universität wien

MASTERARBEIT / MASTER‘S THESIS

Titel der Masterarbeit / Title of the Master’s Thesis

„How do toddlers react upon observing social exclusion?“

verfasst von / submitted by

Julija Zupanc

gemeinsam mit / in collaboration with

Carolina Stürmer, BSc

Angestrebter akademischer Grad / in partial fulfillment of the requirements for the degree of

Master of Science (MSc)

Wien, 2018 / Vienna, 2018

Studienkennzahl lt. Studienblatt / Degree programme code as it appears on the student record sheet:	A 066 840
Studienrichtung lt. Studienblatt / Degree programme as it appears on the student record sheet:	Masterstudium Psychologie UG2002
Betreut von / Supervisor:	Ass.-Prof. Giorgia Silani Privatdoz. PhD

Content

How do toddlers react upon observing social exclusion?

Empathy

In recent decades, extensive research has been conducted on empathy, thereby has been defined differently and the study of the neural basis begun (Decety, 2012). Dymond's definition of empathy in 1949 was “the imaginative transposing of oneself into the thinking, feeling and acting of another and so structuring the world as he does” (p. 127). Whereas Hoffman (1975) defined empathy as an affective response to the situation of another and not of one's own person.

In the course of gaining knowledge, various definitions were met: Empathy as the disposition to feel for others as well as understand and care about their emotional state; knowing the feelings and thoughts of someone; feel the same as the other person; the ability to imagine how someone thinks and feels (in their situation); experiencing the psychological life of another person; experiencing distress due to the observation of another person's suffering; adopting an equivalent neuronal reaction (Batson, 2009; Decety, 2012; Scheler, 1954). De Vignemont and Singer (2006, p. 435) requested that:

> “There is empathy if: (i) one is in an affective state; (ii) this state is isomorphic to another person’s affective state; (iii) this state is elicited by the observation or imagination of another person’s affective state; (iv) one knows that the other person is the source of one’s own affective state.”

Up until now, empathy is not a clearly defined concept, wherefore Cuff, Brown, Taylor, and Howat (2016, p. 150) searched in their review for a common definition including the current knowledge:

> “Empathy is an emotional response (affective), dependent upon the interaction between trait capacities and state influences. Empathic processes are automatically elicited but also shaped by top-down control processes. The resulting emotion is similar to one’s perception (directly experienced or imagined) and understanding (cognitive empathy) of the stimulus emotion, with recognition that the source of the emotion is not one’s own.”

Consensus exists that empathy defines an emotional response as the perception of a sensation, emotion, a psychological state in another person or their

situation, and is also referred to as "feeling with" (Eisenberg & Strayer, 1987; Zahavi & Overgaard, 2012). Not only does it help to understand what type of positive or negative emotion a person feels (de Vignemont & Singer, 2006; Decety & Meyer, 2008), but also what it “feels like” for the person to experience the emotion, what the person is "going through" (Zahavi & Overgaard, 2012).

Because of the other-oriented focus, the experienced emotion thereby resembles the perceived emotion or situation of the other person, less of one’s own, but as some authors state does not necessarily have to be isomorphic since true congruence will be difficult to achieve (Cuff et al., 2016; Eisenberg, Fabes, & Spinrad, 2006; Hoffman, 2001; Scheler, 1954), while a necessary distinction between the two involved and their feelings remain (Decety & Meyer, 2008; Eisenberg, Snjezana, & Edwards, 2012). As a result, caring behavior by the empathic person is possible (Decety, 2012).

Emphatic dispositions occur in the course of development in complex reciprocal interactions with the social environment. In addition to contextual factors, subjective experiences also influence empathy development (Decety & Michalska, 2012). The capacity for empathy can improve through learning, familiarity, and salience (Zahavi & Ovengaard, 2012).

Subtypes of Empathy

Empathy refers to the general ability to resonate with the positive as well as the negative emotional states of others, regardless of their valence. Different subtypes of empathy are distinguished (Light & Zahn-Waxler, 2012). Regarding the purpose of our study, empathic concern is considered more closely.

Empathic Happiness and Empathic Cheerfulness. *Empathic happiness* occurs when one perceives positive emotions in someone else and experiences pleasure and goodwill as one's own reaction. However, when someone else's distress is perceived and encountered with positive affects and goodwill, one speaks of *empathic cheerfulness.* Both subtypes relate to empathy forms of positive emotions. In addition, *empathic concern* represents another form of empathy but is related to the experience of negative emotions (Light & Zahn-Waxler, 2012).

Empathic Concern refers to one's own negatively experienced emotions mirrored due to the perception of suffering or pain in another person, and come along with a feeling of tenderness and goodwill towards the other person (Light & Zahn-Waxler, 2012).

In old developmental theories, it was assumed that the contagion of distress is resembled in empathic concern, whereas today various theories distinguish between personal distress and empathic concern. Personal distress or empathic distress refers to the case when the observer becomes overly aroused or distraught and the focus of concern gets shifted from the other person to oneself, resulting in self-oriented empathy (Davidov, Zahn-Waxler, Roth-Hanania, & Knafo, 2013).

Accordingly, personal distress is reflexive or instinctual and brings out withdrawal, avoidance or self-help, whereas empathic concern leads to rapprochement, engagement or prosocial behavior with the suffering person. Both come from empathy but have different goals and consequences (Batson & Shaw, 1991; Decety & Meyer, 2008; Light & Zahn-Waxler, 2012).

Foundation of empathic concern is *empathic understanding*, which means the disclosure of a person's inner state through perspective-taking, and relates to understanding and sharing affects with the other person (Decety & Jackson, 2004; Decety & Michalska, 2012). Besides to social cognition, empathic concern requires motivation for goal-oriented caring (Batson & Shaw, 1991).

Zahn-Waxler (1991) found that personal distress and empathic concern in childhood go hand in hand and alternate in appearance when children see a distressed person. In her study perceived distress did not necessarily affect the prosocial behavior of children.

Cognitive and Motivational Empathy

Empathy subsumes an emotional and cognitive component. Despite the interconnection of the two components, they are also clearly distinguishable, indicating of different functions (Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008).

The affective response to the perception of another person's emotions and a feeling of goodwill refers to the emotional component (Knafo et al., 2008). In the context of this bottom-up strategy, existing references to emotions (e.g. facial expression) are discovered and processed (Lewis & Hodges, 2012). The awareness

of the inner state of a person - feelings, thoughts, intentions, perception - is understood as the cognitive component and closely related to theory of mind (Astington & Hughes, 2011; Hoffman, 2001). For this purpose a top-down strategy in form of cognitive processes such as the assumption of perspective and executive control are imperative in order to be able to identify own and foreign perspectives and intentions (“I understand what you feel”). Furthermore, experience, prior knowledge and emotional context play an important role (Astington & Hughes, 2011; Decety & Meyer, 2008; Decety, 2011; Lewis & Hodges, 2012; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009).

Personal distress can cause the observer to relieve their own stress and show no help to others. With the help of cognitive means, the probability can be increased to evaluate the automatically shared affective state, and thus to act prosocial (Decety & Meyer, 2008).

Due to the different modes of empathy, humans are able to react empathically in situations with existing emotional or situational cues, as well as in their absence, using cognitive advance modes (Hoffman, 2000).

Development

Components of empathy, which develop throughout childhood and beyond, are already present in early infancy. Bonding and interaction within the family in early childhood promote the disposition of empathy and provide the precondition for later-childhood empathy for individuals outside the family (Hastings, Utendale, & Sullivan, 2007; Knafo et al., 2008; Nichols, Svetlova, & Brownell, 2009). Since children start very early, already in the first year of life, to help, share, protect and care for others, in particular, they also try to relieve other’s distress and show concern for them, even before they can verbally express themselves, it is presumed that empathy is the foundation to that (Knafo et al., 2008, Warneken & Tomasello, 2009; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992).

Emotional Contagion. The basic emotions - anger, fear, disgust, surprise, joy, sadness - are assumed to be genetically determined, cross-cultural in expression and recognition, and exist from birth onward (Ekman, 1970; 1999). Newborn infants are already able recognize, share and use these emotions, as states of distress or contentment, and start so right after birth to communicate their caregiver, suggesting

a neurobiological disposition to connect with other people (Light & Zahn-Waxler, 2012; Rochat, 2002; Rochat & Striano, 2002).

In contrast to the basic emotions, feelings of empathy develop in the course of development and involve multiple emotions (Zahn-Waxler, Robinson, & Emde, 1992). Infants express their concerns for others in the form of facial and vocal expressions that no longer correspond to their own but the others emotional state. The automatic imitation of facial expressions, vocalization, postures, and movements of a model is referred to as motor mimicry. Mimicry enables empathy at a low level (Bush, Barr, McHugo, & Lanzetta, 1989; Hatfield, Rapson, & Le, 2009; Light & Zahn-Waxler, 2012). Often the same brain structures are involved in the perception of an expression and one's own sense of emotion which suggests that this is the basis for emotional mirroring (Murphy, Nimmo-Smith, & Lawrence, 2003). The perception of facial expressions leads to an activation of the corresponding facial muscles in the observer, even if the emotion expression was perceived only unconsciously (Dimberg, Thunberg, & Elmehed, 2000). Haviland and Lelwica (1987) were able to show that ten-week-old children showed matching facial reactions according to photos with happy, angry, sad expressions of their mothers.

Emotional contagion refers to the assumption of affects that are observed in another person (Hatfield, Cacioppo, & Rapson, 1994). In emotional contagion, an emotion is unconsciously taken over by someone else and thereby becomes one's own, without the awareness of what the emotion refers to (Decety, 2012; Scheler, 1954). Emotional contagion is considered as a primitive form of empathy (Hatfield et al., 1994).

Newborn children respond to the crying of another baby with increased crying, compared to white noise and the child's own cry, and assume the same distressful emotional state. This phenomenon is referred to as contagious crying and represents an example of empathic self-distress (Dondi, Simion, & Caltran, 1999; Simner, 1971). This behavior has been found in newborn infants only few hours old who have not yet gained awareness of themselves and others (Hastings, Zahn-Waxler, & McShane, 2006). This reflexive reaction to other people's distress is seen as one of the earliest manifestations of empathic concern (Light & Zahn-Waxler, 2012) but does not yet lead to empathic behavior rather to a self-oriented distressful emotional state (Hastings et al., 2006).

Self- centered emotional contagion in early childhood forms a major key mechanism for developing empathy (Decety & Meyer, 2008).

Self- Other Differentiation. The convergence between the self and others, the awareness of self-entity, the distinction whose feelings belong to whom, builds a first major building block for empathy development and promotes prosocial behavior. Agency refers to the ability to identify oneself as the originator of a desire, an act or a thought. Both contribute to prosocial behavior (Decety & Jackson, 2004; Decety & Meyer, 2008).

Already newborns have an ecological sense of self, an implicit self-image in relation to the environment (Neisser, 1991). Even shortly after birth, babies can distinguish between their own and others cry (Dondi et al. 1999; Simner, 1971) or differentiate between self- and other-generated movements, as these distinct sensory experiences feel different for the children (Butterworth, 1992; Gallagher & Meltzoff, 1996).

Research shows that other-oriented (empathic) responses can take place before a fully developed self-other distinction but this ability is needed to develop empathy as shown in adulthood (Ungerer, Dolby, Waters, Barnett, Kelk, & Lewin, 1990). In studies on self-recognition and self-other differentiation, it was found that the capacity to do so, which is rudimentary anchored during the first few months of life, is developed at approximately 18 months (Bischof-Köhler, 1991; Light & Zahn-Waxler, 2012).

One of the most famous experiments in exploring explicit self-awareness is the mirror-test or rouge test. Children were given a dot unnoticed in their face. If they tried to remove the point from their face standing in front of the mirror and did not point out the dot in the mirror image, it is assumed that self-confidence has already developed. In the second year of life (15-18 months) children begin to recognize themselves in the mirror and successfully complete the test (Asendorpf, Warkentin, & Baudonnière, 1996; Lewis & Brooks-Gunn, 1979).

The development of the self-other distinction is functionally connected with executive functions. Executive functions include processes such as the monitoring and control of thoughts and actions, self-regulation, cognitive flexibility, planning, reaction inhibition, and resistance to interference (Russell, 1996).

Emotion Regulation. The experience of personal distress due to the perceived need of another does not lead to empathic reactions for the other nor to prosocial behavior. In addition to the necessary distinction between self and others, the ability to regulate emotions, which is also linked to the development of executive functions, is another important aspect that contributes to empathy (Decety & Meyer, 2008). Overarousal and increased personal distress through another's distress due to a lack of self-other distinction and/or emotion regulation can lead to a regulation of one's own arousal and an overuse of cognitive resources and consequently prevent dealing with one's own emotions and prosocial behavior (Nielsen, 2002).

Emotional regulation is the ability to influence one's emotions, to change their intensity. In addition, the quality of the emotions can be changed and the expression of emotion can be modulated (Seiferling, Turgut, & Lozo, 2017). The interpersonal process of emotion regulation in children is characterized by the development from complete dependency by the parents towards a self-regulation of the emotions (Rime, 2009). At the beginning, infants can only regulate negative arousal if the discomfort is relatively mild, the ability to regulate emotions for stronger arousal is needed (Davidov et al., 2013).

Emotion regulation allows to regulate personal distress and help others instead of leaving the aversive situation to make oneself feel better (Decety & Meyer, 2008). An intense emotional stimulus and low emotion regulatory capacity lead to greater personal distress (Eisenberg et al., 1994).

Hoffmans Theory

Hoffmann (1975; 2000; 2001) generated a model of empathy development that can be brought into line with current research findings. In his five step model of empathy development, Hoffmann calls the predecessor of empathy, contagious crying, the stage of *global empathy* that shows itself in newborns and their first year of life, and match the emotion the child witnesses. Empathic suffering is perceived as a fusion of unpleasant sensations and feelings. The child behaves as if what happens to others happens to themselves, because of the lack of differentiation between self and other. The reaction to the distress of another person as if it were one's own characterizes the second stage termed *egocentric empathic distress*. Children comfort themselves when exposed to distress. The child differentiates better between one's own and other emotional responses but still immature. The first two

stages refer to the first year of life. *Quasi-egocentric empath*y designates the third stage at the age of two to three years. At this stage, the child is already able to differentiate between self and others and show empathic concern for others. Self-comfort is not shown anymore. With comfort and help behavior, which is personally perceived as comfort, the other one is met. *Veridical empathic distress* occurs in the second half of the second year of life. The child realizes that one's own inner states differ from others and meet her with feelings closer to her. More suitable help behavior for the other in form of comforting and prosocial behavior is shown. In the end, one develops empathy *beyond the situation* for other people. It is no longer responding only to temporary, situation-specific suffering, but also to the persisting general situation of a person. This allows empathy for entire groups.

