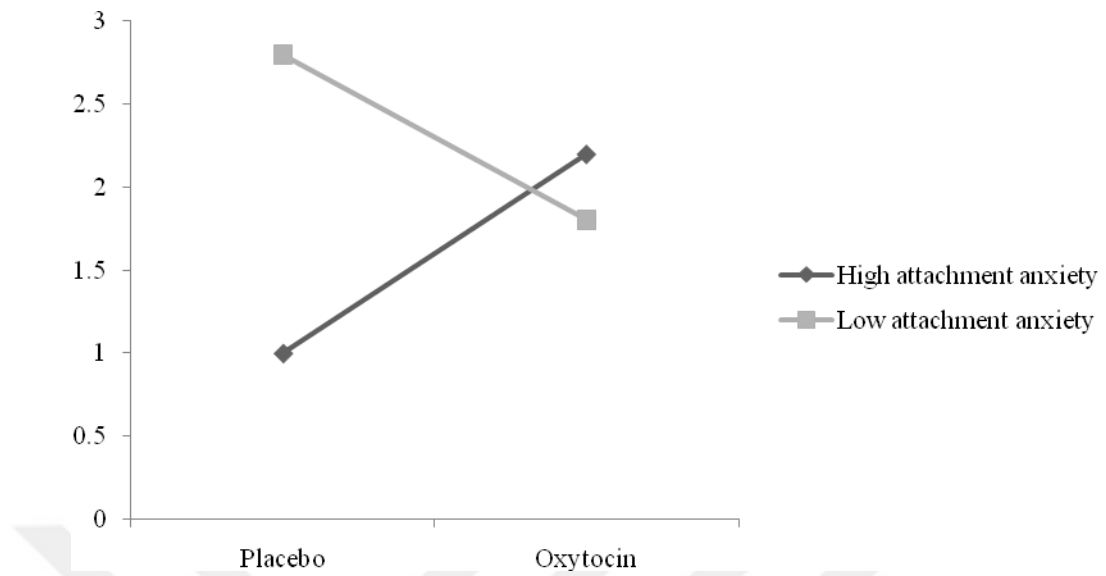


*Figure 3.9* Moderation effect of attachment anxiety on OT for happiness after priming. The vertical axis represents happiness mean scores.

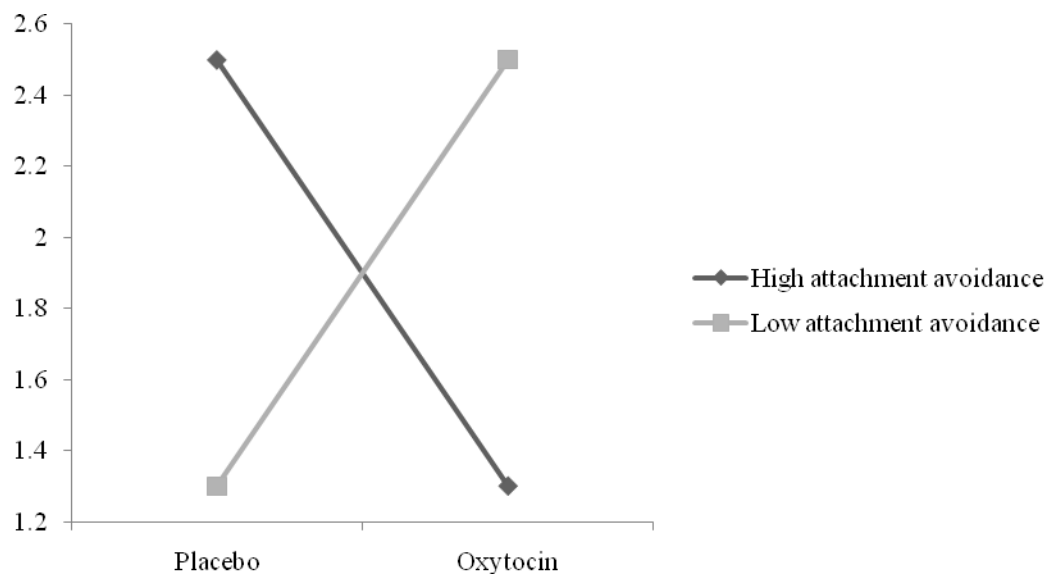


*Figure 4.1* Moderation effect of attachment avoidance on OT for happiness after priming. The vertical axis represents happiness mean scores.

## CHAPTER 6: General Discussion

The main aim of the current thesis was to provide a better understanding of the factors associated with negative and positive changes after traumatic events and to explain how adult attachment might contribute to this process as a protective factor. A theoretical framework that incorporated early trauma experience (Hankin, 2005; McLewin & Muller, 2006; Muller et al., 2000; Stovall-McClough & Cloitre, 2006), attachment (Fraley et al., 2006a; Mikulincer et al., 1993; Schottenbauer, et al., 2006; Shapiro, & Levendosky, 1999; Solomon et al., 1998; Wei et al., 2003) and self-esteem (Bryant & Guthrie, 2007; Cox, MacPherson, Enns, & McWilliams, 2004; Lee, 2008) into Ehlers and Clark's (2001) model was suggested. Previous studies in the literature on attachment and adult psychopathology specifically emphasized the maladaptive role of insecure attachment styles for the development of various psychopathologies (Hankin, 2005; McLewin & Muller, 2006; Muller et al., 2000; Stovall-McClough & Cloitre, 2006) and for the development of PTSD (Fraley et al., 2006a; Mikulincer et al., 1993; Schottenbauer, et al., 2006; Shapiro, & Levendosky, 1999; Solomon et al., 1998; Wei et al., 2003). However, the emotion regulation mechanisms for PTSD and for the development of PTG have not been considered with regard to attachment theory and within a model focusing on the associations between attachment, posttraumatic cognitions, PTSD and PTG. The aim of the first study in the thesis was to understand these associations from Ehlers and Clark's (2000) point of view while integrating Mikulincer and Shaver's (2007) emotion regulation model of attachment. To address these issues, the thesis explored the mediating effects of attachment avoidance and attachment anxiety between early trauma and self esteem; and between early trauma and posttraumatic cognitions. In addition, the thesis examined the mediating effects of self-esteem and posttraumatic cognitions between the different attachment dimensions and PTSD; and between the attachment dimensions and PTG. In the first study, structural equation modelling was used to examine the pathways to PTSD and PTG in a large sample. The second study, on the other hand, aimed to evaluate whether attachment relationship status operated as a protective factor for an analogue of traumatic stress. The second study also aimed to explore the psychopathological and physiological mechanisms underneath PTSD by examining the effect of OT as well as the effect of secure attachment priming in analogue trauma exposure.

The studies in the thesis found that post-traumatic cognitions and self-esteem mediate the relationship between early traumas and attachment anxiety, and PTSD. In addition, PTSD was positively associated with PTG, whereas, attachment avoidance was negatively associated with PTG. The results of the second study, which measured the effects of secure priming and OT on priming and trauma film processing, showed that secure priming could increase felt-security and happiness after priming. However, combining both priming and OT did not have an effect on negative mood and positive mood after the prime or after the trauma film clips. Individuals with secure priming found the trauma films more distressing and more personally relevant. Individuals who received OT showed less attention to films, found the films less distressing and adopted a third person perspective while watching the films.

In the first part of the discussion, I will focus on the role of attachment styles on re-appraising a traumatic event and consider how different attachment styles may contribute to PTSD and PTG while referring to the findings of the second study of the thesis. The results of the first study will also be explained according to Brewin's (2003) and Ehlers and Clark's (2000) models. Then I will focus on study two, which employed an experimental approach to manipulate felt security by priming and OT, and I will discuss the role of felt-security and OT in the psychological outcomes of trauma. I will refer to Heinrichs and Domes's (2008), Mikulincer and Shaver's (2007) models and to Ehlers and Clark's (2000) model while elaborating on the results of two studies. Finally, I will address the implications of the research presented for future studies.

### **Reappraising the traumatic event**

In Ehlers and Clark's (2000) model, one of the basic assumptions is that experiences prior to a traumatic event could have an impact on cognitive processing during and after the traumatic event. To understand the development of PTSD and vulnerability factors it is important to adopt a point of view which provides a developmental perspective, such as attachment theory. A number of studies revealed that different factors such as posttraumatic cognitions, and social support, are associated with traumatic stress (Ozer, et al., 2003). These factors could also be relevant to attachment relationships. Therefore, early adverse events effects, attachment anxiety, and attachment avoidance were investigated in order to explore their contribution to self-view, posttraumatic cognitions, PTSD and PTG.

Although in many studies the link between PTSD and PTG has been discussed (Linley & Joseph, 2004; Zoellner & Maercker, 2007), there is no model that explicitly proposes specific individual factors leading to PTSD and PTG in a cognitive framework. Therefore, the addition of PTG into Ehlers and Clark's (2000) model of PTSD was tested in order to understand the effect of early experiences on negative and positive changes in a cognitive framework for the first time. The SEM model for PTSD revealed that there was a positive association between attachment anxiety and posttraumatic cognitions, between attachment anxiety and negative posttraumatic cognitions, and between negative posttraumatic cognitions and PTSD. However, apart from the effect of PTSD, the main determinant of PTG was having low attachment avoidance. It seems that attachment anxiety has an impact on PTSD in that it initially negatively influences self-esteem, and posttraumatic cognitions, and attachment avoidance contributes to PTG. Furthermore, these findings suggest that the effect of early traumatic events, attachment anxiety, self-esteem and posttraumatic cognitions could be important for PTG but only via PTSD. It provides a better understanding of how different factors could contribute to PTSD as risk factors and to PTG as facilitators.