Function of Empathy

The essential function of empathy is the promotion of adaptive social interaction. Empathy allows the discovery of emotions in others, followed by a corresponding care reaction and therefore promotes an interpersonal understanding (Decety & Batson, 2007; Decety & Ickes, 2009).

Empathy, with the two components of sharing emotions and adopting another’s perspective, enables people to quickly recognize others' state of mind. Social interactions, coordination of activities and collaboration on common goals are thus possible, which ensure the survival the groups (Decety & Michalska, 2012; de Waal, 2012). Consequently empathy promotes social interaction, prosocial behavior (actions intended to benefit others) and even altruistic behavior (actions benefit the others and come along with costs for the helper) and prevents aggression and antisocial behavior towards others, which is central to people's coexistence (Decety, 2012; Echols & Correll, 2012; Hoffman, 2000; Miller & Eisenberg, 1988).

Especially empathic arousal is an essential motivator for prosocial behavior and increases the tendency to help (Echols & Correll, 2012; Hoffman, 2000). While consoling and helping behavior rarely occur in the first year of life, but concern is clearly shown, help-behavior increases significantly in the second year of life (Davidov et al., 2013). Hay, Nash and Pederson (1981) could demonstrate in in their studies that six-month-old infants showed other-focused reactions to the weeping of a peer through leaning, touching, gesturing as long as they could regulate their own empathic arousal.

In addition of trying to change the emotional state of another, children also help in the form of instrumental helping (e.g. hand something to mother that is out of her reach), doing so by 14-18 months of age. For this purpose, children have to understand the intention or goal of another's action in order to be able to give appropriate help (Vaish & Warneken, 2012).

Empathy provides the affective and motivational basis for moral development as a factor that motivates people to respond with prosocial behavior, especially help (Decety, 2012; Decety & Meyer, 2008; Eisenberg, Spinrad, & Sadovsky, 2006). Furthermore, altruistic help, which comes with its own costs, also occurs in second year of life (Warneken & Tomasello, 2009).

As a major risk factor for development of aggressive, hostile and antisocial behavior in children is the lack of empathy and concern for the welfare of others (Decety & Michalska, 2012).

Sympathy, Compassion

Related topics that are similar to empathy and sometimes used as synonyms, but which must be clearly separated, refer to sympathy and compassion. In all three, there is a change in the affective state of a person due to the observation of the affective state of another person (Stocks, Lishner, & Decker, 2009).

Sympathy. An affective response due to the perception of an emotional state of another that resembles person that resembles it, refers to the concept of empathy. Sympathy, on the other hand, is an affective response from the apprehension or understanding the emotional situation of another, but that is not isomorphic to the other person's emotions (Eisenberg, Shea, Carlo, & Knight, 1991). Eisenberg et al. (1991) defined sympathy as "a vicarious emotional reaction based on the apprehension of another's emotional state or situation, which involves feelings of sorrow or concern for the other" (p. 65).

Empathy "feeling as" (e.g. feeling sad when seeing someone sad) and sympathy "feeling for the other" (e.g. feel pity, affection when seeing someone sad) as short description of the two concepts which illustrates that the people are in different affective states (Hein & Singer, 2008).

Nevertheless both empathy and sympathy lead to prosocial behavior (de Vignemont & Singer, 2006; Eisenberg et al., 1994; Eisenberg et al., 2006; Hein & Singer, 2008; Hoffman 2000).

Compassion. Also referred to as "suffering with" is believed to be composed out of feelings of sympathy and pity and relates to the feelings of the other person. Observation of others suffering, leads to great need to help and especially relieve them. Compassion is not just the sharing of emotions but a universal, transcendent experience. Compassion is one of the main motivators of altruism (Burton, 2015; Goetz, Keltner, & Simon-Thomas, 2010).

Neuronal Correlates

Existing evidence suggests that empathy involves a variety of brain structures and systems. In addition to the cortex, subcortical pathways, the brain stem, the regulation of the autonomic nervous system, the hypothalamic-pituitary-adrenal axis (HPA axis), and the endocrine system are involved (Cater, Harris, & Porges, 2009).

Numerous studies have used pain to examine empathy, especially empathic concern. In addition to the widespread knowledge of the neural representation in the brain, pain with the accompanying discomfort and distress is a sensation that all humans can understand, while a clear distinction for the observer persists, who is experiencing the pain and discomfort. Active brain areas in the pain sensation or observation of pain are anterior cingulate cortex, anterior midcingulate cortex and anterior insula (Decety & Jackson, 2004; Echols & Correll, 2012). When study participants were instructed to put themselves in the position of another person experiencing pain, they felt more personal distress and there was a significantly higher activity of the pain-processing areas compared to the instruction to imagine how the other person feels (Lamm, Batson, & Decety, 2007). The brain structures responsible for the ability to share affective states are phylogenetically old structures and develop very early in human ontogenesis (Singer, 2006).

Brain Activity in Children. Since electroencephalography (EEG) and electroretinography (ERG) are mainly used in infants and young children, and neuroimaging techniques are very unlikely, relatively little is known about the neural processes at this age (Light & Zahn-Waxler, 2012).

The neural basis of the beginnings of empathy, emotional mirroring probably lies in the fact that the same structures are involved in the perception of an expression as well as in one's own sense of emotion. An activation of the insula is especially evident in disgust and pain. The orbitofrontal cortex is especially active in anger and the amygdala in fear (Murphy et al., 2003).

Depending on the age of the child, various regions of the brain are involved differently. While at a young age, more limbic-related anatomic structures such as the amygdala are used to respond to emotional events, with advancing age, increased activity in frontal-lobe regions manifests itself in controlling emotional responses (Killgore & Yurgelun-Todd, 2007).

The emotional component of empathy, bottom-up strategy, results on the basis of the interconnection of amygdala, hypothalamus and orbitofrontal prefrontal cortex. The prefrontal regions play a key role in the top-down strategy (Decety, 2010).

The amygdala in the medial temporal lobe and as part of the limbic system is essentially important during early childhood. It enables us to recognize both positive and negative emotions in the faces of others and vicariously experience the negative affects that have been observed in others (Light & Zahn-Waxler, 2012).

The nucleus accumbens, a collection of neurons in the ventral striatum, is particularly important for the reward, which also plays a crucial role in empathy. Caring for someone else leads to a subjective positive feeling. The subjective sense of goodwill and well-being correlates with ventral striatum activity (Hennenlotter et al., 2005; Light & Zahn-Waxler, 2012).

Oxytocin production occurs in the supraoptic and paraventricular nuclei of the hypothalamus and is essential for social bonding and empathy in adults. In the early development of empathy, the effect of oxytocin secretion on the central nervous system is essential for social bonding. Oxytocin receptors are found, inter alia, in nucleus accumbens and orbitomedial prefrontal cortex (Zahn-Waxler, 2012).

Prefrontal cortex (PFC) has an essential function in emotion regulation. Some regions in the PFC show very late changes in postnatal life. The orbitofrontal cortex (OFC) is the most developed area in infants and is therefore essential for early empathy. The generation of feelings of goodwill is likely to result from the activity of the medial part of the orbitofrontal prefrontal cortex (mOFC) (Light & Zahn-Waxler,

2012). For higher executive functions, the lateral prefrontal cortex is important, which develops at a later stage of development (Phillips, Ladoucer, & Drevets, 2008).

Empathic concern results out of the connectivity between mOFC, amygdala and hypothalamus. If a child perceives negative emotions in another, it may cause the amygdala to become activated, induce negative feelings, and send a signal to the hypothalamus and the mOFC. Oxytocin is secreted in the hypothalamus and interacts with the receptors of the mOFC and the amygdala. The arrival of the signal of the amygdala in the mOFC triggers the orbital medial activity and feelings of concern and goodwill. This information can then be sent back to the amygdala. Since the amygdala activity can be modulated by the mOFC activity, personal distress can be prevented. Without this top-down regulation, the reaction of the infant is negatively toned, as personal distress. The oxytocin release intensifies feelings of affiliation, well-being and social interest, which consequently promote caring behaviors via the activation of receptors in mPFC and amygdala (Light & Zahn-Waxler, 2012).

With progressive development, affective sharing occurs through the activity of brainstem, amygdala and OFC with reciprocal connections to the superior temporal sulcus (STS). The ability to different between self and others is achieved by the activity of the medial prefrontal cortex (mPFC) and temporoparietal junction (TPJ). Executive functions and emotion regulation are instantiated especially in the PFC (Decety & Jackson, 2004; Decety & Meyer 2008).

Stress

Definition

Stress nowadays is a popular topic and a global phenomenon. Over the years, various branches of science, such as biology, chemistry, psychology, sociology and economy, formed conceptual definition of stress. In physics, stress is a force that puts strain on an object. Non-specifically, stress is a condition that puts strain on the organism (Selye, 1976). Generally, we can say that stress is a physical or mental reaction to stimuli, called stressor, for which the organism is required to use energy and specific mechanisms (Fink, 2009). Stress is a threat to homeostasis in the body and causes the stress response systems (endocrine, immune and nervous system) to mediate (Smith & Vale, 2006). Stress can be absolute, meaning an objective threat

to the organism (e.g. natural disaster) or relative, where the interpretation, whether a situation is threatening, is essential (e.g. public speaking; Lupien, Maheu, Tu, Fiocco, & Schramek, 2007). Stress can also be simply defined as the response to positive and negative life experiences (Papathanasiou, Tsaras, Neroliatsiou, & Roupa, 2015). It can also be viewed from the social self-preservation theory. The environment is often a threat to the self-esteem and social status, resulting in negative self-evaluations and increases in cortisol, the "stress hormone". Primates and humans with a low rank in the social system experience more stress, meaning that stress can be defined as the motivation to self-preservation and positive self-presentation (Dickerson & Kemeny, 2004).

The history of observing stress dates back to Hippocrates, who defined health as a harmonious balance and disease on the other side, as an imbalance from natural sources. Claude Bernard was next to bring the concepts of harmony and the so-called steady state in the 19th century. Walter Canon, an American neurologist, was first to describe homeostasis, connecting it with emotions and physiological states of the adaptive syndrome. He conducted experiments on animals, which involved a shock or a threatening situation, and found out, that animals produce hormones for survival, leading to a discovery of the flight or fight response (Chrousos & Gold, 1992). The proclaimed father of stress research, is Hans Selye, an endocrinologist, who observed the symptoms of chronic stress and their effect of his patients' health (Fink, 2009). Selye defined the General Adaptation Syndrome, see explanation below, and separated stress into "eustress" and "distress" in the 1930s (Chrousos & Gold, 1992).

As mentioned above, stress is divided into positive stress or "eustress" and negative stress or "distress". Eustress occurs, when the ability to control the situation and general coping skills are greater than the demands or the burden of the situation. The stressful reaction of this kind results in a pleasant readiness, which has a beneficial effect on physical and mental abilities, creativity and productivity. Individuals, who are under the influence of positive stress, may experience high motivation, kindness, feelings of satisfaction and happiness, creativity, diligence and determination. Distress is usually labelled simply as stress, because the term stress is connected with a negative assumption. Distress is the kind of stress where an individual feels that the requirements of a situation are higher than their own abilities to cope with this situation, resulting in experiencing it as a pressure. Commonly,

signs of distress are apathy, anxiety, fatigue, exhaustion, irritability and bad mood. Long term, distress can be harmful and can cause illness (Selye, 1975).

Responses to stress are distinguished according to the time of appearance, which can be acute or persisting. Acute responses mostly include negative feelings (anxiety, depression), distinct malicious behavior (drug abuse, conflict behavior, absence of motivation), physiological symptoms (increased blood pressure, headaches) and cognitive difficulties (concentration problems, errors). If the level of stress does not normalize after time, persisting responses may occur. This can lead to illness and other psychological and physiological damage, such as cardiovascular illnesses, frequent infections (Cooper & Marshall, 1976), autoimmune disease, affective disorders and depression (Smith & Vale, 2006). Responses to stress can also be divided into body, mind and spiritual responses. Body responses include increased heart rate, increased blood pressure, headache, loss of appetite, insomnia, and so forth. Mind responses appear on an emotional and cognitive level, with signs such as decreased concentration, preoccupation, anxiety, depression, anger, and so forth. Amongst spiritual responses we can find loss of interest in a range of different activities, decreased creativity, decreased hope and loss of sense of strength capacities (Barry, 2002). An individual can also show signs of stress on a behavioral level, for example sleeping and eating problems, aggression and drug abuse (Cooper & Marshall, 1976).

Effective coping with stress means to constructively overcome stressors. It is crucial to collect information, consider the causes and consequences, plan, look for social support and work hard towards meeting needs. It is possible to either use all energy with increased activity, move to another equivalent goal or postpone overcoming the obstacle to a later time. Ineffective coping brings only the current relief but does not satisfy the needs on a long run, which is why stress always reappears. It is only a maladaptation to the stressors and can cause more harm, for example, reduce the quality of life. Some defense mechanisms for ineffective coping with stressors are solving a problem with aggression, avoiding the stressor, giving up too fast, acting out, attributing own emotions and thoughts to others, and so forth (Barry, 2002). Coping can be divided into problem-focused coping and emotion-focused coping. Eliminating or minimizing the stressful impact of the stressful event is the main point of problem-focused coping, while dampening stressful emotions is the

point in emotion-focused coping. Mostly, these two strategies occur and are being used in a stressful situation together (Carver & Scheier, 1994).

Stress Models

Stimulus-Based Model. The stimulus-based model explains that stress derives for a stimulus and focuses on different life events and conditions. The model proposes that positive as well as negative life events can cause stress. The way the model looks at events is its main disadvantage, since it views every life event as stressful. *Stressful life events scale* measures self-reported stress amount for each life changing event in individuals (Holmes, 1978).

A stressor is an external or internal stimulus, which is likely to cause a stressful reaction to the situation. The stressor is the cause of the threat to an individual. It needs to be effectively eliminated, otherwise the stress condition may be prolonged. In the short term, the stress reaction is positive, because a certain amount of short-term stress is beneficial for the individual and his organism, while long-term stress is a burden for the organism, since it weakens the immune system and negatively affects his psycho-physical health and well-being (Myers, 2007). Stressors can emerge from inside, creating an internal reaction, such as fear, guilt, anger and similar emotional states. Internal stressors are changeable and are important in detecting external stressors; coming from the outside, over which we have no control. Common external stressors are life changing events, such as death of a family member, divorce, pregnancy, vacation, job loss, loan and retirement. Another group of stressors are chemical stressors and are substances individuals take to affect their organism, for example, nicotine, alcohol, caffeine, sugar, medication (Barry, 2002).

Response-Based Model. General Adaptation Syndrome (GAS) was originally developed by Hans Selye. He divided GAS into three phases, alarm, resistance and exhaustion, and stated, that according to the length of the exposure to stress, not every phase may be experienced (Fink, 2009). A stress response, according to GAS, occurs in the following phases (Selye, 1976):

1. *Alarm phase*: The stressor occurs and causes a shock to the individual. When an individual feels threatened, a physiological response called fight or flight takes place. The reaction occurs when the brain sends a message to the body

that these are dangerous conditions. This helps the individual to protect himself, so physiologically, the release of hormones adrenaline and cortisol follows, which provides muscles with speed, endurance and strength within seconds. The heart rate also increases, pumping blood faster through the body. It is a normal response to stressors and does not damage the physiological or psychological health of the individuals in the short term.

2. *Resistance phase:* In this phase, the mobilization starts. The individual is counteracting the changes that occurred in the body and trying to cope with the stressor. Some increased body functions go back to a normal level, while blood pressure and respiration may still remain high. If the stressor is successfully removed, the general adaptation syndrome stops here.
3. *Exhaustion phase*: If the individual is exposed to stress for a longer period, the third phase of GAS occurs. The body can fight the stress no longer. The occurrence of exhaustion means vulnerability of the organism to various disorders and illness. Rarely, strong conditions can even lead to death.

Allostatic load is a concept connected with the third phase (exhaustion phase). Since the allostatic system is responsible for the homeostasis in the organism, persisting or reoccurring stress can change the neural and neuroendocrine response responsible for the balance after the initial stress intake. Constantly activated stress levels lead to chronic stress, which wears and tears the organism, weakens coping mechanisms and can even turn the stress mediators against them. The damage from the allostatic overload can appear either because of the constant activation, inadequate response, habituation failure or inability to shut down the allostatic system. It is usually measured in physiological activity when resting. Patients that are “stressed out”, have higher baseline levels in the hypothalamic-pituitary-adrenal axis, sympathetic nervous systems and the cardiovascular system (McEwen, 1998).

Transaction-Based Model. Transactional Model by Lazarus and Folkman (1984) states, that the evaluation of the stressor is crucial in the stress process. Since no person on earth is the same, interpretations of a (objective) stressor amongst individuals can differ. For some, a stressor can cause stress, while others would perceive the same stressor as no such threat. After the initial perception of the potential stressor in the environment, the first stage, primary appraisal, is being

carried out, where the potential stressor is first categorized by whether it is positive, irrelevant or negative/stressful. If the potential stressor is perceived as stressful, it can either be evaluated as a challenge, a threat or a loss. In the second stage, a second appraisal is made, whether we have the resources to cope with the stressor. In case of a lack of resources, a stress reaction is triggered. A coping mechanism is chosen for the overcoming of the stressor. In the third stage, called reappraisal, the success of the coping strategy is assessed, to ensure a dynamic adaptation to a new stressful situation.

Other transaction-based models lean on the theory of Lazarus and Folkman (1984), deriving from the key aspect that each individual perceives and interprets the stimulus from the environment differently. Factors for a different interpretation are mostly vulnerability and sensitivity (Papathanasiou et al., 2015).

Discrepancy Model. The Discrepancy Model proposes that there is an imbalance between the demands from the environment and the resources of an individual. Based on this model, individual aims to minimize that discrepancy, either by changing the environmental conditions, by changing internal processes or by changing both. First, the individual compares the requirements from the environment with their own ability to overcome them. If there is an imbalance between the environmental conditions and available resources, the individual then acts with a change of outer or/and inner conditions (Carver, Lawrence, & Scheier, 1999).

Stress Assessment

There are several questionnaires and tests for the assessment of stress. A few of them are mentioned here. The Perceived Stress Scale (PSS) is the most commonly used stress questionnaire in psychology. Created by Cohen and colleagues (1983), it measures to which degree a situation is stressful for an individual. The unidimensional scale has 14 items and assess the subjective appraisals of stressors during the last month (Cohen et al., 1983). Another instrument for checking appraised stress in different situations is the Perceived Stress Questionnaire (PSQ). Consisting of 20 items, it is focused on the cognition and less on the emotions accompanying stressful life events from the last two years (Levenstein, et al., 1993). The Trier Social Stress Test is a psychobiological laboratory tool of social evaluation, which triggers a stress response by talking to

three judges in front of a camera in a job interview setting. Other possible situations include short presentations a person has to prepare. The test consists of three parts. In the first part, the previously mentioned presentation is held. Then the participant has to count backwards from 1022 in steps of 13, starting over if making a mistake. In the last part the participant is informed about the study and its intention of causing stress. Salivary cortisol should be elevated after the stress induction (Kirschbaum, Pirke, & Hellhammer, 1993). Trier Inventory for Chronic Stress (TICS) is a questionnaire about chronic stress. It is divided into six factors, assessing different types of overload, worrying, tension, pressures and demands, which present a deeper view of the work and social conditions of an individual (Schulz & Scholtz, 1999).

Stress in Children

”[C]hild stress might be defined as any intrusion into children’s normal physical or psychosocial life experiences that acutely or chronically unbalances physiological or psychological equilibrium, threatens security or safety, or distorts physical or psychological growth/development, and the psychophysiological consequences of such intrusion or distortion“ (Arnold, 1990, p. 2).

A certain amount of stress is crucial for survival and can lead to positive results in a child’s development. Through stress, a child may learn new social and cognitive skills that allow him to adapt in new situations and environments more quickly. But when stress exceeds normal values of severity, or persists for a longer time, it can be unhealthy and can harm a child’s organism and mind, damaging important cognitive and emotional functions, so they develop incorrectly and have an effect even in the adulthood (Gunnar & Quevedo, 2007). Stressful life events in a child’s life can range from typical situations, such as the first day of kindergarten, moving to another house or experiencing family gatherings, to severely harmful situations, such as a parents’ divorce, abuse, domestic violence, lack of parents’ attention, separation from parents, natural disasters or neglect (Arnold, 1990). Jacobson (1994) has found out that children feel stress when they lose a person or a pet, feel threatened or lose control in their daily routine.

National Scientific Council on the Developing Child have divided childhood stress into positive stress, tolerable stress and toxic stress. Positive stress is mild, temporary and essential for a healthy development and helps the child learn and

adapt to the environment (Shonkoff et al., 2012). Common situations which trigger positive stress are meeting new people and learning new tasks (Franke, 2014). In case of longer lasting stress from intense situations, such as the death of a family member, divorce or natural disaster, a child's organism is activated to a higher degree than in comparison to experiencing situations fostering positive stress. This is called tolerable stress and with proper attention and support from family and others, a child can develop coping strategies and overcome the stressful situation successfully. Toxic stress comes from persistent and severe stress over weeks or even years. Typical toxic situations are abuse, violence and neglect. If the child is not taken care of properly, it can cause severe brain damage and stress-related illness (Shonkoff et al., 2012). The difference between tolerable and toxic stress is the recovery. A child cannot fully recover after toxic stress (Franke, 2014).

According to Zegans (1982), a child experiences stress in four stages. The first stage is alarm, where the stressful situation is recognized. In the second stage, the appraisal stage, the child is evaluating the situation and searching for a meaning. Then, in the third stage, the child searches for a way to respond to the stressful event by using coping strategies. Hormones are being secreted and the body is fully ready to react. In the last stage, the child uses one or more of his prepared strategies, which can be either to fight or flight from the stressor.

A child's response to stress is somewhat different from an adult. Common behavioral and emotional responses of a child are thumb-sucking, crying, sleep problems, loss of appetite, bed-wetting, nail biting, anger, frustration, fear (of animals, dark, night), aggression, irritation and sadness. As for physiological responses, a child may experience headaches, incontinence, sweaty palms, fast heartbeat, dry throat and dizziness (Mindes & Jewett, 1997).

Stress versus Emotions

Emotions and stress have a two-way interaction. Stress can trigger emotions and on the other side, emotions can also cause stress. Both share the arousal component, meaning that they create a psychological and physiological reaction in the organism. Still, we cannot equate stress with emotions, since stress affects the memory by not remembering things with low arousal and emotions, on the other hand, enhance saving memories that we have our attention on (Lupien et al., 2007).

Stress-Related Disorders

Post-traumatic stress disorder (PTSD) can occur after an extremely stressful life event, but only if the individual does not recover from it correctly. There is a range of symptoms divided into four categories - re-experiencing, avoidance, arousal and reactivity, and cognition and mood symptoms. Included in those categories are flashbacks, avoiding places, situations and thoughts that remind of the event, sleeping difficulty, angry outbursts, hard time remembering the traumatic event, negative thoughts and self-image, and so forth. An individual with PTSD has problems with coping in their everyday life. PTSD can cause changing routines, difficulties in daily tasks (sleeping, eating, concentrating etc.) and avoidance of social contact. PTSD is treated with medications and psychotherapy (cognitive behavioral therapy being the most effective); a combination of both is of great advantage (American Psychiatric Association, 2013).

Individuals can have severe PTSD symptoms right after a traumatic event or life experience, but if symptoms disappear after a few weeks, this is classified as acute stress disorder (ASD). A trauma can trigger acute fear, anxiety, dissociation, helplessness, numbing and depersonalization. To have ASD diagnosed, it is crucial for the symptoms to appear in a time range between three days and four weeks after the exposure to the trauma (American Psychiatric Association, 2013).

The Physiology of Stress

The physiological response to stress runs across two main systems – the sympathetic-adrenomedullary (SAM) system and hypothalamic-pituitary-adrenal (HPA) axis (Gunnar & Quevedo, 2007).

SAM System. The SAM system is a part of the autonomic nervous system and its key task is to produce adrenaline in the center of the adrenal gland. After the “adrenaline rush”, the body is prepared for a fight-or-flight situation, meaning it can sufficiently adapt to acute stress. The system’s preganglionic neurons are located in the inter-mediolateral grey matter of the spinal cord. They leave the spinal cord though the ventral root and form cholinergic direct synapses on the chromaffin cells of the medulla of the adrenal glands, which are the secretion cells. With their stimulation, they produce catecholamine, epinephrine and norepinephrine, which

goes into circulation. They stimulate the sympathetic nervous system by binding onto adrenergic receptors, serving as hormones in fight-or-flight situations (Gunnar & Quevedo, 2007).

HPA Axis. The HPA system controls responses to stress, mostly in case of the General Adaptation Syndrome (GAS), with the production of cortisol in human bodies. The HPA axis is a neuroendocrine system connected not only with stress, but with controlling other body functions also for example, emotions, digestion, immune system (Stephens & Wand, 2012). Glucocorticoid hormones (corticotrophin-releasing hormone CRH and arginine vasopressin) are released from the hypothalamus, which stimulates the anterior pituitary gland. There, the adrenocorticotropic hormone (ACTH) is produced, affecting the adrenal cortex of the adrenal gland, which secretes glucocorticoid hormones (cortisol; Gunnar & Quevedo, 2007). Cortisol then also acts as a negative feedback regulator, suppressing the pituitary gland and the hypothalamus secretion processes, so the body can return to a normal state after a stress situation (Stephens & Wand, 2012). Glucocorticoids bind to mineralocorticoid receptors and glucocorticoid receptors (Ulrich-Lai & Herman, 2009) and work though gene transcription in the nucleus of a cell, and because of this, cortisol needs around 20-30 minutes to show up (Gunnar & Quevedo, 2007).

Cortisol. Cortisol, a steroid hormone synthesized from cholesterol, is one of the end products of the HPA axis activation process. Produced by the adrenal gland in zona fasciculata, its tasks in acute stress are to affect metabolism and the immune system by activating anti-inflammatory mechanisms and increasing blood sugar (Pocock, Richards, Richards, & Richards, 2013). It increases the adaptation of energy throughout the organism and enhances the memorization of strong emotions. Receptors can be found in brain areas such as amygdala, frontal lobe and hippocampus. Stress is crucial for survival. However, if stress persists over a longer period of time and the cortisol level stays elevated, it presents a health risk. It can cause cognitive impairment (Lupien et al., 2007), a damage of the hippocampus, suppression of the immune system and the production of collagen, slower wound and infection healing, slower breakdown of fat, reduced bone formation and many other illnesses (Hannibal & Bishop, 2014).

Cortisol has the highest circadian peak within 30 minutes after waking up in the morning and slowly drops throughout the day until midnight, with some weak peaks during daytime (Pocock et al., 2013). The highest cortisol peak 30-45 minutes after awakening is known as the cortisol awakening response. Cortisol increases by 50–75% within the first 30 minutes after waking up. Since age, gender, sleep, weight, smoking or consuming alcohol have no significant effect on the cortisol awakening response, measuring cortisol in the morning is a reliable method for establishing an individual's adrenocortical activity (Pruessner et al., 1997).

A meta-analysis from Dickerson and Kemeny (2004) reviewed 208 studies about acute psychological stressors and cortisol responses. They hypothesized that uncontrollable social threat stressors would increase cortisol production in comparison to other stressors. Social evaluation becomes a threat, when a self-aspect is negatively judged. Typical situations with social-evaluative threats are performances, public speaking or presentations. In the selection, studies had to be experiments with a laboratory induced psychological stressor (e.g. cognitive or emotional tasks, speaking, conflicts). Altogether, more than 6000 participants participated in those studies, either having their cortisol taken through plasma (55.0%) or saliva. Almost one half of the studies induced a stressor with a cognitive task, following public speaking tasks, verbal interaction tasks, emotional tasks or a combination. Results showed a significant increase of cortisol from baseline in these studies. The hypothesis was also confirmed, with uncontrollable social tasks containing evaluation and judgement threats provoking the highest cortisol level amongst all kinds of tasks (more specifically, the public speaking and cognitive task combination). On average, emotion induction tasks did not manage to change the cortisol level. Their main conclusions were that psychological stressors, just like physical, affect cortisol secretion and that these are highly variable. The reasons to this may be the subjective understanding of a stressor between individuals, meaning also a different cortisol level. But there were some differences between the studies, some stating the universal effect of stressors on cortisol and others debating about specific characteristics.