Tedeschi and Calhoun (1996) suggested that posttraumatic growth could take place only if individuals' basic assumptions related to self-view and world-view were challenged, which often leads to PTSD. As a result, participants could report PTSD while they also report PTG. The first study showed that there is an association between early traumas and attachment styles which are related to post-traumatic cognitions. Individuals with high attachment anxiety and more early traumas seem to be more likely to report negative post-trauma cognitions and this would have negatively influenced their traumatic stress in the study. On the other hand, those who have low attachment anxiety might already have stronger, and more positive self-views and world views compared to those who are high on attachment anxiety and attachment avoidance. As a result, those individuals might cope better with a traumatic event due to both their emotion regulation strategies (Mikulincer & Shaver, 2007) and through accessing supportive social networks. However, attachment anxiety and attachment avoidance may not serve this coping process effectively because attachment anxiety is positively associated with PTSD and attachment avoidance is negatively associated with PTG. In the first study, attachment anxiety was a specific risk factor for PTSD through its influence on self-

esteem and posttraumatic cognitions. Although high attachment avoidance did not appear to be a risk factor for PTSD, it was negatively associated with PTG. In other words, individuals with high attachment avoidance find it more difficult to re-appraise the traumatic event and thus to change their perspective in life in a positive direction following a trauma. Being highly avoidant may inhibit individuals from facing and re-appraising the trauma and this might be related to their negative view of others, which prevents them from establishing a reciprocal relationship with others. This in turn might limit their ability to re-assess the traumatic event. Even though individuals with high attachment avoidance have a positive view of self their lack of ability to form and maintain relationships seems to be problem for re-examining the trauma and reporting PTG.

Having a social outlet to share feelings and difficulties related to the trauma may facilitate active coping and expressing the trauma like a story may help cognitive processing as suggested in Brewin (2003). Attachment avoidance might be a risk factor, especially for improving positive contact with partners and friends. By this potential lack of social contact, individuals may actually talk less and try to think less about trauma (i.e., the avoidance symptoms of PTSD may be exacerbated and prevent adaptive processing of the event). As he suggested, individuals who have experienced traumatic events have trouble in expressing the traumatic event in a narrative form, although they distinctively remember the sensory cues.

According to Brewin (2003), one of the most important ways of coping with trauma is to express it in a narrative format and transfer the traumatic memories from the SAM to the VAM memory system. Since many trauma-related memories are registered in sensual cues and with the use of the SAM memory system (Brewin, 2003), the use of the VAM memory for trauma-related information might allow individuals to have access to their trauma memories as a whole and to make sense out of it more easily by expressing it in a narrative. Sharing feelings and experiences with others and finding comfort during this process might actually reinforce re-appraising the traumatic event. Sharing trauma related memories enables activating VAM memory system and organizing the trauma memory with use of VAM memory system. In addition, during this sharing experience individuals could obtain social support and ease their stress. However, avoidant individuals cannot make use of such shared experiences and, therefore would have to manage the adverse effects of the traumatic event on their own because attachment avoidance reduces the opportunity

to use social contact to see trauma in new ways and from alternative angles or to re-examine their life-style. As a result, attachment avoidance may hinder posttraumatic growth as a process.

On the other hand, attachment anxiety may contribute to PTSD due to individuals' hypervigilance and their preoccupation with stress-related cues. Mikulincer and Shaver (2007) suggest that individuals with high attachment anxiety are likely to pay more attention to stress cues related to attachment and therefore their hypervigilance is associated with their preoccupation about their relationships. This hypervigilance and sensitivity to attachment-related stress might be relevant to coping with stress following a trauma. Individuals' attachment anxiety seems to be associated with PTSD and lack of coping with the effects of trauma in the current thesis. Furthermore, their sensitivity to stress and stress cues may lead to registering the traumatic event in SAM memory and sensual cues according to Brewin (2003). In other words, individuals' emotion regulation strategies in their relationships and stress regulation are similar. As a result, high attachment anxiety may serve continuation of the symptoms as well as preventing individuals from making use of social support due to their preoccupation in their relationships.

In the SEM models tested in the first study, attachment anxiety and attachment avoidance have different effects on PTSD and PTG. In the next section, I will focus on the effect of attachment dimensions on trauma processing and emotion regulation in more detail.

### **The effect of attachment dimensions on trauma processing**

The SEM models of PTSD provided support for a positive association between attachment anxiety and PTSD, which is in line with earlier research (Besser et al., 2009; Besser & Neria, 2010). Those who have high attachment anxiety by remembering the traumatic event with flashbacks and nightmares probably engage in a hypervigilant emotion regulation strategy which may affect their coping due to becoming overly anxious. Since they have a negative view of self that was shaped by their early experiences, they may also attribute the traumatic event to personal reasons and could blame themselves. The negative association between attachment anxiety and self-esteem, and attachment anxiety and posttraumatic cognitions supports this view. As a result, having an anxious attachment style might make the individual more vulnerable to the negative effects of trauma, and thus such an

individual may suffer from traumatic stress more than those who are low in attachment anxiety.

Attachment anxiety could be a drawback in terms of emotion regulation but it could also affect appraisals of social support. Individuals with high attachment anxiety may become preoccupied with receiving help from others, could be demanding and may perceive the received help as not sufficient to sooth their stress even though they could benefit from it. Their preoccupation with their relationships and their urge to be supported may be hard and frustrating for the ones who provide this support. This might be a handicap in terms of their relationships. Although attachment anxiety seems to be a risk factor for the development of PTSD, as shown in the first study, individuals with high attachment anxiety responded better than those with low attachment anxiety to secure attachment priming as indicated by reductions in their negative mood, which is demonstrated in the moderation analysis of the second study. Secure attachment priming might have reduced their attachment-related anxieties, as demonstrated in Carnelley and Rowe (2007). In time of stress, remembering a secure relationship might have provided them with a temporary safe-haven, which may have reduced their negative emotional state. The felt-security induced by priming temporarily changes the self-view of individuals with high attachment anxiety. In studies it has also been shown that the activation of secure attachment positively affects individuals' self-view (Carnelley & Rowe, 2007), which might be an important determinant of well-being following an adverse life event (Cozzarelli, et al., 1998). The results from the second study of this thesis showed that individuals in the secure prime condition reported more happiness and felt-security following the priming compared to the neutral prime group. As a result, these findings suggest that reducing the distress of trauma survivors with high attachment anxiety by offering them a secure relationship in psychotherapy might be possible.

A key element here, namely having an effective social network may actually help individuals to put their feelings and gather their fragmented experiences about the trauma into a narrative form. Even though attachment avoidance seems to be a disadvantage for PTG, it might function as a defense mechanism. The moderating effect of attachment avoidance on OT for positive mood after trauma films indicates that attachment avoidance functions as a defense and could maintain individuals' positive mood. However, the participants of the second study are not survivors of

real traumas and this only shows that the negative effect of trauma films might have been avoided by the individuals. Therefore, manipulating or trying to disentangle this defence mechanism is a critical decision during psychotherapy. Although Mikulincer et al. (1993) demonstrated that attachment avoidance might be associated with the avoidant symptoms of PTSD, in the current thesis attachment avoidance was not directly associated with PTSD. However, in the second study individuals with high attachment avoidance who were in the OT group reported more positive mood following trauma films. This may indicate that they tried to suppress the negative effect of the trauma films. In addition, the marginally positive association between OT and watching films from a third person's perspective might have contributed to this avoidance process. In other words, OT was associated with taking a third person's perspective. Here OT, with its anxiolytic effect may play a key role and could facilitate the avoidance defense and this could explain the reports of increased positive mood.

It is important to know that early experiences and attachment styles may not only have an effect on the psychology of the person, but also on the physiology of the individual. One of the mechanisms associated with social interaction and coping with stress is the oxytocinergic system of individuals (Fries et al., 2008; Heim, et al., 2008; Heinrichs & Domes, 2008). The oxytocinergic system of the person would provide information regarding the physiological effects of adverse life events as well as their attachment styles (Fries et al., 2008; Heim et al., 2008; Strathearn et al., 2009). It may provide information as to whether individuals who have had adverse early experiences or insecure attachment may benefit from nasal OT and improve their social interactions within their social network and during psychotherapy (Heinrichs & Domes, 2008). In the next section, I will discuss the potential role of OT during the emotion regulation of traumatic stress

### **Can transient activation of secure attachment and oxytocin protect against PTSD?**

The main focus of the second study was to understand whether an intervention that induces a state of secure attachment either with a priming method (Carnelley & Rowe, 2007) or with the administration of OT (Heinrichs, 2000) would alter the individuals' psychological and physiological reactions towards traumatic stimuli. It was found that temporary activation of secure attachment influences a person's current mood after priming, as well as individual evaluations regarding the

trauma film clips after watching trauma films. However, the effect of secure priming and OT was more influential after the secure priming rather than following trauma film exposure.

There was no effect of OT on any of the mood measures especially following the film clips. This demonstrates that OT's anxiolytic effect did not endure, or alternatively that the trauma films induced a lot of stress, which was not suppressed by the effect of OT. There was also no effect of OT and secure priming or their combined effect on intrusions. This suggests that the secure priming and OT manipulation did not have an impact on the processing and encoding of the trauma films. A key hypothesis was that the soothing effect of both secure priming and OT on trauma film processing, individuals would report fewer intrusions. This was not confirmed in the current study. It seems that OT and symbolic activation of secure priming did not change individuals psychological and physiological responses to the trauma film, as a result their combined effect did not make a difference in the intrusion reports of participants. This means that combined effect of secure priming and OT in an analogue trauma paradigm did not produce the expected impact.

#### **Role of individual differences in attachment style for success of oxytocin**

One of the main contributions of the second study of the thesis was to evaluate the effect of pre-trauma attachment style on priming and OT. There are studies that show the moderating effect of attachment anxiety on OT for interpersonal trust (Bartz, 2009, 2010). However, the moderating effect of attachment anxiety on negative mood and the moderating effect of attachment avoidance on happiness in the second study are novel. Specifically, individuals with high attachment anxiety benefited from OT more than those who received a placebo. Moreover the individuals with high attachment avoidance, who received OT, reported more positive mood after the film clips. These moderating effects show that OT might have an anxiolytic effect especially on those with high attachment anxiety, and as a result they may report less negative mood. However, for the high attachment avoidance group, OT boosted mood following the films. This result might be related to attentional differences between the OT and placebo group. In this study, the OT group reported less attention to films, therefore they might not have been affected by the films as much as the placebo group. This reduced attention to the films combined with attachment avoidance may have influenced their positive mood.

These findings on the moderating effects of attachment styles on OT could be explained by referring to studies that investigate the association between adverse early experiences and their negative effects on the oxytocinergic system, which indicate lower levels of plasma OT and central OT in the brain (Fries et al., 2008; Heim et al., 2008). The current findings of the OT study demonstrated that not only early adverse experiences (Fries et al., 2008; Heim et al., 2008), but also individual differences in attachment styles could play a role in the effects of nasal administration of OT as attachment anxiety and attachment avoidance both moderated the impact of OT. Nevertheless, it is not clear whether participants' plasma levels of OT affects the link between attachment anxiety and attachment avoidance, and response to nasal administration of OT (Strathearn et al., 2009) or whether there are other underlying reasons (i.e., specific early traumas; testosterone cortisol levels of individuals) which mediate this relationship. To understand such a mediation effect, it is crucial to measure individuals' early experiences, especially emotional abuse histories (Heim et al., 2008), or deprivation histories (Fries et al., 2008), and then their attachment styles as well as plasma levels of OT before nasal OT administration. These measurements as a whole could provide a more detailed explanation of the specific links between early experiences, and their effects on both attachment styles and on the neuroendocrinological response to nasal OT. Moreover, their effect on emotion regulation and on the development of psychopathology could be better understood when individuals' hormonal markers, OT levels are checked.

It seems that trauma survivors, who have insecure attachment styles with early abuse histories should be considered separately in terms of OT's effect because their susceptibility to OT might be low (Fries et al., 2008; Heim et al., 2009). Those who are avoidant and had early abuse may not respond to OT (Bucheim et al., 2009). According to the results (Bartz, 2009, 2010), people with high attachment anxiety could benefit more than individuals with low attachment anxiety. Therefore, before integrating OT use into the treatment of PTSD or psychotherapy, it is crucial to have more information on individuals' background and general relationship characteristics.

Both studies in this thesis emphasize the importance of early experiences for negative and positive changes following trauma exposure. Although temporary activation of secure attachment and the use of OT could be beneficial in terms of psychological outcomes, their effects were not present at the physiological (heart-

rate) and symptom levels (intrusions). Nonetheless, interaction effects between secure attachment priming and OT for negative mood after the prime and the moderation effect of attachment styles on the effects of OT after prime and films should be examined further on the context of real traumatic events and trauma survivors. In the next section I will present the implications of the studies.

### **Implications.**

According to Brewin (2003), one of the major accomplishments for a trauma survivor is to express the traumatic event in a narrative form. Since sensual cues are more actively registered during the traumatic event, individuals could have difficulty in verbalizing the impact of trauma. Sharing the traumatic event with someone, especially with a person (e.g., psychotherapist) who can serve as a safe haven and provide the secure base functions of attachment, might facilitate expressing the trauma in a narrative form and dealing with the negative emotions due to trauma. In addition, by sharing the traumatic experience, an individual could have an opportunity to re-appraise the traumatic event and to identify aspects that could be developed in order to change the perspective in life and this may help to develop PTG.

Being a secure attachment figure as a psychotherapist in the form of re-parenting, in which the main purpose is to guide the clients to developing healthier corrective emotional experiences in terms of their relationships and earlier relationship patterns, has been considered in psychodynamic-oriented psychotherapies such as transactional analysis (Bernes, 1977), and more recently in schema-focused cognitive therapy (Young, 1999; Bernstein, Arntz & de Vos, 2007). According to these therapies, it should be the psychotherapist's priority to investigate previous relationships and address the current problems experienced by the individual. The early relationship patterns and early traumatic experiences not only affect the person's communication with the psychotherapist, but also affect his or her emotion regulation strategies, cognitions regarding self and others, and post-trauma cognitions. These attachment-related factors might be the underlying issues for both PTSD, and the individual's likelihood of finding positive meaning following the traumatic event.

For psychotherapy, making use of nasal administration of OT as a treatment option during psychotherapy as suggested in Heinrichs and Domes's (2008) model might be applicable and useful only if the individuals' personal histories regarding

previous adverse life events and attachment styles are considered. Therefore, in their model (Heinrichs & Domes, 2008, p. 346), early adverse experiences and attachment styles might be inserted as mediators between the central oxytocinergic system and anxiety stress as well as between OT stimulation and the central oxytocinergic system. Knowing the mediating effect of attachment styles in these paths would make it more efficient to use OT as a helping element for psychotherapy.

### **Future research.**

Future research should consider four main areas that could not be addressed in the thesis. First, the results of both studies should be re-assessed individuals with PTSD. The effect of secure priming and OT should be tested on trauma survivors which may yield different results in terms of increased soothing effect of secure priming and OT.

Second, a longitudinal study regarding the effects of trauma and the development of PTG would be useful in order to understand whether there are specific times or situational factors that may contribute the PTG process. To address this question, individuals who are likely to undergo traumatic events such as fire-fighters and police officers could be recruited before they start active work as studied by Bryant and Guthrie (2007). To investigate such a sample would provide more information regarding the protective effect of attachment and physiological factors which might be related to PTSD, trauma coping and social support (i.e., OT).

Third, there are no studies which test the effects of secure priming and OT on PTSD and other anxiety disorders. Moreover, to use other methods to assess temporary activation of secure attachment in the course of treatment (i.e., making them write and think about secure relationships or read novels or watch movies in which secure attachment relationships could be viewed) and nasal administration of OT might be helpful. By the help of secure attachment priming and OT administration, individuals may experience less negative mood and feel more secure while coping with trauma. It could be part of psychotherapy and individuals could benefit from effects of secure priming and OT when they cannot have access to social support or a therapist.

The overall aim of the thesis was to understand the emotion regulation of traumatic stress. The results of studies conducted for the thesis revealed that attachment related factors, early traumas, post-traumatic cognitions, and self-esteem are associated with PTSD and PTSD with attachment avoidance contributing to

PTG. However, the effect of secure priming and OT did not significantly change individuals' reactions to films or the intrusions after the trauma films. In conclusion, dispositional attachment plays an important role during the emotion regulation of traumatic stress. Besides, attachment theory could provide a deeper understanding for post-trauma psychological problems and offer a helpful tool for treatment.



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## Appendix A

Table. Regression analysis testing moderation interaction effect of attachment anxiety and attachment avoidance on PTSD symptom clusters

| Variable                                  | B     | SE B | $\beta$ | $R^2$ |
|-------------------------------------------|-------|------|---------|-------|
| DV: PTSD Avoidance                        |       |      |         |       |
| Step1                                     |       |      |         | 0.03  |
| Attachment anxiety                        | 0.26  | 0.08 | 0.17    |       |
| Attachment avoidance                      | 0.02  | 0.05 | 0.02**  |       |
| Step 2                                    |       |      |         | 0.03  |
| Attachment anxiety                        | 0.28  | 0.11 | 0.18    |       |
| Attachment avoidance                      | 0.02  | 0.05 | 0.02*   |       |
| Attachment anxiety X Attachment avoidance | -0.01 | 0.05 | -0.01   |       |
| DV: PTSD Numbing                          |       |      |         |       |
| Step1                                     |       |      |         | 0.06  |
| Attachment anxiety                        | 0.58  | 0.14 | 0.22*** |       |
| Attachment avoidance                      | 0.05  | 0.09 | 0.03    |       |
| Step 2                                    |       |      |         | 0.08  |
| Attachment anxiety                        | 0.98  | 0.19 | 0.38*** |       |
| Attachment avoidance                      | 0.03  | 0.09 | 0.02    |       |
| Attachment anxiety X Attachment avoidance | -0.27 | 0.09 | -0.21** |       |
| DV: PTSD Hyperarousal                     |       |      |         |       |
| Step1                                     |       |      |         | 0.03  |
| Attachment anxiety                        | 0.41  | 0.15 | 0.15**  |       |
| Attachment avoidance                      | 0.07  | 0.09 | 0.04    |       |
| Step 2                                    |       |      |         | 0.04  |
| Attachment anxiety                        | 0.70  | 0.20 | 0.26**  |       |
| Attachment avoidance                      | 0.06  | 0.09 | 0.03    |       |
| Attachment anxiety X Attachment avoidance | -0.19 | 0.09 | -0.14*  |       |

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .001$ ,  $^\dagger p = .06$

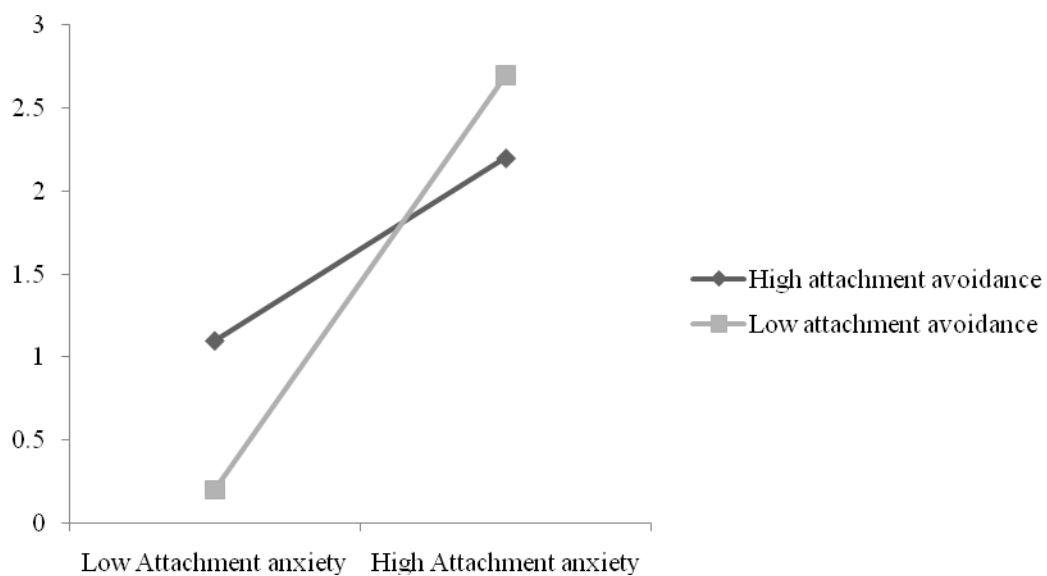


Figure. Attachment anxiety and attachment avoidance moderation on PTSD numbing symptom