In a study of 180 twelve-year-old twins, Bartels, de Geus, Kirschbaum, Sluyter and Boomsma (2003) found out, that there is a significant genetic contribution to the cortisol level in the morning and afternoon, meaning that not only environmental conditions are responsible for basal cortisol levels.

With psychological interventions, like cognitive behavioral therapy and mindfulness-based training (Hannibal & Bishop, 2014), music (Thoma et al., 2013) dancing, laughing, guided relaxation, yoga and meditation may decrease the levels of cortisol (Varvogli & Darviri, 2011). An increase can be caused by sleep deprivation, caffeine, trauma, anorexia, intense aerobic exercise and overthinking (Hannibal & Bishop, 2014).

Cortisol in Children. Price, Close and Fielding (1983) were first to discover that until 12 weeks of age, babies experience multiple peaks of cortisol throughout the day and that already at three months, infants develop a typical diurnal cortisol pattern, with a morning peak and evening nadir. Gröschl, Rauh and Dörr (2003) took saliva samples in the morning, noon and evening on casual non-stressful days from 252 healthy children, aged four days to 15 years. They found out that babies have a very high cortisol levels throughout the day until the age of four weeks. There was no circadian rhythm in babies, younger than one month, but it showed developing signs in babies and toddlers, aged 1-12 months. After 12 months of age, noon and evening levels decreased even more and a peak in the morning appeared, meaning a full development of the circadian cortisol rhythm. Bäumler, Kirschbaum, Kliegel, Alexander and Stalder (2013) were specifically focused on the development of the cortisol awakening response in children, aged 1-7.5 years. Their results show that on average, the cortisol levels grew from 14.69 nmol/l, measured right after awakening, to 23.42 nmol/l, measured 30 minutes later. That indicates the well-developed cortisol awakening response from the age of one.

Salivary cortisol is the best method when conducting research about stress in children and it is also best to measure stress in children with sleeping or eating problems and other illnesses. This method is non-invasive, reliable, ethical, presents patterns of the HPA axis activation in children accurately without confounding values (Keil, 2012) and can be applied by non-professionals, such as parents or teachers (McCarthy et al., 2009). Therefore, being virtually stress-free, it is a good alternative for blood sampling, which could easily cause the children distress and affect the results (Gröschlet al., 2003).

When measuring salivary cortisol, it is important to take some factors which could affect the cortisol pattern into consideration, such as meals, napping and other activities. Different methods of saliva sampling can be implemented, according to age

and developmental stage. Whole saliva sampling is done by spitting or passive drooling and is feasible with school aged children and adolescents. With younger children, an eye sponge or a cotton dental rope can be used, since it is being held by an adult on one side. The most common method is polymer rolls for example, Sarstedt Cortisol-Salivette®. Because of its variety in shapes and sizes, it can be used with infants, toddlers and older children (Keil, 2012).

In research, protocols for the collection should be established first. It is important to collect salivary cortisol at similar times of the day (e.g. always in the afternoon), since cortisol values vary across the day. For the best outcome, at least two values, baseline and stress response cortisol, should be assessed, in the same time intervals. For a standardized saliva collection, the material (e.g. always with an eye sponge) should be the same, as well as the technique (e.g. always chewing for at least two minutes). Saliva samples should be coded, stored (e.g. in a freezer at -20°C) and shipped in the same conditions (Hanrahan, McCarthy, Kleiber, Lutgendorf, & Tsalikian, 2006). Clements and Parker (1998) were interested in the difference between frozen and non-frozen saliva samples and found out that both samples were almost the same, showing that the cortisol is stable in a non-frozen state as well.

Gröschl and colleagues' (2003) saliva analysis of 252 babies and children displayed the development of a circadian rhythm. Babies, younger than four weeks, had high cortisol levels at all times, with an average of 34.5 nmol/l (*SD* = 8.5) in the morning, 30.5 nmol/l (*SD* = 9.6) at noon and 27.5 nmol/l (*SD* = 10.9) in the evening, showing no signs of a circadian rhythm. Their cortisol ranges were wide tough, ranging from 20.4-48.3 nmol/l in the morning and 3.3-43.3 nmol/l in the evening. In children, aged 1-12 months, evidence of a circadian rhythm is present, with high levels of cortisol in the morning (*M* = 24.3 nmol/l, *SD* = 12.0) and a dropdown at noon (*M* = 11.5 nmol/l, *SD* = 8.9) and evening (3.8 nmol/l, SD = 3.0). Even more prominent circadian pattern is visible in 2-15 year-old children, with a morning peak of 24.7 nmol/l on average (*SD* = 8.5), a noon dropdown to an average of 8.0 nmol/l (*SD* = 4.0) and an evening nadir with an average of 1.7 nmol/l (*SD* = 1.4). Though, again we must mention the range of the cortisol levels, going from 3.0 all to 54.9 nmol/l in the morning, 1.1-20.7 nmol/l at noon and ranging from 0.2-8.7 nmol/l in the evening. The values are comparable to Price et al. (1983), which stated that normal cortisol values usually vary between 3.3 to 26.6 nmol/l in the morning and 0 to 7.1 nmol/l in the evening in children aged 5-15 years. The high variability across the population can

come from differences in prenatal conditions, genetics, medication, age, weight, gender, developmental stage, personality traits, temperament, competences and coping mechanisms (Hanrahan et al., 2006).

Social Exclusion

The origin of the definition of social exclusion dates back to the 70s of the 20th century to France. The definition was initially broader and covered more aspects of social exclusion, which in addition to social, economic and political problems, included a moral problem. In general, social exclusion means incapacity, inability, and deprivation in different areas of life. An individual can be socially excluded from employment, public goods, credit, loan, property, citizenship (Sen, 2000). Social exclusion, as defined in psychology, is excluding a person from the community or social groups. The desire to belong to a group and to have fulfilling relationships is typical for every human being. A social monitoring system in a human's cognition is responsible for reading different rejection hints. When the system is sensitive, social exclusion can feel like physical pain. Social exclusion results in the activation of the autonomic nervous system, specifically the secretion of cortisol in the HPA axis and alpha-amylase in the sympathetic-adrenomedullary system. Humans like deciding the belonging to the group because it shows success and power (Bass, Stednitz, Simonson, Shen,& Gahtan, 2014). Social exclusion can happen on a physical or emotional level. Social exclusion is harmful for both adults and children. While it has an emotional impact on everyone, children are a vulnerable group since it can also influence cognitive development (Tobia, Riva, & Caprin, 2016).

Effects of Social Exclusion

Social exclusion can have negative effects on various areas of life. It can lead to internalizing (e.g. withdrawal, anxiety, fear, substance abuse, loneliness) and externalizing behavior (e.g. aggression, acting out, destructiveness, delinquent behavior), as well as apathy, frustration, depression and elevated distress levels (Tobia et al., 2016). Social exclusion can trigger sadness, anger, shame and even higher rivalry. Individuals can feel meaningless, worthless, hopeless and lack of confidence (Abrams, Hogg, & Marques, 2005). In children, decreased interest in everyday activities, school avoidance and classroom disengagement can also be

signs of undergoing social exclusion. These can result in bad grades and decreased cognitive functioning (e.g. in working memory, executive functions, logic, reasoning; Tobia et al., 2016). Social exclusion is also linked to poor health (cardiovascular diseases, mental disorders), low well-being, low life satisfaction and high substance or alcohol abuse (Abrams et al., 2005).

Responses to Social Exclusion

Responses to social exclusion can either be antisocial/aggressive, passive/self-defeating or prosocial/conciliatory. Typical aggressive responses are seeking revenge or harming the excluders. Such individuals can also criticize or threaten others. Distraction from the rejection, avoiding of places and people reminding of the social exclusion event or withdrawal from social situations are common for passive responders. An extreme response to social exclusion is suicide. Last type of response to social exclusion is characterized by acting prosocial or working harder. That way, individuals strive toward increasing their excluded status and influencing others by some kind of norms in new groups (Abrams et al., 2005).

Social Exclusion in Children

Young children like being exclusive in play and deciding who can play with them or not. Even when the rule of inclusion is applied on the playground by caregivers, they still tend to dislike previously excluded children. Many times, social exclusion accompanies aggression – harming someone by removing them physically or telling them to leave, or telling them not to play with them. But social exclusion is not always negative and happens as a natural process as part of the social development. In our study, we investigate the first option, when social exclusion is harmful (Killen & Rutland, 2013). Why do children exclude others in the first place? Sometimes, reasons for social exclusion are functional – so the group functions more coherent or exclusion is used as a sanction for someone who broke the rules. More important, we need to focus on harmful behavior when someone is socially excluded because of stereotypes or prejudices. Such reasons may also include race, power, status and intentionality (Abrams & Killen, 2014).

Social exclusion can be best viewed from a social developmental perspective. Attitudes and stereotypes developed in the childhood have impacts on cognition and behavior later in life. These beliefs are harder to change in adulthood so early

interventions are more efficient. As such, social exclusion is a complex phenomenon with its roots embedded in the childhood of individuals (Abrams & Killen, 2014).

Possible risk factors for being socially excluded are social anxiety, ineffective coping strategies, low self-esteem and anxiousness. Children with rejection sensitivity and overall low popularity may be more subjected to social exclusion. In an experiment in was found out that children with low to medium self-esteem, intelligence and popularity were affected more in a social exclusion game (Tobia et al., 2016).

Cyberball Paradigm

William's Ball-tossing paradigm (1997) is one of the most used instruments to measure the impact of social exclusion. This paradigm was later on expanded and transformed into a virtual online ball game with at least two players. While the original ball toss paradigm was tested in a face-to-face ball game, where two participants toss a ball and the third one is being excluded (or included in the control group), the Cyberball paradigm does the same but on the computer. Participants are told that other co-players (at least two) will join the computer game. They showed that there is also an effect of social exclusion even when there is no direct contact with the excluders or no real life event. After exclusion, participants felt higher levels of anxiety and anger, decreased self-esteem and a reduced sense of belonging (Williams, Cheung, & Choi, 2000).

Recent Studies

Sense of Social and Antisocial Behavior

A large number of studies on empathy development in children have already been carried out. Initially, the focus was primarily on older children, but especially in recent years babies and toddlers had become the focus of attention (Wynn & Bloom, 2014).

Roth-Hanania, Davidov, and Zahn-Waxler (2011) focused on development of empathy in children from eight to 16 months and had been able to reveal that children showed concern for others already at this age. By the second year of life, beginnings of other-oriented empathy are already recognizable for both the emotional and cognitive component. When 8-10 months old children watched their mother

injure her finger or bump her knee, they showed concern as affective responses in form of facial, vocal, and gestural-postural manifestations and attempted to understand the distress of the mother. Prosocial behavior like comfort and help were still rare in first year of life, increased during second year of life, and mostly shown by 16 months of age. The authors argue that prosocial behavior cannot be shown before, because of the necessity for appropriate motor abilities, a complex integration of cognition, affect and action which develop in the course of development.

Humans develop a mechanism, which lets them evaluate others actions to decide whether a person is good or bad, friendly or harmful. Hamlin, Wynn and Bloom (2007) demonstrated that the development of this mechanism starts pretty early in a human's life, already at the age of six months. In their experiment, infants at the age of 6-10 months watched a play, where one shape could not get up the hill and the other shape either helped him get up or pushed him down. At the end, infants had to choose, which of the characters they prefer (helper, hinderer or neutral). The results show that children mostly picked either the helper, if they saw the "helping situation" or the neutral one, if they saw the "hinderer situation", meaning, they were avoiding the hinderer. Their explanation was that infants lean toward cooperative others and avoid those getting in their way to reach a goal. Infants already make social preferences according to how someone behaves to another person, even when they are only watching a situation without taking an active part as an actor in it. Through that, a concept of moral judgement develops, which allows infants, to differentiate between those, who make positive or negative actions and distinguish right and wrong.

The experiment was furthermore carried out with three-month-old children, where the gazing direction and length were measured, as young children are not yet able to reach for the shapes. Again, the children preferred the prosocial helper (Hamlin, Wynn, & Bloom, 2010).

In response to the numerous criticisms of the study, Hamlin (2015) presented some more findings. When the climber gazed uphill, infants chose the helper, but when the gaze was not focused on the goal (the hill), infants chose characters randomly. Again it was proven that children do evaluate other's actions and can tell good from bad.

Hamlin and Wynn (2011) developed two scenarios presented to five and nine months old children. In the first scenario, a puppet tried to open a box and failed.

Thereupon comes another puppet and a) helps to open the box successfully b) jumps on the box, slamming it shut. In the second scenario, five months old children saw a puppet playing ball and rolled it to a) a prosocial puppet who rolled the ball back b) an antisocial puppet who took the ball and went offstage. When the children were given the opportunity to choose between the puppets, they chose mainly the prosocial puppet.

In another study of Hamlin, Ullman, Tenenbaum, Goodman and Baker (2013), ten-month-old children were placed in front of a legowall, which had two passages. A tiger puppet peered through both passages, each looking at a toy (flower and duck) and opting for the flower in each randomized passage. The whole time the tiger was observed by two differently dressed elephants. In the next part of the experiment, the passageways of the legowall were closed by moveable doors. The observer elephants successively opened each one door for the tiger. The results showed that children mainly chose the elephant that opened the door to the preferred toy of the tiger (flower).

Similar to other authors mentioned above, Vaish, Missana and Tomasello (2011) were interested in how children use their moral judgement and how they behave, when someone is being harmful to someone else. Thirtytwo three-year-old children watched a puppet show with two puppets on stage, one of them made a sculpture and went off the stage, in the meantime the other puppet destroyed the sculpture or just expressed the intention to do so. As the first puppet returned, it was either sad or just neutral. Children’s protest was coded as normative, imperative, hints of protest or none at all. Coding was also used for whether the child told the puppet who destroyed the sculpture and whether the child interacts or helps with the affected puppet. All children were verbally protesting against the destroyer, telling the harmed puppet who caused it, and showed prosocial behavior towards the harmed puppet, but only in the condition, where the harmed puppet was expressing his sadness, showing that small children are capable of moral understanding and intervening in an unfair situation.

Fair Resource Allocation

Fairness is related to morality and means the allocation of resources, process of decision making, provision of information and social interaction with others (Bierhoff, 2017). For a long time it was assumed that children do not develop

sensitivity for moral norms such as fairness until the preschool years but only recently research shows that already infants prefer fair allocation of resources and rewarding depending on the amount of effort (Sloane, Baillargeon, & Premack, 2012).