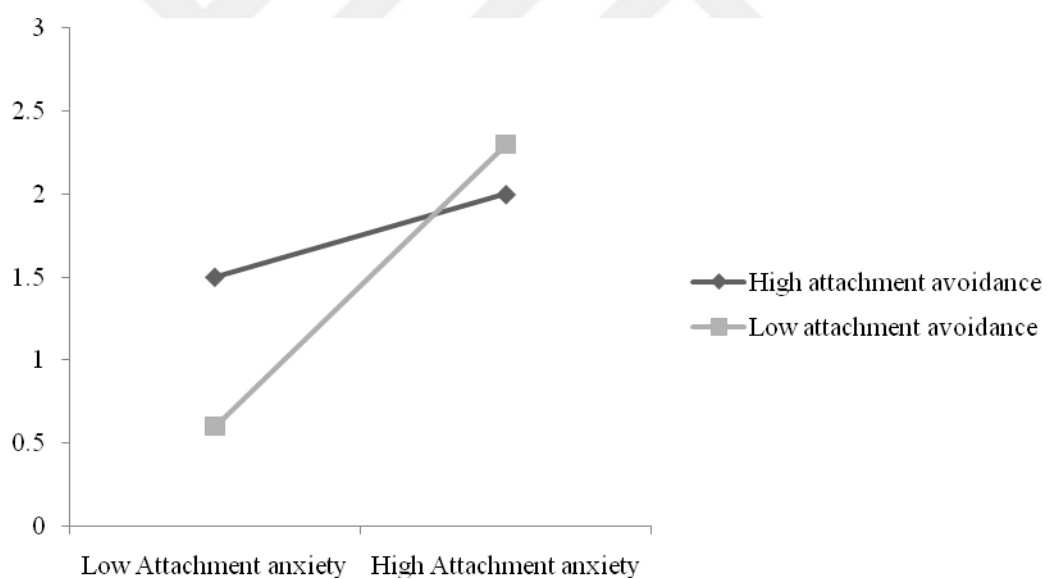


Figure. Attachment anxiety and attachment avoidance moderation on PTSD hyperarousal symptom

## Appendix B

Table. ANOVA for happiness (with gender effect)

| Source                       | df | F     | $\eta_p^2$ | P     |
|------------------------------|----|-------|------------|-------|
| DV: Happiness                |    |       |            |       |
| Between Subjects             |    |       |            |       |
| Priming                      | 1  | 8.61  | 0.06       | .015  |
| OT                           | 1  | 0.96  | 0.01       | .330  |
| Gender                       | 1  | 0.17  | 0.00       | .680  |
| Priming X OT                 | 1  | 0.04  | 0.00       | .837  |
| Priming X Gender             | 1  | 1.57  | 0.01       | .212  |
| OT X Gender                  | 1  | 0.07  | 0.00       | .781  |
| Priming X OT X Gender        | 1  | 1.59  | 0.01       | .211  |
| Within Subjects              |    |       |            |       |
| Time                         | 2  | 62.42 | 0.41       | <.001 |
| Time X Priming               | 2  | 1.97  | 0.15       | .022  |
| Time X OT                    | 2  | 3.33  | 0.03       | .047  |
| Time X Gender                | 2  | 0.25  | 0.00       | .773  |
| Time X OT X Gender           | 2  | 0.42  | 0.05       | .615  |
| Time X Priming X OT          | 2  | 0.61  | 0.00       | .515  |
| Time X Priming X Gender      | 2  | 0.46  | 0.05       | .591  |
| Time X Priming X OT X Gender | 2  | 1.26  | 0.01       | .281  |
| Error                        | 88 |       |            |       |

Table. ANOVA for film ratings (with gender effect)

| Source                                     | df | F    | $\eta_p^2$ | P    |
|--------------------------------------------|----|------|------------|------|
| Trauma film ratings (after films)          |    |      |            |      |
| <b>DV: Attention paid to the films</b>     |    |      |            |      |
| Priming                                    | 1  | 0.27 | .00        | .604 |
| OT                                         | 1  | 5.49 | .05        | .021 |
| Gender                                     | 1  | .014 | .01        | .510 |
| Priming X OT                               | 1  | 0.27 | .01        | .604 |
| OT X Gender                                | 1  | 1.28 | .01        | .259 |
| Priming X Gender                           | 1  | 1.08 | .01        | .300 |
| OT X Priming X Gender                      | 1  | 2.20 | .02        | .141 |
| <b>DV: Distress after the films</b>        |    |      |            |      |
| Priming                                    | 1  | 4.97 | .05        | .028 |
| OT                                         | 1  | 3.59 | .03        | .061 |
| Gender                                     | 1  | 6.00 | .06        | .016 |
| Priming X OT                               | 1  | 0.68 | .00        | .411 |
| Priming X Gender                           | 1  | 2.85 | .03        | .095 |
| OT X Gender                                | 1  | 0.00 | .00        | .967 |
| Priming X OT X Gender                      | 1  | 0.87 | .01        | .352 |
| <b>DV: Personal relevance of the films</b> |    |      |            |      |
| Secure priming                             | 1  | 3.30 | .03        | .072 |
| OT                                         | 1  | 0.03 | .00        | .831 |
| Gender                                     | 1  | 0.74 | .00        | .389 |
| Priming X OT                               | 1  | 1.97 | .02        | .164 |
| Priming X Gender                           | 1  | .000 | .00        | .984 |
| OT X Gender                                | 1  | .254 | .00        | .615 |
| Priming X OT X Gender                      | 1  | .635 | .00        | .428 |
| <b>DV: Perspective taking</b>              |    |      |            |      |
| Secure priming                             | 1  | 1.42 | .01        | .236 |
| OT                                         | 1  | 3.02 | .03        | .086 |
| Gender                                     | 1  | 0.10 | .00        | .751 |
| Priming X OT                               | 1  | 0.64 | .00        | .424 |
| OT X Gender                                | 1  | 0.44 | .00        | .507 |
| Priming X Gender                           | 1  | 0.05 | .00        | .813 |
| Priming X OT X Gender                      | 1  | 0.00 | .00        | .993 |
| Error                                      | 88 |      |            |      |

## Appendix C

UNIVERSITY OF  
Southampton

Ms Gizem Arikan  
School of Psychology  
University of Southampton  
University Road  
Highfield  
Southampton  
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03 December 2008

Dear Ms Arikan

RGO Ref: 5570

**Project Title The Predictors of Negative and Positive Psychological Changes Aftermath of Adverse Life Events.**

I am writing to confirm that the University of Southampton is prepared to act as sponsor for this study under the terms of the Department of Health Research Governance Framework for Health and Social Care (2nd edition 2005).

The University of Southampton fulfils the role of Research Sponsor in ensuring management, monitoring and reporting arrangements for research. I understand that you will be acting as the Principal Investigator responsible for the daily management for this study, and that you will be providing regular reports on the progress of the study to the Research Governance Office on this basis.

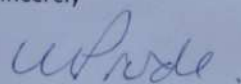
I would like to take this opportunity to remind you of your responsibilities under the terms of the Research Governance Framework, and the EU Clinical Trials Directive (Medicines for Human Use Act) if conducting a clinical trial. We encourage you to become fully conversant with the terms of the Research Governance Framework by referring to the Department of Health document which can be accessed at:

<http://www.dh.gov.uk/assetRoot/04/12/24/27/041224>

In this regard if your project involves NHS patients or resources please send us a copy of your NHS REC and Trust approval letters when available.

Please do not hesitate to contact me should you require any additional information or support. May I also take this opportunity to wish you every success with your research.

Yours sincerely



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## Appendix D



**National Research Ethics Service**  
**SOUTHAMPTON & SOUTH WEST HAMPSHIRE**  
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CM/sta

12 May 2009

Dr Anke Karl  
 Research Director and Lecturer in Clinical Psychology  
 University of Southampton  
 School of Psychology  
 University of Southampton  
 Highfield, Building 44  
 SO171BJ

Dear Dr Karl

**Full title of study:** Do secure attachment priming and oxytocin prevent aversive emotional response, physiological arousal and intrusive memories after processing a trauma film?

**REC reference number:** 09/H0502/54

Thank you for your letter of 05 May 2009, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Vice-Chair.

**Confirmation of ethical opinion**

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

**Ethical review of research sites**

The favourable opinion applies to the research sites listed on the attached form.

**Conditions of the favourable opinion**

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission at NHS sites ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority  
*The National Research Ethics Service (NRES) represents the NRES Directorate within  
 the National Patient Safety Agency and Research Ethics Committees in England*



### Early Trauma Inventory Self Report-Short Form (ETISR-SF)

#### Part 1. General Traumas. Before the age of 18 (Please put a tick)

|                                                                                                    | YES | NO |
|----------------------------------------------------------------------------------------------------|-----|----|
| 1. Were you ever exposed to a life-threatening natural disaster?                                   |     |    |
| 2. Were you involved in a serious accident?                                                        |     |    |
| 3. Did you ever suffer a serious personal injury or illness?                                       |     |    |
| 4. Did you ever experience the death or serious illness of a parent or a primary caretaker?        |     |    |
| 5. Did you experience the divorce or separation of your parents?                                   |     |    |
| 6. Did you experience the death or serious injury of a sibling?                                    |     |    |
| 7. Did you ever experience the death or serious injury of a friend?                                |     |    |
| 8. Did you ever witness violence towards others, including family members?                         |     |    |
| 9. Did anyone in your family ever suffer from mental or psychiatric illness or have a "breakdown"? |     |    |
| 10. Did your parents or primary caretaker have a problem with alcoholism or drug or drug abuse?    |     |    |
| 11. Did you ever see someone murdered?                                                             |     |    |

#### Part 2. Physical Punishment. Before the age of 18 (Please put a tick)

|                                                                         | YES | NO |
|-------------------------------------------------------------------------|-----|----|
| 12. Were you ever slapped in the face with an open hand?                |     |    |
| 13. Were you ever burned with hot water, a cigarette or something else? |     |    |
| 14. Were you ever punched or kicked?                                    |     |    |
| 15. Were you ever hit with an object that was thrown at you?            |     |    |
| 16. Were you ever pushed or shoved?                                     |     |    |

#### Part 3. Emotional Abuse. Before the age of 18 (Please put a tick)

|                                                                                                        | YES | NO |
|--------------------------------------------------------------------------------------------------------|-----|----|
| 17. Were you often put down or ridiculed?                                                              |     |    |
| 18. Were you often ignored or made to feel that you didn't count?                                      |     |    |
| 19. Were you often told you were no good?                                                              |     |    |
| 20. Most of the time were you treated in a cold, uncaring way or made to feel like you were not loved? |     |    |
| 21. Did your parents or caretakers often fail to understand you or your needs?                         |     |    |

#### Part 4. Sexual Events. Before the age of 18 (Please put a tick)

|                                                                                                                                                                  | YES | NO |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 21. Were you ever touched in an intimate or private part of your body (e.g breast, thighs, genitals) in a way that surprised you or made you feel uncomfortable? |     |    |
| 22. Did you ever experience someone rubbing their genitals against you?                                                                                          |     |    |
| 23. Were you ever forced or coerced to touch another person in an intimate or private part of their body?                                                        |     |    |
| 24. Did anyone ever have genital sex with you against your will?                                                                                                 |     |    |
| 25. Were you ever forced or coerced to perform oral sex on someone against your will?                                                                            |     |    |
| 26. Were you ever forced or coerced to kiss someone in a sexual rather than an affectionate way?                                                                 |     |    |

***If you respond any of the above "YES" answer the following for the one that has had the greatest impact on your life. In answering consider how you felt at the time of the event.***

***Write the item number of the event\_\_\_\_\_***

|                                                                         | YES | NO |
|-------------------------------------------------------------------------|-----|----|
| 1. Did you experience emotions of intense fear, horror or helplessness? |     |    |
| 2. Did you feel out-of-your-body or as if you were in a dream?          |     |    |

## PDS

**PART 1**

**Many people have lived through or witnessed a very stressful and traumatic event at some point in their lives. Below is a list of traumatic events. Put a checkmark in box next to ALL of the events that have happened to you or that you have witnessed.**

- (1) ☐ Serious accident, fire, or explosion (for example, an industrial farm, car, plane, or boating accident)
- (2) ☐ Natural disaster (for example tornado, hurricane, flood, or major earthquake)
- (3) ☐ Non-sexual assault by a family member or someone you know (for example, being mugged, physically attacked, shot, stabbed, or held at gunpoint)
- (4) ☐ Non-sexual assault by a stranger (for being mugged, physically attacked, shot, stabbed, or held at gunpoint)
- (5) ☐ Sexual assault by a family member or someone you know (for example, rape or attempted rape)
- (6) ☐ Sexual assault by a stranger (for example rape or attempted rape)
- (7) ☐ Military combat or war zone
- (8) ☐ Sexual contact when you were younger than 18 with someone who was 5 or more years older than you (for example, contact with genitals, breasts)
- (9) ☐ Imprisonment (for example, prison inmate, prisoner of war, hostage)
- (10) ☐ Torture
- (11) ☐ Life-threatening illness
- (12) ☐ Other traumatic events
- (13) If you marked item 12, specify the traumatic event below.

IF YOU MARKED ANY IF THESE ITEMS ABOVE, CONTINUE. IF NOT, STOP HERE.

**PART 2**

**(14) If you marked more than one traumatic event in Part 1, put a checkmark in the box below next to the event that bothers you most. If you marked only one traumatic event in Part 1, mark the one below.**

- ☐ Accident
- ☐ Disaster
- ☐ Non-sexual assault/someone you know
- ☐ Non-sexual assault/stranger
- ☐ Sexual assault/someone you know
- ☐ Sexual assault/stranger
- ☐ Combat
- ☐ Sexual contact under 18 with someone 5 or more years older
- ☐ Imprisonment
- ☐ Life-threatening illness
- ☐ Other

In the box below, briefly describe the traumatic event marked above.

**Below are several questions about the traumatic event you just described above.**

**(15) How long ago did the traumatic event happen? Put a tick please**

- 1 ☐ Less than 1 month
- 2 ☐ 1 to 3 months
- 3 ☐ 3 to 6 months
- 4 ☐ 6 months to 3 years
- 5 ☐ 3 to 5 years
- 6 ☐ More than 5 years

**For the following questions, put a tick near for near Y for Yes or N for No.**

During the traumatic event:

- (16) Y ☐ N ☐ Were you physically injured?
- (17) Y ☐ N ☐ Was someone else physically injured?
- (18) Y ☐ N ☐ Did you think that your life was in danger?
- (19) Y ☐ N ☐ Did you think someone else's life was in danger? \_\_\_\_\_
- (20) Y ☐ N ☐ Did you feel helpless?
- (21) Y ☐ N ☐ Did you feel terrified?

**PART 3**

**Below is a list of problems that people sometimes have after experiencing a traumatic event. Read each one carefully and circle the number ( 0 – 3 ) that best describes how often that problem has bothered you IN THE PAST MONTH. Rate each problem with respect to the traumatic event you described in item 14.**

**0** Not at all or only one time.

**1** Once a week or less / once in a while

**2** 2 to 4 times a week / half the time

**3** 5 or more times a week / almost always

- (22) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Having upsetting thoughts or images about the traumatic event that came into your head when you didn't want them.
- (23) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Having bad dreams or nightmares about the traumatic event
- (24) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Reliving the traumatic event, acting or feeling as if it was happening again
- (25) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Feeling emotionally upset when you were reminded of the traumatic event for example, feeling scared, angry, sad, guilty)
- (26) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Experiencing physical reactions when you were reminded of the traumatic event (for example, breaking out in a sweat, heart beating fast)
- (27) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Trying not to think about, talk about, or have feelings about the traumatic event.
- (28) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Trying to avoid activities, people, or places that remind you of the traumatic event
- (29) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Not being able to remember an important part of the traumatic event
- (30) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Having much less interest or participating much less often in important activities
- (31) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Feeling distant or cut off from people around you
- (32) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Feeling emotionally numb (for example, being unable to cry or unable to have loving feelings)
- (33) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Feelings as if your future plans or hopes will not come true (for example, you will not have a career, marriage, children, or a long life)
- (34) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Having trouble falling or staying asleep
- (35) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Feeling irritable or having fits of anger
- (36) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Having trouble concentrating (for example, drifting in and out of conversations, losing track of a story on television, forgetting what you read)
- (37) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Being overly alert (for example, checking to see who is around you, being uncomfortable with your back to a door, etc)
- (38) 0 ☐ 1 ☐ 2 ☐ 3 ☐ Being jumpy or easily startled (for example, when someone walks up behind you)
- (39) How long have you experienced the problems that you reported above? (put a tick ONE)
- 1 ☐ Less than 1 month
- 2 ☐ 1 to 3 months
- 3 ☐ More than 3 months
- (40) How long after the traumatic event did these problems begin? (put a tick ONE)
- 1 ☐ Less than 6 months
- 2 ☐ 6 or more months

**PART 4**

**Indicate below if the problems you rated in your Part 3 have interfered with any of the following areas of your life DURING THE PAST MONTH. Pick Y for Yes and N for No.**

- (41) Y ☐ N ☐ Work
- (42) Y ☐ N ☐ Household chores and duties
- (43) Y ☐ N ☐ Relationships with friends
- (44) Y ☐ N ☐ Fun and leisure activities
- (45) Y ☐ N ☐ Schoolwork
- (46) Y ☐ N ☐ Relationships with your family
- (47) Y ☐ N ☐ Sex life
- (48) Y ☐ N ☐ General satisfaction with life
- (49) Y ☐ N ☐ Overall level of functioning in all areas of your life

### Relationships Structures (RS) Questionnaire

This questionnaire is designed to assess the way in which you mentally represent important people in your life. You'll be asked to answer questions about your parents, your romantic partners, and your friends. Please indicate the extent to which you agree or disagree with each statement by putting a tick a number for each item.

**Please answer the following 10 questions about your mother or a mother-like figure**

1. It helps to turn to this person in times of need.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
2. I usually discuss my problems and concerns with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
3. I talk things over with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
4. I find it easy to depend on this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
5. I don't feel comfortable opening up to this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
6. I prefer not to show this person how I feel deep down.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
7. I often worry that this person doesn't really care for me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
8. I'm afraid that this person may abandon me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
9. I worry that this person won't care about me as much as I care about him or her.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
10. I don't fully trust this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

**Please answer the following 10 questions about your father or a father-like figure.**

1. It helps to turn to this person in times of need.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
2. I usually discuss my problems and concerns with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
3. I talk things over with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
4. I find it easy to depend on this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
5. I don't feel comfortable opening up to this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
6. I prefer not to show this person how I feel deep down.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree
7. I often worry that this person doesn't really care for me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

8. I'm afraid that this person may abandon me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

9. I worry that this person won't care about me as much as I care about him or her.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

10. I don't fully trust this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

**Please answer the following 10 questions about your dating or marital partner.**

If you are not currently in a dating or marital relationship with someone, answer these questions with respect to a former partner or a relationship that you would like to have with someone.