Geraci and Surian (2011) were investigating, if infants already have a sense of fairness and social evaluation skills to recognize if resources are equally distributed or not. Ten to 16 month-old infants watched four animals (observer, distributor and two receivers) with either an equal (the distributor gave each receiver one toy) or unequal distribution (the distributor have one receiver both toys). In the second part, the observer approached either the fair or the unfair distributor. Results showed that infants looked longer when the observer met the unfair distributor, so they not only have social evaluation skills, they also evaluate actors by their fairness in distribution. Asking the children which distributor is the good one, ten months olds guessed randomly, however children 16 months old preferred the equal distributor.

In the experiment of Sloane and colleges (2012), 21-month old children observed an experimenter reward two individuals after they both helped to complete a chore (put toys away) or just one child did the work while the other child was playing. In the control condition, the toy boxes were no longer transparent. The experimenter therefore could not track which child cleaned up. The results showed that 21- month old infants detected a violation when both individuals were rewarded equally. Children at that age already expect a reward according to individual effort. Infants had expectations towards the experiments actions when the boxes where transparent and it could be determined, who had worked and who had not. Whereas, children no longer detected a violation if the experimenter could not see the boxes' contents and both individuals were equally rewarded.

The authors argue that children of this age could already have acquired a list of behavioral rules or an early emerging concern of fairness by observing and participating in social interaction and thereby learned how individuals typically distribute resources and rewards.

Schmidt and Sommerville (2011) dealt with the research question of emergence of the willingness to share goods altruistically with an unfamiliar adult. Fifteen months old infants were given the option to choose one of two toys. After the child has chosen his preference, an experimenter handed the infant the other, non-preferred toy. In the second part of the experiment an unfamiliar experimenter asked

for a toy. Results showed that one third of the children shared altruistically their preferred toy.

Social Exclusion and Empathy

Most of the previous research has focused only on social exclusion in children aged four years and older, because it is better visible in the structures such as kindergarten, school, high school, and because most of the children can already talk and express feelings by that age. Many researchers have already concentrated on the impacts such as the environment, social status, ethnicity, economic stability, poverty, disease, parenting and community opportunities. Others have looked at it from a social and developmental perspective – how group dynamics, membership, attitudes and peer relationships are connected to social exclusion (Abrams & Killen, 2014). The consequences of social exclusion have been known for a long time. Social exclusion can have many negative outcomes on children such as lack of motivation, emotional lability, unhealthy relationships, stress, depression and anxiety. An important aspect in the research of social exclusion in children is also how we could prevent exclusion in children “at risk” and which interventions could help and raise awareness about social exclusion (Abrams & Killen, 2014).

Research on empathy for social exclusion had mainly been done for adults, some in adolescents but not yet much in children (Masten, Eisenberger, Pfeifer, & Dapretto, 2010; Masten, Morelli, & Eisenberger, 2011). In the study by Over and Carpenter (2009), a video was shown to five-year-old children in which a group of shapes excluded another shape. It turned out that children who saw that video, compared to the control group, showed more imitative actions of the model. The authors assume that the children have a higher motivation to affiliate and thus behave like the model.

Marinović, Wahl and Träuble (2017) have done research on the topic of social exclusion, showing the same video as Over and Carpenter (2009), and seeking proximity to another person. In their experiment, 4-5 year old children watched videos which either included acts of social exclusion/ostracism. Afterwards the children had to choose, on which chair they are going to sit according to the proximity to the researcher. Children, who watched videos with social exclusion, sat closer to the researcher. The results show, that children seek proximity after they are directly or indirectly exposed to social exclusion.

Stress, Emotions and Empathy

McCarthy et al. (2009) compared salivary cortisol on a hospital visit day for an IV procedure and a non-procedural baseline day in 384 children, 4-10 years old (*M* = 7.2). Criterion for collecting saliva samples (time, meal intake, medications and activities) was established to assure valid results. Saliva was collected with the spitting technique, using gum to stimulate saliva production and a straw to collect saliva into a tube. Baseline values were collected two times by parents at home on a non-procedural non-stressful day, matching the two sampling times from the procedure day, between 8:00 and 15:00. Another two samples were obtained on a day of the clinical procedure at the hospital, one at the arrival and one after the procedure. Normative cortisol value means were ranging from 0.301 mcg/dl in the morning and 0.119 mcg/dl in the afternoon, meaning a 8.7% decrease, normal for a circadian cortisol pattern. Clinical cortisol values had a mean of 0.243 mcg/dl at the arrival in the hospital and 0.281 mcg/dl after the procedure in the hospital, showing an increase of 15.7% (McCarthy et al., 2009). The conversion formula for cortisol units: mcg/dl (reported unit) x 27.6 (factor) for nmol/l (converted unit); Hanrahan et al., 2006). The mean change was significantly greater on the clinical day and the cortisol values were 33.6% higher before the procedure and 69.3% higher after the procedure compared to the two baselines on a non-clinical day. Going to the hospital was a stressful event for children and this study showed how cortisol values can increase significantly, when stress is induced; compared to normative values on a normal day (McCarthy et al., 2009).

Gunnar, Brodersen, Krueger and Rigatuso (1996) longitudinally observed cortisol levels and behavioral distress in infants (at two, four, six and 15 months) at their exams in a clinical facility. Saliva samples were taken right after the arrival to the clinic and 20 minutes after the inoculation period. They found significant changes in the HPA activity between two and six months. Post-test cortisol was higher compared to baseline at two, four and six months, but not at 15 months. Baseline cortisol declined significantly between six and 15 months, while post-test cortisol significantly decreased between two and four, as well as six and 15 months. Differences between two and six months were observed, where the circadian rhythm is being developed. Differences were also noted between six and 15 months, arising from the development of a different sleep pattern and the memorization of the clinical visit. Behavioral distress reactions decreased with age.

Bunea, Szentágotai-Tătar and Miu (2017) were interested in how an early-life adversity can affect the functioning of the HPA axis in response to psychosocial stress. Therefore, they included 29 studies in their meta-analysis. The results showed a blunted cortisol response to psychosocial stress in the early-life adversity group. Individuals with no adversity had a normal cortisol pattern when reacting to stress.

Yim, Quas, Cahill and Hayakawa (2010) have compared children's and adults' cortisol levels in exposure to positive and negative affect. Children aged 9-12 and adults aged 18-25 were included in this study. Researchers used a Modified Trier Social Stress Test (TSST-M), which provokes psychosocial stress through controlled laboratory stressors. A positive and negative affect questionnaire was filled out and saliva samples were taken at the start of the test and at seven additional times after the test. The results showed cortisol increasing after the test, with an average cortisol baseline of 3.79 nmol/l in adults. There were no differences in cortisol responses between children and adults, except some sex differences in adults. After the test, children and adults similarly reported significantly higher levels of perceived stress, more negative affect and less positive affect. Comparing the behavior expressed towards stress, children displayed a greater amount of stress-related behavior than adults.

Fortunato, Dribin, Granger and Buss (2008) were interested in their bio-behavioral study, how alpha-amylase and cortisol change when inducing emotion tasks of pleasure and displeasure in toddlers. Their research was focused on affective behavior (approach and withdrawal) and emotional behavior (negative and positive affect). Alpha-amylase is a product of the sympathetic nervous system and is produced in the salivary glands as an acute stress response. 111 toddlers (age M = 24.05 months, SD = 1.52) were given tasks from the Toddler and Preschool Laboratory Temperament Assessment Battery in the laboratory, which inflicted positive and negative emotions and behavior. Saliva was collected with a cotton swab from a salivette before, right after and 20 minutes after the tasks. Toddlers' behavior was videotaped and rated for intensity and valence on a Likert scale. The results showed, that alpha-amylase was positively correlated with positive affect and approach behavior, and that cortisol was positively correlated with negative affect and withdrawal behavior. The findings demonstrated, how the sympathetic nervous

system and the hypothalamic-pituitary-adrenal axis are connected to emotional and behavioral stress response in toddlers.

A new concept, called “empathic stress”, was defined by Engert, Plessow, Miller, Kirschbaum and Singer (2014). Empathic stress occurs when a person feels stressed (higher cortisol level) just by observing someone else feeling stressed. Their study was focused on the contagious effect of stress, whether it causes changes in the HPA axis, and the difference between genders, closeness to the person and situation reality. Participants were male-female dyads, either in a relationship or complete strangers. After arrival, a resting period for 30 minutes was included and the stress induction with the TSST started after 50 minutes. For measuring cortisol and alpha-amylase, saliva was taken nine times, before the stress induction, right after and at later stages of the experiment. They were controlling for heart rate. Empathy was measured by Interpersonal Reactivity Index and Emotional Response Scale. The results showed a significant stress response increase in the HPA axis and the SAM system when observing the other participant experience stress in more than a fourth of all observers. Couples felt more empathic stress than strangers, real life situations triggered more empathic stress than video situations and no difference between genders were found.

Another study using the TSST was carried out by Maldonado, Trianes, Cortes, Moreno and Escobar (2009). They compared the cortisol response between children with different types of Attention-Deficit-Hyperactivity Disorder (ADHD) and a control group with no disorders. Their goal was to discover, whether there are changes in the HPA axis after the induction of the psychosocial stressor with the TSST-C (child version) and then compare it between the two groups. They hypothesized that the ADHD group would show less cortisol reactivity then the control group. Therefore, 66 children, aged five to eight years, were recruited for the experiment (33 with ADHD). TSST-C is an adapted version of the TSST, inducing a psychosocial and cognitive stressor by making the child to improvise a story from a starting paragraph, speak in a microphone and match familiar figures. Saliva samples were taken with salivettes right before the start and then four times more (at one, ten, 20 and 30 minutes) after the stress induction. The experiment was always carried out in the forenoon. The results showed no significant elevation in the cortisol levels between baseline and first post-test in any groups, but the cortisol values dropped with each post-test measure, leaving a significant effect of time. This might be because of a “stress

hyporesponsiveness period", where the negative regulation of the HPA axis increases and the adrenal cortex sensitivity reduces. ADHD had constant lower cortisol values throughout the study in comparison to the control group.

Kudielka, Buske-Kirschbaum, Hellhammer and Kirschbaum (2004) compared the stress response to the psychosocial stressor of the TSST between ages. The groups were assessed in different studies before and consisted of 30 older adults, 41 young adults and 31 children in this analysis. The children sample was divided into an atopic dermatitis/allergic asthma group and a control group. Older and younger adults have completed the classical TSST, while children received the TSST-C adapted version with a preparation period, public speaking (finishing a story) and an arithmetic task. Salivary cortisol was measures before the test and four times after the test. All groups showed a significant increase in cortisol after the inducted stressor. Salivary cortisol values did not defer between the groups (older, younger adults, children).

Jansen, Gispen-de Wied, Jansen, van der Gaag, Matthys and van Engeland (1999) did not find any changes in cortisol after inducting a psychological stressor. They compared 52 children with psychiatric symptoms (dysthymia, oppositional defiant disorder/conduct disorder, pervasive developmental disorder and ADHD) and a control group in the cortisol response to a psychological and physical stressor. The psychological stressor was inducted with two different tests, the Continuous Performance Task with negative feedback and time pressure, and a task from a neuropsychological test battery from the Californian Verbal Learning Task. The physical stressor was exercise on a bicycle for ten minutes. Saliva samples were taken two times before the stress situation and four times after in each condition. The physical stressor provoked a significant increase in cortisol in all groups, but not the psychological stressors, as mentioned above already. Some psychiatric groups (dysthymia and autistic-like disorders) had a hyporesponsivity in the physical task.

Duesenberg and colleagues (2016) were interested in the effects of stress (cortisol specifically) on empathy and emotion recognition of faces. Emotion recognition serves for the basic interaction, whilst empathy is the ability to understand another's perspective and emotions. Eighty students participated in the study. The participants were divided into two groups, receiving either a dose of hydrocortisone or a placebo. After 45 minutes, participants completed the Multifaceted Empathy Test (questions about what persons with different emotional

states on pictures are feeling and how much are they feeling for them) and the facial emotion recognition task (recognizing anger and sadness). Salivary cortisol was collected before the drug/placebo intake and three times after. Results showed a significant effect of gender on facial recognition, but not on empathy. Cortisol had no significant effect on empathy or face recognition, which was contrary with their hypothesis. The authors discuss the impact of other hormones on emotional arousal.

In a review, Miller (2018) investigates the relationships between physiological activity and prosocial behavior. Affective empathy was positively correlated with cortisol, while non-emotionality was linked to blunted cortisol levels. Arousal in the sympathetic nervous system is positively connected with empathy, the motivation to help others.

Stress and Social Exclusion

Bass et al., (2014) were interested in how social exclusion affects the physiological stress response and empathy. They hypothesized that acute social exclusion would result in higher cortisol and alpha-amylase levels, decreased empathy for others and no change in the affective state. Sixtyeight students participated in the study, where they played the Cyberball game on a computer, either in the social exclusion condition or control condition. Cortisol, alpha-amylase and positive and negative affect were assessed before and after the procedure. The Cyberball game is a virtual computer game and a tool that triggers the feeling of social exclusion by not tossing the ball to the participant. The results showed that there was a significant decrease in cortisol in socially excluded participants, which is contrary to the hypothesis. Alpha-amylase increased in both groups, meaning a general increase in arousal. Positive affect decreased significantly more in the social exclusion condition group. No significant change in empathy was found.

When looking at the connection between social exclusion and the stress response, Blackhart, Eckel and Tice (2007) found out that excluded participants show a higher cortisol level than the control group, meaning that social exclusion is a cause of distress and can lead to other psychological problems.

The Current Study

The studies listed above show the state of research on the topics of empathy and stress. Many have focused on the research of empathy development in children.

A great number of studies examined the impact of a psychosocial stressor on the emotional state and physiological reactions in the body, especially cortisol, in children and adults.

Most studies found out that the cortisol values increase after the induction of a stressor (Bunea et al., 2017; Dickerson & Kemeny, 2004; Engert et al., 2014; Fortunato et al., 2008; Kudielka et al., 2004; McCarthy et al., 2009; Yim et al., 2010) and some found no significant impact (Jansen et al., 1999; Maldonado et al., 2009). The psychosocial stressors used in these studies, were adapted to the age of the participants and were mostly induced with an unpleasant situation of a job interview, public speaking, story finishing and arithmetical tasks. However, no study explored the impact of observing social exclusion and how this psychosocial stressor affects the cortisol pattern and emotional state.