1. It helps to turn to this person in times of need.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

2. I usually discuss my problems and concerns with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

3. I talk things over with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

4. I find it easy to depend on this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

5. I don't feel comfortable opening up to this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

6. I prefer not to show this person how I feel deep down.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

7. I often worry that this person doesn't really care for me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

8. I'm afraid that this person may abandon me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

9. I worry that this person won't care about me as much as I care about him or her.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

10. I don't fully trust this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

**Please answer the following 10 questions about your best friend**

1. It helps to turn to this person in times of need.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

2. I usually discuss my problems and concerns with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

3. I talk things over with this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

4. I find it easy to depend on this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

5. I don't feel comfortable opening up to this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

6. I prefer not to show this person how I feel deep down.

strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

7. I often worry that this person doesn't really care for me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

8. I'm afraid that this person may abandon me.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

9. I worry that this person won't care about me as much as I care about him or her.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree

10. I don't fully trust this person.  
strongly disagree 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ strongly agree



### ROSENBERG SELF ESTEEM SCALE (RSES)

BELOW IS A LIST OF STATEMENTS DEALING WITH YOUR **GENERAL FEELINGS** ABOUT YOURSELF. IF YOU **STRONGLY AGREE**, PUT A TICK ON **SA**. IF YOU **AGREE** WITH THE STATEMENT, PUT A TICK **A**. IF YOU **DISAGREE**, PUT A TICK ON **D**. IF YOU **STRONGLY DISAGREE**, PUT A TICK ON **SD**.

|     |                                                                            | 1.<br>STRONGLY<br>AGREE | 2<br>AGREE | 3.<br>DISAGREE | 4.<br>STRONGLY<br>DISAGREE |
|-----|----------------------------------------------------------------------------|-------------------------|------------|----------------|----------------------------|
| 1.  | I feel that I'm a person of worth, at least on an equal plane with others. | SA                      | A          | D              | SD                         |
| 2.  | I feel that I have a number of good qualities.                             | SA                      | A          | D              | SD                         |
| 3.  | All in all, I am inclined to feel that I am a failure.                     | SA                      | A          | D              | SD                         |
| 4.  | I am able to do things as well as most other people.                       | SA                      | A          | D              | SD                         |
| 5.  | I feel I do not have much to be proud of.                                  | SA                      | A          | D              | SD                         |
| 6.  | I take a positive attitude toward myself.                                  | SA                      | A          | D              | SD                         |
| 7.  | On the whole, I am satisfied with myself.                                  | SA                      | A          | D              | SD                         |
| 8.  | I wish I could have more respect for myself.                               | SA                      | A          | D              | SD                         |
| 9.  | I certainly feel useless at times.                                         | SA                      | A          | D              | SD                         |
| 10. | At times I think I am no good at all.                                      | SA                      | A          | D              | SD                         |

**PTCI**

This questionnaire lists different thoughts which people may have after a traumatic experience. In this questionnaire we are interested in the way that YOU thought, IN THE LAST MONTH, in regard to the traumatic event that you have experienced.

Please read each statement carefully and decide how much you have AGREED or DISAGREED with each statement during the last month.

For each of the thoughts, please show your answer by choosing the number from the scale below which BEST DESCRIBES HOW MUCH YOU AGREED WITH THE STATEMENT and put a tick to the number next to that statement. People react in different ways; there are no right or wrong answers to these statements.

|                     |                       |                      |         |                   |                    |                  |
|---------------------|-----------------------|----------------------|---------|-------------------|--------------------|------------------|
| 1                   | 2                     | 3                    | 4       | 5                 | 6                  | 7                |
| Totally<br>Disagree | Disagree<br>Very Much | Disagree<br>Slightly | Neutral | Agree<br>Slightly | Agree<br>Very Much | Totally<br>Agree |

|                                                                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------------------------------------------------------------|---|---|---|---|---|---|---|
| 1. My reactions since the event mean that I am going crazy.               |   |   |   |   |   |   |   |
| 2. Somebody else would have stopped the event from happening.             |   |   |   |   |   |   |   |
| 3. I feel like an object, not like person.                                |   |   |   |   |   |   |   |
| 4. I have to be on guard all the time.                                    |   |   |   |   |   |   |   |
| 5. Nothing good can happen to me anymore.                                 |   |   |   |   |   |   |   |
| 6. I will not be able to control my anger and will do something terrible. |   |   |   |   |   |   |   |
| 7. The event happened to me because of the sort of person I am.           |   |   |   |   |   |   |   |
| 8. The world is a dangerous place.                                        |   |   |   |   |   |   |   |
| 9. I feel like I don't know myself any more.                              |   |   |   |   |   |   |   |
| 10. If I think about the event, I will not be able to handle it.          |   |   |   |   |   |   |   |
| 11. People can't be trusted.                                              |   |   |   |   |   |   |   |
| 12. My life has been destroyed by the event.                              |   |   |   |   |   |   |   |

|                                                                                  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
| 13. Somebody else would not have gotten into this situation.                     |  |  |  |  |  |  |  |  |
| 14. I can't deal with even the slightest upset.                                  |  |  |  |  |  |  |  |  |
| 15. I feel dead inside.                                                          |  |  |  |  |  |  |  |  |
| 16. People are not what they seem.                                               |  |  |  |  |  |  |  |  |
| 17. I can't rely on myself.                                                      |  |  |  |  |  |  |  |  |
| 18. There is something wrong with me as a person.                                |  |  |  |  |  |  |  |  |
| 19. I will never be able to feel normal emotions again.                          |  |  |  |  |  |  |  |  |
| 20. I have to be especially careful because you never know what can happen next. |  |  |  |  |  |  |  |  |
| 21. My reactions since the event showed that I am a lousy copper.                |  |  |  |  |  |  |  |  |
| 22. I am inadequate.                                                             |  |  |  |  |  |  |  |  |
| 23. You can never know who will harm you.                                        |  |  |  |  |  |  |  |  |
| 24. I feel isolated and set apart from others.                                   |  |  |  |  |  |  |  |  |
| 25. I have no future.                                                            |  |  |  |  |  |  |  |  |
| 26. There is something about me that made the event happen.                      |  |  |  |  |  |  |  |  |
| 27. I have permanently changed for the worse.                                    |  |  |  |  |  |  |  |  |
| 28. I can't rely on other people.                                                |  |  |  |  |  |  |  |  |
| 29. I can't trust that I will do the right thing.                                |  |  |  |  |  |  |  |  |
| 30. I am a weak person.                                                          |  |  |  |  |  |  |  |  |

|                                                                                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------------------------------------------------------------------------|---|---|---|---|---|---|---|
| 31. The event happened because of the way I acted.                                     |   |   |   |   |   |   |   |
| 32. I used to be a happy person but now I am always miserable.                         |   |   |   |   |   |   |   |
| 33. I can't stop bad things from happening to me.                                      |   |   |   |   |   |   |   |
| 34. I will not be able to tolerate my thoughts about the event, and I will fall apart. |   |   |   |   |   |   |   |
| 35. I will not be able to control my emotions, and something terrible will happen.     |   |   |   |   |   |   |   |
| 36. You never know when something terrible will happen.                                |   |   |   |   |   |   |   |
| 37. I should be over this by now.                                                      |   |   |   |   |   |   |   |

## DASS 21

*Please read the each statement and put a tick on the numbers 0, 1, 2, or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.*

*The rating scale is as follows:*

- 0 Did not apply to me at all**  
**1 Applied to me to some degree, or some of the time**  
**2 Applied to me to a considerable degree, or good part of time**  
**3 Applied to me very much, or most of the time.**

|     |                                                                                                                                    |   |   |   |   |
|-----|------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| 1.  | I found it hard to wind down                                                                                                       | 0 | 1 | 2 | 3 |
| 2.  | I was aware of dryness of my mouth                                                                                                 | 0 | 1 | 2 | 3 |
| 3.  | I couldn't seem to experience any positive feeling at all                                                                          | 0 | 1 | 2 | 3 |
| 4.  | I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)           | 0 | 1 | 2 | 3 |
| 5.  | I found it difficult to work up the initiative to do things                                                                        | 0 | 1 | 2 | 3 |
| 6.  | I tended to over-react to situations                                                                                               | 0 | 1 | 2 | 3 |
| 7.  | I experienced trembling (eg, in the hands)                                                                                         | 0 | 1 | 2 | 3 |
| 8.  | I felt that I was using a lot of nervous energy                                                                                    | 0 | 1 | 2 | 3 |
| 9.  | I was worried about situations in which I might panic and make a fool of myself                                                    | 0 | 1 | 2 | 3 |
| 10. | I felt that I had nothing to look forward to                                                                                       | 0 | 1 | 2 | 3 |
| 11. | I found myself getting agitated                                                                                                    | 0 | 1 | 2 | 3 |
| 12. | I found it difficult to relax                                                                                                      | 0 | 1 | 2 | 3 |
| 13. | I felt down-hearted and blue                                                                                                       | 0 | 1 | 2 | 3 |
| 14. | I was intolerant of anything that kept me from getting on with what I was doing                                                    | 0 | 1 | 2 | 3 |
| 15. | I felt I was close to panic                                                                                                        | 0 | 1 | 2 | 3 |
| 16. | I was unable to become enthusiastic about anything                                                                                 | 0 | 1 | 2 | 3 |
| 17. | I felt I wasn't worth much as a person                                                                                             | 0 | 1 | 2 | 3 |
| 18. | I felt that I was rather touchy                                                                                                    | 0 | 1 | 2 | 3 |
| 19. | I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat) | 0 | 1 | 2 | 3 |
| 20. | I felt scared without any good reason                                                                                              | 0 | 1 | 2 | 3 |

## PTGI

Indicate for each of the following statements the degree to which the change reflected in the question is true in your life as a result of your crisis, using the following scale:

**0= I did not experience this change as a result of my crisis.**

**1= I experienced this change to a very small degree as a result of my crisis.**

**2= I experienced this change to a small degree as a result of my crisis.**

**3= I experienced this change to a moderate degree as a result of my crisis.**

**4= I experienced this change to a great degree as a result of my crisis.**

**5= I experienced this change to a very great degree as a result of my crisis.**

|                                                                         | 0 | 1 | 2 | 3 | 4 | 5 |
|-------------------------------------------------------------------------|---|---|---|---|---|---|
| 1. I changed my priorities about what is important in life.             |   |   |   |   |   |   |
| 2. I have a greater appreciation for the value of my own life.          |   |   |   |   |   |   |
| 3. I developed new interests.                                           |   |   |   |   |   |   |
| 4. I have a greater feeling of self-reliance.                           |   |   |   |   |   |   |
| 5. I have a better understanding of spiritual matters.                  |   |   |   |   |   |   |
| 6. I more clearly see that I can count on people in times of trouble.   |   |   |   |   |   |   |
| 7. I established a new path for my life.                                |   |   |   |   |   |   |
| 8. I have a greater sense of closeness with others.                     |   |   |   |   |   |   |
| 9. I am more willing to express my emotions.                            |   |   |   |   |   |   |
| 10. I know better that I can handle difficulties.                       |   |   |   |   |   |   |
| 11. I am able to do better things with my life.                         |   |   |   |   |   |   |
| 12. I am better able to accept the way things work out.                 |   |   |   |   |   |   |
| 13. I can better appreciate each day.                                   |   |   |   |   |   |   |
| 14. New opportunities are available which wouldn't have been otherwise. |   |   |   |   |   |   |
| 15. I have more compassion for others.                                  |   |   |   |   |   |   |
| 16. I put more effort into my relationships.                            |   |   |   |   |   |   |
| 17. I am more likely to try to change things which need changing        |   |   |   |   |   |   |
| 18. I have a stronger religious faith.                                  |   |   |   |   |   |   |
| 19. I discovered that I'm stronger than I thought I was.                |   |   |   |   |   |   |
| 20. I learned a great deal about how wonderful people are.              |   |   |   |   |   |   |
| 21. I better accept needing others.                                     |   |   |   |   |   |   |

## Appendix F

### Demographics

1. Gender: ☐ Female ☐ Male
2. Age: \_\_\_\_\_
3. Are you currently in a romantic love relationship? ☐ Yes ☐ No
  - 3a. If so, how long have you been involved with this person? \_\_\_\_\_ years \_\_\_\_\_ months.
4. How many times have you been in a serious love relationship (including any current relationship)?  
\_\_\_\_\_ times
5. Are you a student? ☐ Yes ☐ No
  - 5a. If so, what subject are you studying? \_\_\_\_\_
  - 5b. What year of your degree are you in? ☐ 1st ☐ 2<sup>nd</sup> ☐ 3<sup>rd</sup> ☐ 4<sup>th</sup>
6. Are you employed? (Please tick one): ☐ yes; full-time  
☐ yes; part-time  
☐ no; unemployed  
☐ no; retired  
☐ stay at home parent  
☐ other \_\_\_\_\_
7. Is your mother alive today?  
☐ Yes ☐ No  
 If not, how old were you at the time of her death? \_\_\_\_\_ years
8. Is your father alive today?  
☐ Yes ☐ No  
 If not, how old were you at the time of his death? \_\_\_\_\_ years
9. Have your parents ever been divorced? ☐ Yes ☐ No  
 If you answered no, please skip to Question 14.
10. How old were you at the time of your parents' divorce? \_\_\_\_\_
11. Who obtained custody of you? ☐ Mother ☐ Father ☐ Joint
12. Do you have a step\_mother? ☐ Yes ☐ No
13. Do you have a step\_father? ☐ Yes ☐ No
14. Were you an adopted child? ☐ Yes ☐ No  
 If so, how old were you at the time of your adoption? \_\_\_\_\_

### Relationships Structures (RS) Questionnaire

This questionnaire is designed to assess the way in which you mentally represent important people in your life. You'll be asked to answer questions about your parents, your romantic partners, and your friends. Please indicate the extent to which you agree or disagree with each statement by putting a tick a number for each item.

**Please answer the following 10 questions about your mother or a mother-like figure**

|                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. It helps to turn to this person in times of need.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                |
| 2. I usually discuss my problems and concerns with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                     |
| 3. I talk things over with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                             |
| 4. I find it easy to depend on this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                         |
| 5. I don't feel comfortable opening up to this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                              |
| 6. I prefer not to show this person how I feel deep down.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                           |
| 7. I often worry that this person doesn't really care for me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                       |
| 8. I'm afraid that this person may abandon me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                      |
| 9. I worry that this person won't care about me as much as I care about him or her.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree |
| 10. I don't fully trust this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                                |

**Please answer the following 10 questions about your father or a father-like figure.**

|                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. It helps to turn to this person in times of need.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                |
| 2. I usually discuss my problems and concerns with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                     |
| 3. I talk things over with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                             |
| 4. I find it easy to depend on this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                         |
| 5. I don't feel comfortable opening up to this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                              |
| 6. I prefer not to show this person how I feel deep down.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                           |
| 7. I often worry that this person doesn't really care for me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                       |
| 8. I'm afraid that this person may abandon me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                      |
| 9. I worry that this person won't care about me as much as I care about him or her.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree |
| 10. I don't fully trust this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                                |

**Please answer the following 10 questions about your dating or marital partner.**

If you are not currently in a dating or marital relationship with someone, answer these questions with respect to a former partner or a relationship that you would like to have with someone.

|                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. It helps to turn to this person in times of need.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                |
| 2. I usually discuss my problems and concerns with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                     |
| 3. I talk things over with this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                             |
| 4. I find it easy to depend on this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                         |
| 5. I don't feel comfortable opening up to this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                              |
| 6. I prefer not to show this person how I feel deep down.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                           |
| 7. I often worry that this person doesn't really care for me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                       |
| 8. I'm afraid that this person may abandon me.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                      |
| 9. I worry that this person won't care about me as much as I care about him or her.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree |
| 10. I don't fully trust this person.<br>1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/><br>Strongly disagree      Strongly agree                                                |

**Please answer the following 10 questions about your best friend**

|                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>4. It helps to turn to this person in times of need.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                                |
| <p>2. I usually discuss my problems and concerns with this person.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                     |
| <p>3. I talk things over with this person.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                                             |
| <p>4. I find it easy to depend on this person.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                                         |
| <p>5. I don't feel comfortable opening up to this person.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                              |
| <p>6. I prefer not to show this person how I feel deep down.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                           |
| <p>7. I often worry that this person doesn't really care for me.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                       |
| <p>8. I'm afraid that this person may abandon me.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                                      |
| <p>9. I worry that this person won't care about me as much as I care about him or her.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p> |
| <p>10. I don't fully trust this person.</p> <p>1 <input type="checkbox"/>      2 <input type="checkbox"/>      3 <input type="checkbox"/>      4 <input type="checkbox"/>      5 <input type="checkbox"/>      6 <input type="checkbox"/>      7 <input type="checkbox"/></p> <p>Strongly disagree      Strongly agree</p>                                                |

**DASS 21**

Please read the each statement and put a tick on the numbers 0, 1, 2, or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

- 0** Did not apply to me at all
- 1** Applied to me to some degree, or some of the time
- 2** Applied to me to a considerable degree, or good part of time
- 3** Applied to me very much, or most of the time.

|            |                                                                                                                                    |          |          |          |          |
|------------|------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------|
| <b>1.</b>  | I found it hard to wind down                                                                                                       | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>2.</b>  | I was aware of dryness of my mouth                                                                                                 | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>3.</b>  | I couldn't seem to experience any positive feeling at all                                                                          | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>4.</b>  | I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)           | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>5.</b>  | I found it difficult to work up the initiative to do things                                                                        | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>6.</b>  | I tended to over-react to situations                                                                                               | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>7.</b>  | I experienced trembling (eg, in the hands)                                                                                         | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>8.</b>  | I felt that I was using a lot of nervous energy                                                                                    | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>9.</b>  | I was worried about situations in which I might panic and make a fool to myself                                                    | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>10.</b> | I felt that I had nothing to look forward to                                                                                       | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>11.</b> | I found myself getting agitated                                                                                                    | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>12.</b> | I found it difficult to relax                                                                                                      | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>13.</b> | I felt down-hearted and blue                                                                                                       | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>14.</b> | I was intolerant of anything that kept me from getting on with what I was doing                                                    | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>15.</b> | I felt I was close to panic                                                                                                        | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>16.</b> | I was unable to become enthusiastic about anything                                                                                 | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>17.</b> | I felt I wasn't worth much as a person                                                                                             | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>18.</b> | I felt that I was rather touchy                                                                                                    | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>19.</b> | I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat) | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>20.</b> | I felt scared without any good reason                                                                                              | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |
| <b>21.</b> | I felt that life was meaningless                                                                                                   | <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> |

## ETISR-SF

**Part 1. General Traumas. Before the age of 18 (Please put a tick)**

|                                                                                                    | YES | NO |
|----------------------------------------------------------------------------------------------------|-----|----|
| 1. Were you ever exposed to a life-threatening natural disaster?                                   |     |    |
| 2. Were you involved in a serious accident?                                                        |     |    |
| 3. Did you ever suffer a serious personal injury or illness?                                       |     |    |
| 4. Did you ever experience the death or serious illness of a parent or a primary caretaker?        |     |    |
| 5. Did you experience the divorce or separation of your parents?                                   |     |    |
| 6. Did you experience the death or serious injury of a sibling?                                    |     |    |
| 7. Did you ever experience the death or serious injury of a friend?                                |     |    |
| 8. Did you ever witness violence towards others, including family members?                         |     |    |
| 9. Did anyone in your family ever suffer from mental or psychiatric illness or have a "breakdown"? |     |    |
| 10. Did your parents or primary caretaker have a problem with alcoholism or drug or drug abuse?    |     |    |
| 11. Did you ever see someone murdered?                                                             |     |    |

**Part 2. Physical Punishment. Before the age of 18 (Please put a tick)**

|                                                                         | YES | NO |
|-------------------------------------------------------------------------|-----|----|
| 12. Were you ever slapped in the face with an open hand?                |     |    |
| 13. Were you ever burned with hot water, a cigarette or something else? |     |    |
| 14. Were you ever punched or kicked?                                    |     |    |
| 15. Were you ever hit with an object that was thrown at you?            |     |    |
| 16. Were you ever pushed or shoved?                                     |     |    |

**Part 3. Emotional Abuse. Before the age of 18 (Please put a tick)**

|                                                                                                        | YES | NO |
|--------------------------------------------------------------------------------------------------------|-----|----|
| 17. Were you often put down or ridiculed?                                                              |     |    |
| 18. Were you often ignored or made to feel that you didn't count?                                      |     |    |
| 19. Were you often told you were no good?                                                              |     |    |
| 20. Most of the time were you treated in a cold, uncaring way or made to feel like you were not loved? |     |    |
| 21. Did your parents or caretakers often fail to understand you or your needs?                         |     |    |

**Part 4. Sexual Events. Before the age of 18 (Please put a tick)**

|                                                                                                                                                                  | YES | NO |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 21. Were you ever touched in an intimate or private part of your body (e.g breast, thighs, genitals) in a way that surprised you or made you feel uncomfortable? |     |    |
| 22. Did you ever experience someone rubbing their genitals against you?                                                                                          |     |    |
| 23. Were you ever forced or coerced to touch another person in an intimate or private part of their body?                                                        |     |    |
| 24. Did anyone ever have genital sex with you against your will?                                                                                                 |     |    |
| 25. Were you ever forced or coerced to perform oral sex on someone against your will?                                                                            |     |    |
| 26. Were you ever forced or coerced to kiss someone in a sexual rather than an affectionate way?                                                                 |     |    |