Furthermore, this current study focused on the development of empathy particularly in toddlers, especially the development of self- and other oriented empathy (Hoffmann 1975; 2000; 2001; Ungerer et al., 1990). Our interest was whether children react empathically to the observation of social exclusion, and at which age the shift from self- to other oriented empathy happens.

So far, research found out, that toddlers already show concern for others (Roth-Hanania et al., 2011), prefer prosocial actors who assist to reach goals over neutral or antisocial actors (Hamlin et al., 2007; Hamlin et al., 2010; Hamlin & Wynn, 2011), and already have a sense of fairness for resource allocation (Geraci & Surian, 2011; Sloane et al., 2012). Studies on empathy in social exclusion revealed, that children seek proximity to the study conductor after they were directly or indirectly exposed to social exclusion (Marinović et al., 2017). Over and Carpenter (2009), however found that children tend to imitate the behavior of the model observing social exclusion.

There is no study to date that has explored social exclusion, empathy and stress, and so our research provides an important contribution to research in clinical and developmental psychology.

Hypotheses

H1: Children will react with a higher distress level, measured with cortisol, by observing social exclusion.

H2: Children will react with negative emotions, measured with the smiley-rating scale, by observing social exclusion.

H3: Children, younger than 24 months will choose a puppet randomly after observing social exclusion.

H4: Children, older than 24 months will choose the socially excluded puppet after observing social exclusion.

H5: There will be no differences in the cortisol levels between the two age groups.

Methods

The research design was a field experiment with a cross-sectional data collection. The two age groups 18-24 months and 25-42 months were distinguished and compared in terms of results. Since the study was a within-subject design, all children were shown both conditions, social inclusion and social exclusion. On average, they observed each condition six times (*SD* = .80). The period between the first and second collection day was 7-14 days. The data collection took place in the period from 26.03.2018 to 29.05.2018 and on average 2.48 children were tested per day.

Therefore, a puppet theatre was built and a puppet show with teddies was created. Saliva samples, a rating scale, teddy selection and multiple questions were used as indicators for the assessment of empathy, emotions and physiological responses. The entire study was conducted in German.

Sample

Thirtytwo parents, from four different kindergartens in Vienna, gave the consent for their child's participation in our study. All participants were from Vienna. Four children had to be excluded due to refusal of saliva collection. Another child began to cry during the puppet theater and therefore could not be considered. One child was excluded after the analysis of saliva samples due to extremely high levels of cortisol. Eventually 26 children were included in the study, with six children in the first group, 18-24 months (*M* = 21.83, *SD* = 1.33) and 20 children in the second group, 25-42 months (*M* = 34.0, *SD* = 5.06). The gender distribution was 10 (38.5%)

boys and 16 (61.5%) girls. Fifteen (57.7%) children had siblings, whereby nine children had one sibling, five children two and one children four siblings. All children were already able to walk (*M* = 12.92 months, *SD* = 2.31) and 23 children could already speak (*M* = 16.22 months, *SD* = 5.59). Children were already on average 11.85 months (*SD* = 8.50) in kindergarten, whereas the average age of the child entry was 19.31 months (S*D* = 6.20). All children understood German, however ten (38.5%) of these children spoke a second language as Chinese (one) ,Croatian (one), English (one), French (one), Polish (one), Romanian (two), Spanish (one) or Swedish (two).

The average age of the parents was 36.82 (*SD* = 6.53), whereby mothers' age average was 35.0 (*SD* = 5.60) and fathers 38.64 (*SD* = 6.78). One parent did not state their age. Fifteen (57.7%) of the mothers and 19 (73.1%) of the fathers had an Austrian nationality, others had diverse nationalities as Chinese, Croatian, Ecuador, French, German, Congo, Polish, Romanian, Swedish.

Concerning the highest level of education, one parent (1.9%) had finished mandatory school, three parents (5.8%) apprenticeship, one parent (1.9%) professional school ("Fachschule"), nine parents (17.3%) high school ("Matura"), 29 parents (55.8%) had a university degree and three parents (5.8%) stated other education. Six parents (11.6%) did not state any educational level. The majority of the parents (78.8%) were employed. Two parents (3.9%) were unemployed, and six parents (11.5%) gave no information. Three mothers were on maternity leave (5.8%) at the time of data collection. With regard to monthly income, 46.2% (n = 24) gave no information. Three parents (5.8%) stated they get 0-500€ per month, one parent (1.9%) gets 501-1000€ per month, four parents (7.7%) get 1001-1500€ per month, five parents (9.6%) get 1501-2000€ per month, ten parents (19.2%) get 2001-3000€ per month and five parents (9.6%) get more than 3000€ per month.

Measures

Demographic Questionnaire. The demographic questionnaire (see appendix B) was used to collect personal data (gender, date of birth, siblings, first language, age of kindergarten admission) and the developmental stage (development of language and gait) of the child as well as the socioeconomic background of the parents (age, nationality, employment, highest qualification, income). The parents

could also indicate, who filled out the questionnaire (mother/father) and whether they would like to receive study results via email.

This data is relevant as the socioeconomic background along with the environment, in which the child grows up, have a significant impact on their social, cognitive and emotional development. Depending on their age, children show different advanced empathic skills.

Differences in the results within an age group can therefore be attributed to socioeconomic factors and not due to their biological age or stage of development. This allows us to control the influence of socioeconomic variables.

Cortisol. Because cortisol is one of the best indicators of stress and it is hard to measure stress in small children by reports, we chose it for our measure. And since free cortisol can be assessed through saliva, we chose this non-invasive method of collecting with salivettes. Based on our study design with multiple saliva sampling in young children, it was necessary to conduct a pretest, whether sufficient saliva can be gained with the Sarstedt Cortisol-Salivettes®, code blue. The salivettes were selected because of their non-invasive and non-painful method, that allows multiple sampling and with the synthetic swab sufficient saliva can be collected. The salivettes were weighed and saliva was taken twice from ten children, using two different methods for two minutes each, either under the tongue or on the inner cheeks. Thereafter, the salivettes were weighed again and it was concluded that for the needed amount of saliva, is it necessary to perform the saliva collection in the whole oral cavity for more than two minutes.

The data collection was only done in the forenoon, because of the low cortisol fluctuations at this time and at least thirty minutes after the last meal, since it could affect the results. The last saliva collection was performed 30-40 minutes after exposure with the stressor (social exclusion), because the cortisol release can be detected only delayed.

Gloves were worn to ensure hygiene standards, as the use of the synthetic swab of the salivettes was carried out by the study conductors to guarantee the child’s safety. In case the child produced little saliva, tongue movements and conversations were used to stimulate salivary production.

The salivettes were stored directly after the collection in a freezer at -20C.

Smiley-Rating Scale. The 5-point Likert scale was used to measure the emotional state of the child (see appendix C). Therefore, five smileys with different emotional expressions, ranging from “very sad” to “very happy”, were used. The first step was to discuss with the child, if they could identify, which feelings were shown by the smileys (“How does the smiley feel?”). In the second step, the child was presented with three images of fruits (apple, banana, and pear) and could choose their preference. Consequently, the child was asked how they feel to receive their favorite fruit and show the emotion by using the rating scale. Finally, two illustrations from the children’s book “Der Ernst des Lebens” (Jörg & Kellner, 1983) were used to further examine, whether the child understood the emotional state of the main book character (“How does the girl feel?”) and used the rating scale appropriately.

If the rating scale was understood, the child was asked to rate their emotional state after each saliva sample. In addition, the rating scale was used by the child to identify the emotional state of the affected teddy (“Can you show me, how the teddy feels who was (not) allowed to play?”).

Selection of the Teddy and Further Questions. Teddy selection was a nonverbal method for measuring empathic behavior in toddlers. Therefore, the child was presented with the three teddies from the puppet show, lying on a panel and got the instruction to choose the one they want to play with. The arrangement of the teddies on the panel was the same as in the puppet show, otherwise it might had caused confusion for the children.

In the social exclusion condition, it was expected that children under the age of two would not show preferences in the selection of teddy because they still have self-oriented empathy. Children, older than two years, were expected to select the affected teddy, since they have already developed an other-oriented empathy and they show help behavior. In the social inclusion condition, no preference for the teddy selection was expected in both age groups (Hoffmann 1975; 2000; 2001).

Children, who were already able to speak, were asked additional questions about the puppet play narrative (“Can you tell me what you saw?”, “Can you tell me how teddy played?”) and the emotional states of themselves and the affected teddy. Furthermore, the child received a question concerning the compassion for the affected teddy (see appendix D).

Procedure

Recruitment. We personally contacted some kindergartens in Vienna that we already knew. Furthermore, we contacted others per email. In case of existing interest for the cooperation in our study, we agreed to an appointment, where we gave information about our study and necessary conditions for the procedure to the head of the kindergarten and the kindergarten teachers, who also received an information sheet (see appendix E). In each kindergarten, the group-leading kindergarten teacher was our contact person, who hung out the insertion for our study (see appendix F) on the information panel and handed out unsealed envelopes to the parents of children with the corresponding age. The envelope contained an information sheet, a demographic questionnaire and informed consent. The parents who agreed to their child's participation in the study, handed over the closed envelope with the completed questionnaire and the signed informed consent to the kindergarten teacher, where we collected them afterwards. The documents were checked for completeness and exclusion criteria. When all the necessary conditions have been fulfilled, the participants were assigned codes, which were used to ensure anonymity.

Inclusion and Exclusion Criteria. Children, aged 18-42 months with good German knowledge were included. If parents stated two mother languages and one of them was German, we used the estimation of the kindergarten teacher regarding the understanding. Furthermore, the signed informed consent for study participation and the saliva collection (see appendix G) of a parent were absolutely necessary. If the parents did not agree to video recording (see appendix G), this was not treated as an exclusion criterion.

Children were excluded, if they could not walk with 18 months, since an upright walk at this age is regarded as development-adequate. If the children showed behavior that suggested that they did not want to participate (crying, lying on the floor, wanting to leave the room, etc.) during the study, this was considered as an exclusion criterion and the study was stopped immediately. If the child did not wish to participate in spite of the presence of the kindergarten teacher or parent, this was considered an exclusion criterion. If the child's demographic data in the questionnaire were not completely filled out by the parents and could not be answered by the kindergarten teacher, this was considered an exclusion criterion. If the

sociodemographic data of the parents were not given, this was not considered as an exclusion criterion.

Preparation. Depending on the number of children who participated in our study, we arranged a suitable number of appointments with the kindergarten teacher. For the data collection, necessary preparations were made in advance. Based on the child's assigned code, the salivettes were labeled and a data sheet was prepared. In the course of the within-condition, the participants were alternately presented with social exclusion or social inclusion condition, according to the principle of alternating randomization, starting with the social exclusion with the first participant. The randomization of the teddies was performed with Research Randomizer (Urbaniak & Plous, 1997) and referred to the six different colors of their t-shirts. Per condition, three teddies were presented, whereby all six t-shirt colors were considered in the two conditions, with the restriction, that no color was presented twice.

The puppet theater was self-built and consisted of a wood panel with cut-outs, which served as entrance for the teddies and the ball, four removable legs and two black opaque curtains. At the corners of the wood panel, holes were drilled for four wooden sticks, on which a curtain was attached and served as a background for the puppet show. At the lower end of the wood sticks, a second curtain for sight protection was attached tied on. The identical teddies differed only in the color of the t-shirt, which were blue, red, light green, dark green, light brown and dark brown. For the puppet show, the teddies and the table tennis ball were led with the help of wooden sticks (see appendix H). The conversations between the teddies were spoken by three female voices and recorded as audio files. These were played during the puppet show while the teddies were moved simultaneously (see appendix I).

In both versions, three bears are differentiated; the co-player ("Mitspieler") on the right side; decider ("Entscheider") in the middle; affected teddy ("Betroffene") on the left side of the stage. The puppet show starts with the co-player, decider and a ball appearing through the wood panel cut-outs. The decider invites the co-player to a soccer game. After a short period of playtime, another teddy enters the stage from the left side and asks, if he can join the game. In the social exclusion condition, the decider rejects him and sends him away. As a result, the affected teddy leaves the stage on the left side. The decider and co-player continue their soccer game. In the

social inclusion condition, the decider allows him to play along, whereupon all teddies play soccer together. At the end of both conditions, the teddies disappear though the cut-outs in the wooden panel. The duration of the puppet show lasted in both conditions 43 seconds and was repeated at least five times and eight times at most.

Procedure in the Kindergarten. The data collection always took place from 8:30 AM until noon in an individual setting in a separate room in the kindergarten. Each data collection took 20-30 minutes depending on the age of the child. Whereby, for the third saliva sampling, the child was taken out of the kindergarten group again, after approximately thirty minutes.

First, due to the very young age of the children, some time was spent in the kindergarten group with the child to build up contact and trust with the help of free play. After the initial introductory phase, the child was asked to go with us to a separate room, where the puppet theater was already set up and a child-height table with chairs and games were prepared. At the beginning, there was a short period of playtime, in which the child had the opportunity to choose from different toys. Then it was checked, if the child already recognizes emotional states. For this, a five-level rating scale with faces was used and the child was asked various questions. In case the child already recognized emotional states, it was asked after each saliva testing, how it feels.

Following, the first saliva collection was conducted. We informed the child that it should open the mouth and that this will not cause any pain. In order that the child did not understand the action, this was discussed with the help of a book about a visit to the doctor and was presented with a finger puppet. If the child refused to open the mouth, it could also hold the salivette and try it out himself on the finger puppet.

Subsequently, the child was told that it may watch a puppet show. For this purpose, the child’s chair was turned in the direction of the puppet theater and we stepped behind it. Another saliva sample was taken right after watching the puppet show.

Afterwards, the child was presented with the three teddies from the puppet theater, lying on a panel, and was asked to pick one. For that the child was given the instruction "With which do you want to play?". The arrangement of the bears was the same as in the puppet show, otherwise it might had caused confusion for the children. The older children, who were already able to speak, were then asked

questions about the puppet show and their own feeling as well as the feelings of the teddies (see appendix C and D). With consent of the parents, this section of the data collection was filmed.

The participation of the child was rewarded on both survey days. For this, the child could choose a stamp in the first and stickers in the second round, which we then wrapped up as a gift. The child was than accompanied back to the group. The last saliva sampling took place around thirty minutes later, for which the child was taken briefly out from the kindergarten group.