*If you respond any of the above "YES" answer the following for the one that has had the greatest impact on your life. In answering consider how you felt at the time of the event.  
Write the item number of the event \_\_\_\_\_*

|                                                                         | YES | NO |
|-------------------------------------------------------------------------|-----|----|
| 1. Did you experience emotions of intense fear, horror or helplessness? |     |    |
| 2. Did you feel out-of-your-body or as if you were in a dream?          |     |    |



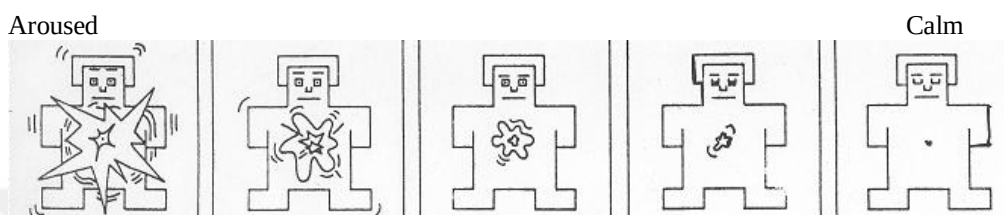


### How AROUSED and HAPPY do you feel?

Below you see some manikins in different states of arousal. Please circle the manikin that describes best how aroused you feel at the moment.

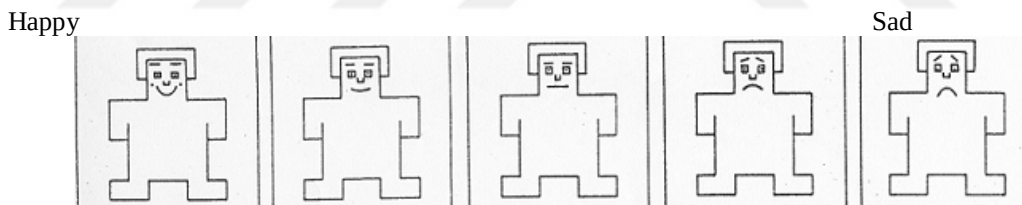
For example if you feel stimulated, excited, frenzied, jittery, wide awake or aroused, then you would circle the image at the left end of the scale. If the word makes you feel completely relaxed, calm, sluggish, dull, sleepy, and un-aroused, then you would circle the image at the right end of the scale.

If you feel completely neutral, that is neither excited nor calm; you should circle the image in the centre of the scale. You can also circle anywhere else along the line to indicate varying degrees of pleasure.



- 2) The second rating you will make deals with how HAPPY you feel.  
 If the word makes you feel happy, pleased, satisfied, contented or hopeful, then you would circle the image at the left end of the scale. If the word makes you feel completely unhappy, annoyed, unsatisfied, melancholy, despairing or bored, then you would circle the image at the right end of the scale.

If you feel completely neutral, that is neither happy nor unhappy; you should circle the image in the centre of the scale (this is where SAM's mouth is completely flat). Again, you can also circle anywhere else along the line to indicate varying degrees of pleasure.



### FELT SECURITY SCALE

#### Care

Please respond to the items below using the following 6-point rating scale.

|            |   |   |   |   |           |
|------------|---|---|---|---|-----------|
| 1          | 2 | 3 | 4 | 5 | 6         |
| not at all |   |   |   |   | very much |

**When I think about my close relationships, I feel . . .**

\_\_\_\_\_ comforted

\_\_\_\_\_ supported

\_\_\_\_\_ looked after

\_\_\_\_\_ cared for

#### Safe

Please respond to the items below using the following 6-point rating scale.

|            |   |   |   |   |           |
|------------|---|---|---|---|-----------|
| 1          | 2 | 3 | 4 | 5 | 6         |
| not at all |   |   |   |   | very much |

**When I think about my close relationships, I feel . . .**

\_\_\_\_\_ secure

\_\_\_\_\_ safe

\_\_\_\_\_ protected

\_\_\_\_\_ unthreatened

#### Self-Esteem

Please respond to the items below using the following 6-point rating scale.

|            |   |   |   |   |           |
|------------|---|---|---|---|-----------|
| 1          | 2 | 3 | 4 | 5 | 6         |
| not at all |   |   |   |   | very much |

**When I think about my close relationships, I feel . . .**

\_\_\_\_\_ better about myself

\_\_\_\_\_ valued

\_\_\_\_\_ more positive about myself

\_\_\_\_\_ I really like myself

**Love**

Please respond to the items below using the following 6-point rating scale.

|            |   |   |   |   |           |
|------------|---|---|---|---|-----------|
| 1          | 2 | 3 | 4 | 5 | 6         |
| not at all |   |   |   |   | very much |

**When I think about my close relationships, I feel . . .**

\_\_\_\_\_ loved

\_\_\_\_\_ cherished

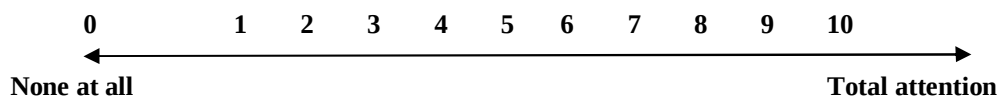
\_\_\_\_\_ treasured

\_\_\_\_\_ adored

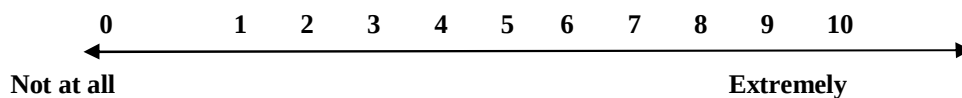


### FILM RATING

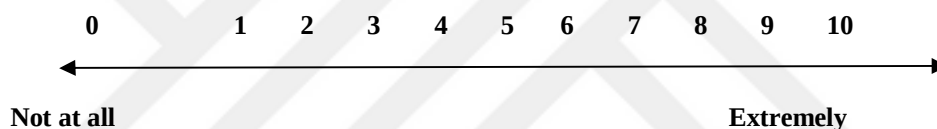
Please indicate how much attention you have paid to the film you have just seen. Circle the number which indicates your attention level.



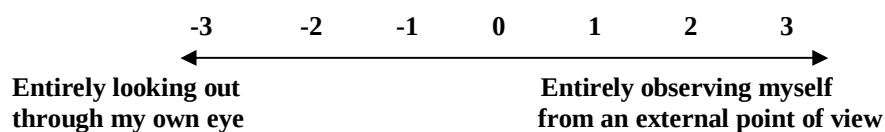
Please indicate how distressing you found the film you have just seen



Please indicate how personally relevant you found the film



Please indicate from what perspective you felt you were watching the film



### PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way **right now**, that is, at the present moment. Use the following scale to record your answers:

| 1                              | 2        | 3          | 4           | 5                |
|--------------------------------|----------|------------|-------------|------------------|
| very slightly<br>or not at all | a little | moderately | quite a lot | extremely        |
| _____ interested               |          |            |             | _____ irritable  |
| _____ distressed               |          |            |             | _____ alert      |
| _____ excited                  |          |            |             | _____ ashamed    |
| _____ upset                    |          |            |             | _____ inspired   |
| _____ strong                   |          |            |             | _____ nervous    |
| _____ guilty                   |          |            |             | _____ determined |
| _____ scared                   |          |            |             | _____ attentive  |
| _____ hostile                  |          |            |             | _____ jittery    |
| _____ enthusiastic             |          |            |             | _____ active     |
| _____ proud                    |          |            |             | _____ afraid     |

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17

|                               |                                                                        |                                                                 |                                                |                                                                            |
|-------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------|
| Date /<br>Day of<br>Intrusion | Was I an<br>intruder?<br>(I for image, T for thought or<br>both (ITT)) | What was the content of the intrusion? (e.g.<br>subject matter) | What, if anything, triggered the<br>intrusion? | How distressed were<br>you at the time? (0<br>not at all, 10<br>extremely) |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |
|                               |                                                                        |                                                                 |                                                |                                                                            |

p6

Mark each intrusion as 'I' for image, 'T' for thought or IT if it is a combination of both. Otherwise write '0' for that timeframe.

|             |     |           |       |
|-------------|-----|-----------|-------|
| Example Day |     | Day 1     | Date: |
| Morning     | 0   | Morning   |       |
| Afternoon   | I T | Afternoon |       |
| Evening     | T   | Evening   |       |

|           |  |       |
|-----------|--|-------|
| Day 2     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

|           |  |       |
|-----------|--|-------|
| Day 3     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

Please remember to fill in the content page for each intrusion indicated.  
Thank you

p3

|           |  |       |
|-----------|--|-------|
| Day 4     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

|           |  |       |
|-----------|--|-------|
| Day 5     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

|           |  |       |
|-----------|--|-------|
| Day 6     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

|           |  |       |
|-----------|--|-------|
| Day 7     |  | Date: |
| Morning   |  |       |
| Afternoon |  |       |
| Evening   |  |       |

Please remember to fill in the content page for each intrusion indicated.  
Thank you

p4

|                               |                                                                        |                                                                 |                                                |                                                                         |
|-------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------|
| Date /<br>Day of<br>Intrusion | Was I an<br>intruder?<br>(I for image, T for thought or<br>both (ITT)) | What was the content of the intrusion? (e.g.<br>subject matter) | What, if anything, triggered the<br>intrusion? | How distressed were you at the<br>time? (0 not at all, 10<br>extremely) |
| Day 1                         | I                                                                      | What was the content of the intrusion?                          | What triggered the intrusion?                  | 1                                                                       |
| Day 2                         | T                                                                      | What was the content of the intrusion?                          | What triggered the intrusion?                  | 2                                                                       |

Intrusions of the film can include **mental images**, (that is 'see' or 'hear' in your mind's eye) and/or **verbal thought**, (thoughts about using verbal language when we talk) or combination of both image plus verbal thoughts.

p5