Post-testing Procedure. The salivettes were labeled with the child's code and testing date. After each data collection day the salivettes were put into a zip lock bag and stored in a freezer at -20 degrees Celsius. Parents who were interested in the study results received them by email in September 2018, and also had the opportunity to submit further questions.

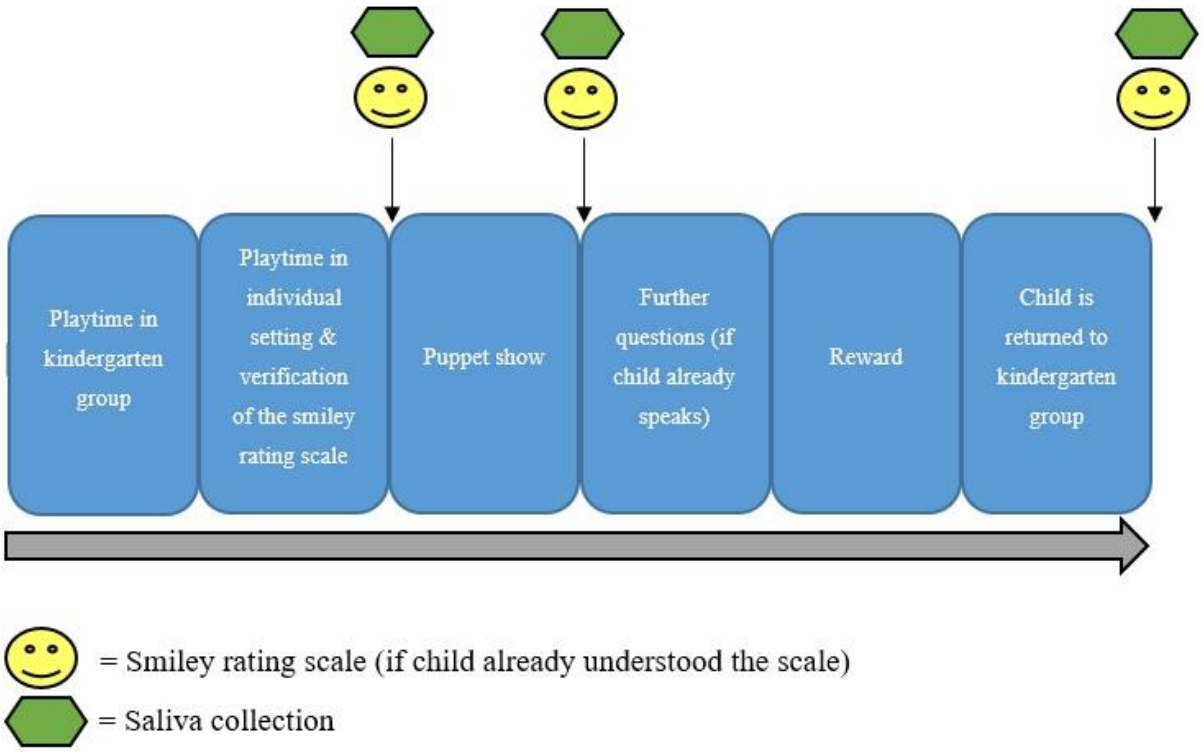

Figure 1. Timeline of the study with time points of all measurements.

Statistical Analyzes

IBM SPSS Statistics 21.0 (IBM, 2012) was used for all statistical analyzes. The significance threshold was set at $p < 0.05$. First, the cortisol data of the entire sample was examined for normal distribution with a one-sample Kolmogorov-Smirnov test (Massey, 1951), which was given. A boxplot was created to check for outliers, showing one case which was then excluded for the further analysis.

Afterwards the sociodemographic and baseline data of the children and their parents were examined for normal distribution. Therefore the Kolmogorov-Smirnov Test (Massey, 1951) for two independent samples, divided by age (18-24 months; 25-42 months) was used, for the variables gender, start of speech and walking, parents education and income, which were fulfilled. Age of the children was not normal distributed due to the lack of younger children in the first group. Cortisol-baseline for social exclusion and inclusion was normal distributed. The emotional state baseline for both conditions could not be tested for normal distribution due to missing data.

Due to unequal sizes of the original age groups and to prevent distortions and bias in the data, the total sample was divided into two groups according to the median (13 children per group). Analyzes were mostly run for both group splits and shown comparative in the results.

Line diagrams were created to visualize the differences in cortisol means over time in the age groups.

To examine if the puppet show was effective, repeated measures general linear model (GLM, Nelder & Wedderburn, 1972) to investigate the differences between related means was used with two within-subject factors (cortisol data; condition) and one between-subject factor (age group). Cortisol data had three levels (baseline, post-test, follow-up) in the two conditions (social exclusion and social inclusion).

To check for violations of the homogeneity of covariance, the Mauchly's test of sphericity was used. In case Greenhouse-Geisser corrections were considered.

New variables consisting of the difference baseline and post-test for both conditions were created and correlated with age at testing.

Emotional state of the child measured by the smiley-rating scale could not analyzed due to the insufficient responses of the children. The emotional state of the affected teddy was correlated with the emotional state of the child in both conditions.

T-test was performed to compare the means in both conditions between the two groups by median, to check for differences in compassion.

Correlations were carried out between sociodemographic data and the age groups as well as cortisol means and the emotional states of the child, separated by conditions.

Pie charts were created and Pearson Chi-Square test was run to check for the differences in the age groups (originals and by median), regarding the teddy selection.

Results

The following results are divided in two sections. First showing the data analysis from the original age groups (18-24 months; 25-42 months) followed by the groups divided by median (18-30.5 months; 30.6-42 months).

Kolmogorov-Smirnov test showed no significant difference in the cortisol baseline for social exclusion (p = .231) and social inclusion (p = .231). As well there was no difference between the original age groups regarding gender (p = 1.00), start of speech (p = .990) and walking (p = .853), mothers' education (p = 1.000), fathers' education (p = .624), and mother income (p = .744), father income (p = 1.000).

In the modified groups by median there were also no significant differences regarding gender (p = 1.000), start of speech (p = .866) and walking (p = .291), mothers' education (p = .879), fathers' education (p = .879), and mother income (p = .570), father income (p = .998). As well there was no difference in the cortisol baseline for social exclusion (p = .879) and social inclusion (p = .291). Emotions state rate could be considered here and showed a normal distribution, with p = .693 for social exclusion (n = 13) and p = .356 for social inclusion (n = 9).

Cortisol

First, in a boxplot (see Fig. 2), one extreme outlier was found, which was then excluded.

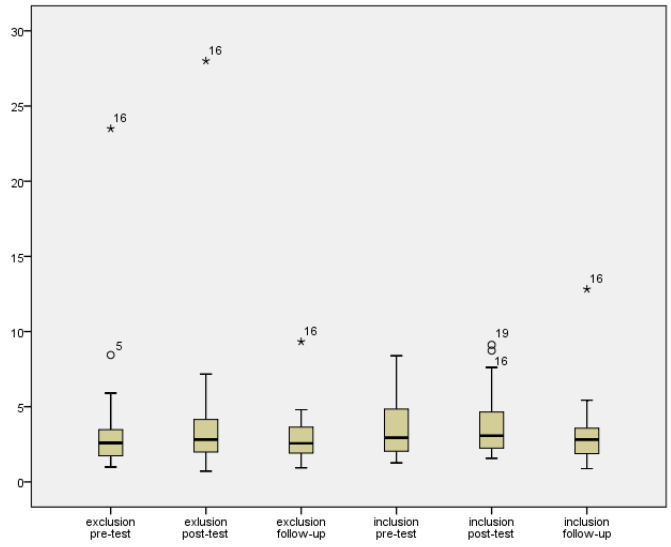

Figure 2. Boxplot for cortisol values in both conditions.

Original age groups. Afterwards, the mean cortisol data divided in the two original age groups, was visualized by line diagram. In the social exclusion condition in both groups there were no differences identifiable. In the younger group (18-24 months), in the condition of social inclusion, a peak was visible in the second saliva collection (see Fig. 3 and Fig. 4).

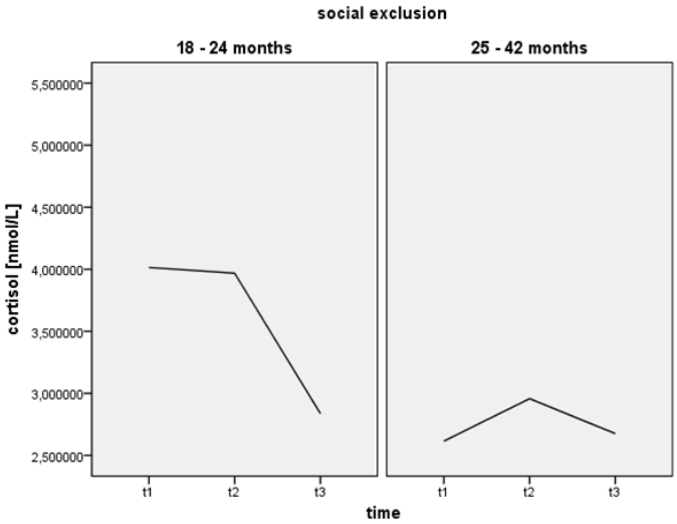

Figure 3. Cortisol mean levels in both original age groups at the three saliva collection times in the social exclusion condition.

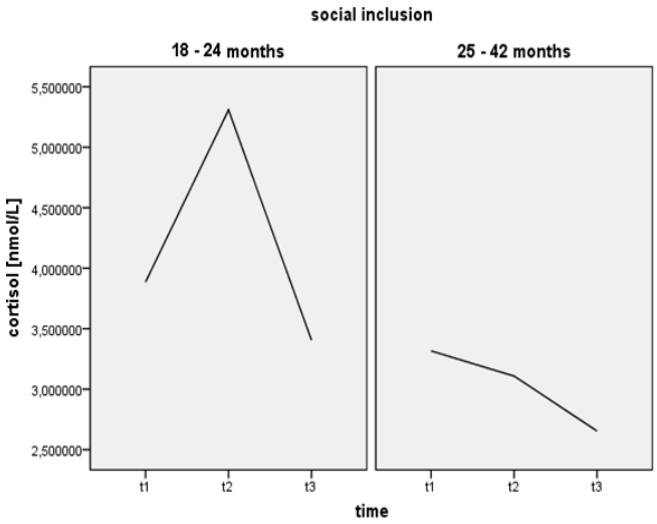

Figure 4. Cortisol mean levels in both original age groups at the three saliva collection times in the social inclusion condition.

Next, repeated measures GLM was carried out. Mauchly's test of sphericity indicated that the assumption of sphericity had been violated in factor time $\chi^2(2) = 24.351$, $p < .001$. In Condition x time $\chi^2(2) = .251$, $p = .882$ the sphericity was not violated.

Cortisol showed a significant effect of time ($F(2, 1.21) = 4.71$, $p = .032$, $\eta p^2 = .016$), and no significant effect of condition x time ($p = .420$). There was a significant effect of condition x time x group ($F(2) = 3.28$, $p = .046$, $\eta p^2 = .120$). No significance was found for condition ($p = .219$), condition x group ($p = .651$) and time x group ($p = .200$).

Cortisol significantly increased by 0.378 nmol/L between baseline and post-test ($p = .020$), and significantly decreased by 0.943 nmol/L between post-test and follow-up ($p = .009$). Therefore the second cortisol values had the highest mean (see Tab. 1).

Table 1

Cortisol Means in Both Original Age Groups and Conditions

Time	Mean	Std. error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	3.458	.350	2.735	4.180
2	**3.836**	.331	3.153	4.519
3	2.893	.243	2.392	3.394

Considered group x time (see Tab. 2) significance effects were found only in the younger group (18-24 months), following the same pattern as shown in the time factor results, but with higher mean differences, from baseline to post-test (p = .016) and post-test to follow-up (p = .015).

Table 2

Group x Time Pairwise Comparisons

Group	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.
18 - 24 Months	1	2	-.689	.266	.016
		3	.829	.690	.242
	2	**1**	**.689**	**.266**	**.016**
		3	**1.517**	**.580**	**.015**
	3	1	-.829	.690	.242
		2	-1.517	.580	.015
24 - 42 Months	1	2	-.068	.146	.647
		3	.301	.378	.434
	2	1	.068	.146	.647
		3	.368	.318	.258
	3	1	-.301	.378	.434
		2	-.368	.318	.258

Time x group showed significant effects between the two original age groups in the second cortisol mean value (p = .023). There was also a significant effect in condition x time interaction. The social inclusion condition had a p-value of .012 at

the second cortisol measurement time. No significant effects were found in the interaction between social exclusion condition and time.

In the interaction group x condition x time, significant effects in the younger group in the social inclusion condition were found in the mean difference between baseline and post-test (p = .002) as well as post-test and follow-up (p = .007). Condition x time x group interaction revealed a significant effect in the social inclusion condition in the second mean cortisol value between the two original age groups (p = .012).

There was a trend toward significance in the mean difference of cortisol between the two original age groups ($F(1) = 3.96$, p = .058, ηp^2 = .142).

Groups by Median. Divided the groups by the median gave a different distribution in the case of social exclusion (see Fig. 5) and similar mean cortisol values for social inclusion (see Fig. 6).

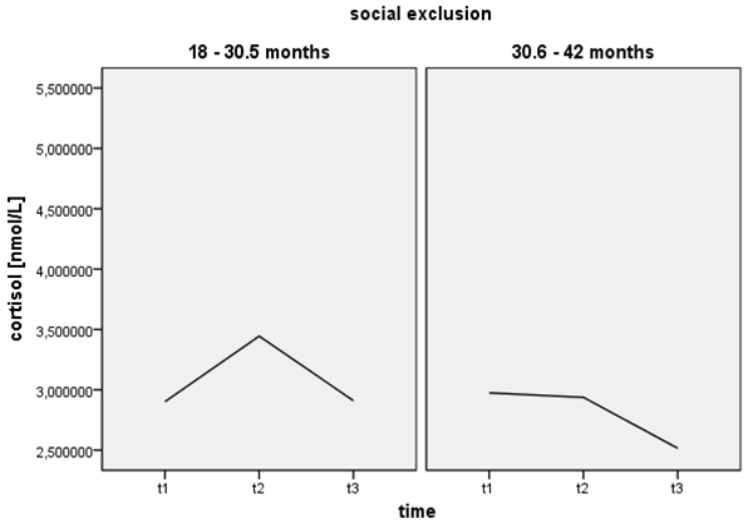

Figure 5. Cortisol mean levels in groups by median at the three saliva collection times in the social exclusion condition.

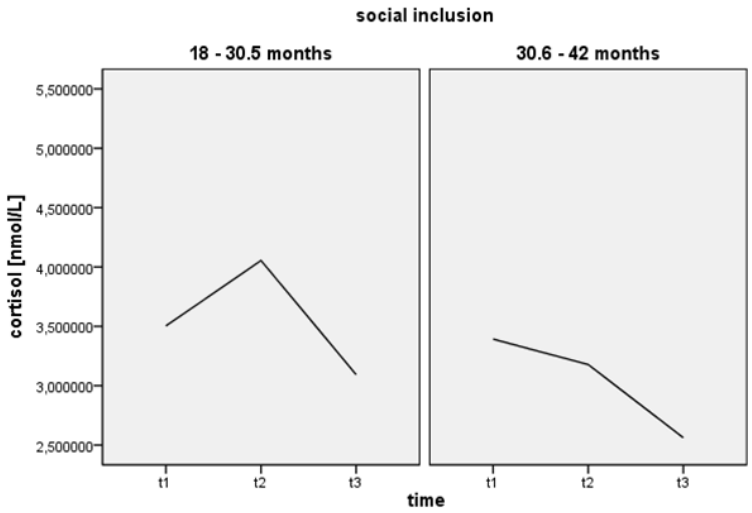

Figure 6. Cortisol mean levels in groups by median at the three saliva collection times in the social inclusion condition.

Once more, repeated measures GLM was performed. Mauchly's test of sphericity showed again, that the assumption of sphericity had been violated in factor time ($\chi^2(2) = 25.359$, $p < .001$). Yet another time, the assumption of sphericity was not violated in the case of condition x time ($\chi^2(2) = .353$, $p = .838$).

Divided groups by median, there were no significant effects of time ($p = .090$), condition ($p = .241$), condition x time ($p = .523$), condition x group ($p = .696$), time x group ($p = .441$) and condition x time x group ($p = .945$).

Cortisol increased only by 0.211 nmol/L between baseline and post-test, which was not significant ($p = .092$), but significantly decreased by 0.634 nmol/L between post-test and follow-up ($p = .042$). The second cortisol values still had the highest mean (see Tab. 3).

Table 3

Cortisol Mean in Both Age Groups by Median and Conditions

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	3.193	.307	2.559	3.826
2	**3.404**	.303	2.778	4.029
3	2.770	.203	2.351	3.189

In the group x time interaction (see Tab. 4), there was again a significant effect in a younger group (18-30.5 months), but only between the baseline and post-test values (p = .004).

Table 4

Group by Median x Time Pairwise Comparisons

Group	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.
18 - 30.5 Months	**1**	**2**	**-.548**	**.170**	**.004**
		3	.201	.469	.673
	2	1	.548	.170	.004
		3	.748	.417	.085
	3	1	-.201	.469	.673
		2	-.748	.417	.085
30.5 - 42 Months	1	2	.126	.170	.466
		3	.645	.469	.182
	2	1	-.126	.170	.466
		3	.519	.417	.225
	3	1	-.645	.469	.182
		2	-.519	.417	.225

There was no more significant interaction in time x group, the second cortisol mean value had now a p-value of .265. No significance was found in condition x time also.

Group x condition x time now showed only one significant point, in the younger group in the inclusion condition between post-test and follow-up (p = .050). Condition x time x group interaction revealed no more significant effects.

Furthermore, no significance in the mean difference of cortisol between the two groups by median was found (p = .401).

Correlations with Cortisol

Social Exclusion. Considering the social exclusion condition, significant correlations were found between first cortisol value and second cortisol value (r = .803, p = <.001) but no significant correlations between the first and third cortisol

value (r = .085, p = .681) and second and third cortisol value (r = .350, p = .079). No significant relation was found between the age of testing and the difference between cortisol baseline and post-test (r = -.104, p = .613), and post-test and follow-up (r = .093, p = .653).

Viewing the correlations between emotional states measured by the smiley-rating scale, a significant correlation was found between first and third emotional state (n = 9, r = .783, p = .013). A highly significant correlation between the second and third emotional state (n = 9, r = 1, p = <.001) was found. There was no significant correlation between the first and second emotional state (n = 11, r = .348, p = .294).

Social Inclusion. In the social inclusion the first and second cortisol value (r = .812, p = <.001) and the first and third cortisol value (r = .417, p = .034), and the second and third cortisol value (r = .525, p = .006) correlated.

Emotional states correlations showed a significant relation between the first and second (n = 8, r = .942, p = <.001), a total correlation between the second and third (n = 8, r = .100, p = <.001), but no significant correlation between the first and third (n = 9, r = .296, p = .439). A significant relation was found between the age of testing and the difference between cortisol baseline and post-test (r = -.492, p = .011), but not between post-test and follow-up (r = .225, p = .269).

Between Conditions. A barely detectable trend was found between cortisol baselines of the two conditions (r = .354, p = .076). Comparing the cortisol post-test (r = .395, p = .046) and follow-up (r = .637, p <.001) values, between the two conditions, significant relations were found.

Difference between Baseline and Post-Test

New variables for social exclusion and inclusion, consisting of the difference between the baseline and post-test cortisol measurement, had been created. A correlation between age at testing and difference variable in social inclusion was found ($r(26)$ = -.492, p = .011).

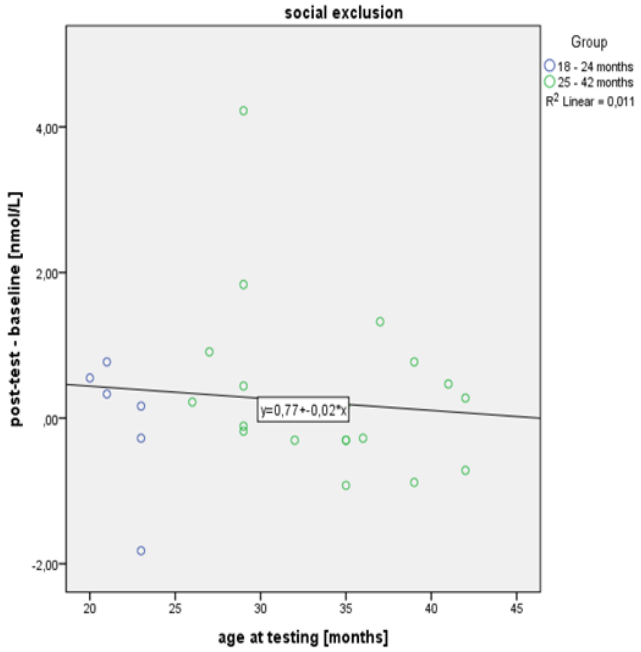

Figure 7. Difference variable (post-test - baseline) in social exclusion correlated with age in months.

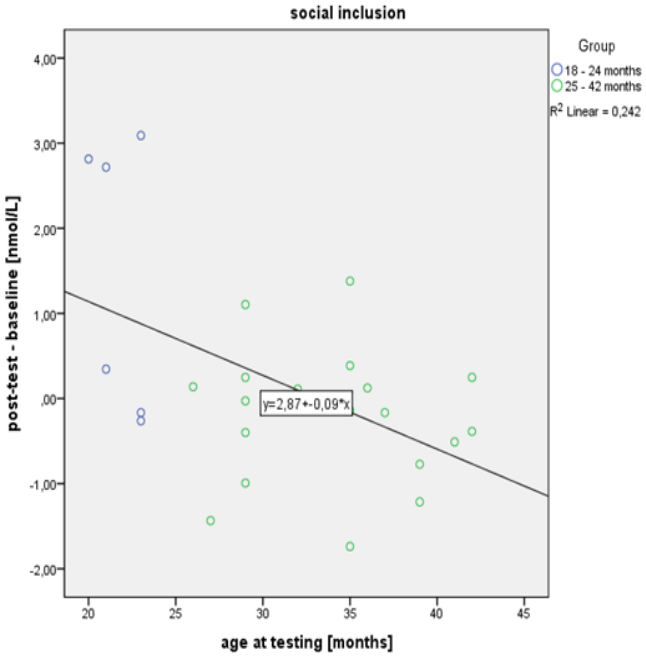

Figure 8. Difference variable (post-test - baseline) in social inclusion correlated with age in months.

Emotional State

The descriptive statistics showed that not enough children in the first original age group responded. Accordingly, the evaluation of the smiley-rating scale was carried out with group by median.

Based on the baseline measurement of the emotional state in the exclusion condition, it was shown that there was a slightly positive increase in post-test measurement and follow-up. In the social inclusion condition there were no changes across the three measurement points (see Tab. 5). Since only six children in the older group by median had complete data, no further evaluations were possible.

Table 5

Descriptive Statistics of the Emotional States at the Three Measurement Times in Both Conditions

		Social Exclusion			Social Inclusion		
		Emotional State 1	Emotional State 2	Emotional State 3	Emotional State 1	Emotional State 2	Emotional State 3
N	Valid	13	11	9	9	10	9
	Missing	13	15	17	17	16	17
Mean		4.31	4.45	4.78	4.44	4.40	4.44
Std. Deviation		.947	1.036	.667	.882	.966	.882
Variance		.897	1.073	.444	.778	.933	.778
Minimum		2	2	3	3	2	3
Maximum		5	5	5	5	5	5

Emotional State of the Affected Teddy. Ten children stated the emotional rate of the affected teddy in both conditions. Regarding the younger group by median, the second emotional state of the child was correlated with the reported emotional state of the affected teddy, a total correlation was found in the social exclusion condition (n = 2, r = -1.00, p <.001), but not in the social inclusion condition (n = 3, r = -.891, p = .300).

In the older group by median no significant correlation were found.

Compassion

Due to missing data in the original younger age group, groups by median was used to analyze the compassion response of the children (see Tab. 6). Independent samples t-test showed a significant difference in compassion between the two groups by median in the social exclusion condition ($t(8) = -3.16$, $p = .013$), with a mean difference of -.556.

Table 6

Descriptive Statistics for Compassion across Both Conditions and Both Groups by Median

Condition	Compassion	Group	
		18 - 30.5 months	30.6 - 42 months
Social Inclusion	Yes	1	2
	No	2	6
Social Exclusion	Yes	4	4
	No	0	5

Selection of the Teddy

Original Age Groups. Depending on the split of the age groups, there were different distributions of the teddy selection. While in the original age groups (see Fig. 9) in the condition of social exclusion the younger children chose the affected and decider equally and the older children chose mostly the decider followed by the co-player. In the social inclusion condition the younger children chose only the affected and co-player. The older children chose mostly the affected and the decider.

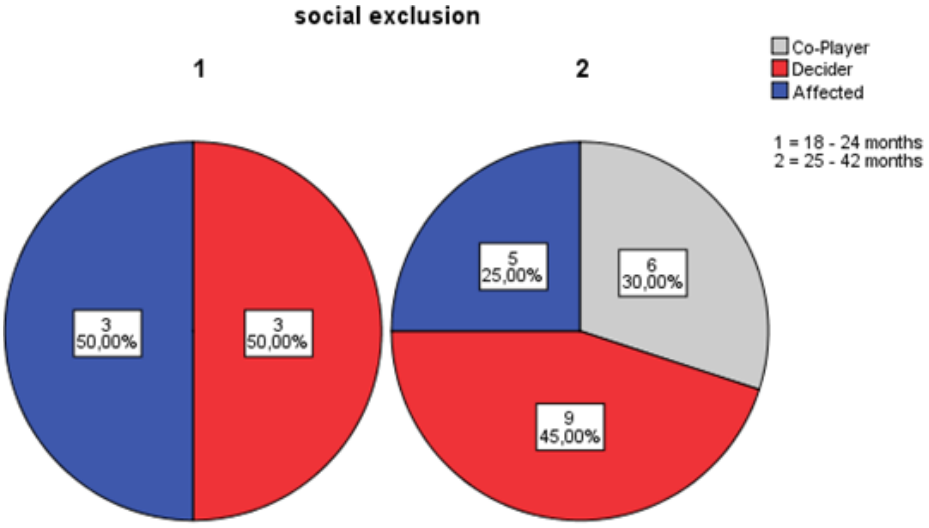

Figure 9. Chosen teddy in both original age groups in the social exclusion condition.

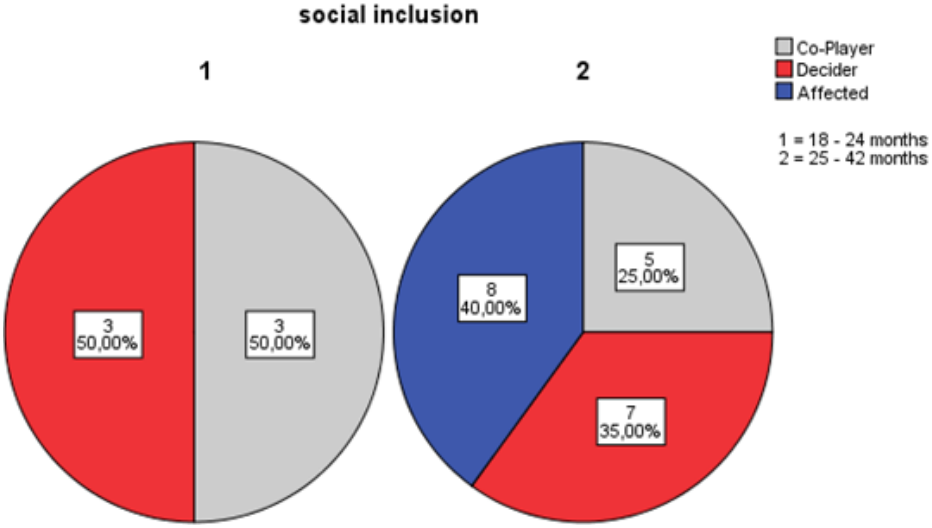

Figure 10. Chosen teddy in both original age groups in the social inclusion condition.

The Pearson Chi-Square test showed no differences in the preference of a teddy between the two original age groups ($\chi(2) = 2.763$, $p = .251$) in the social exclusion condition (see Fig. 10). There were also no differences in the social inclusion condition ($\chi(2) = 3.608$, $p = .165$).

Group by Median. As seen in the pie charts below the decider was picked the most in both age groups in the social exclusion condition (see Fig. 11). In the younger group by median, the selection was balanced between the decider and the affected teddy. In the social inclusion condition (see Fig. 12) younger children mostly picked the decider while the older children chose the affected.

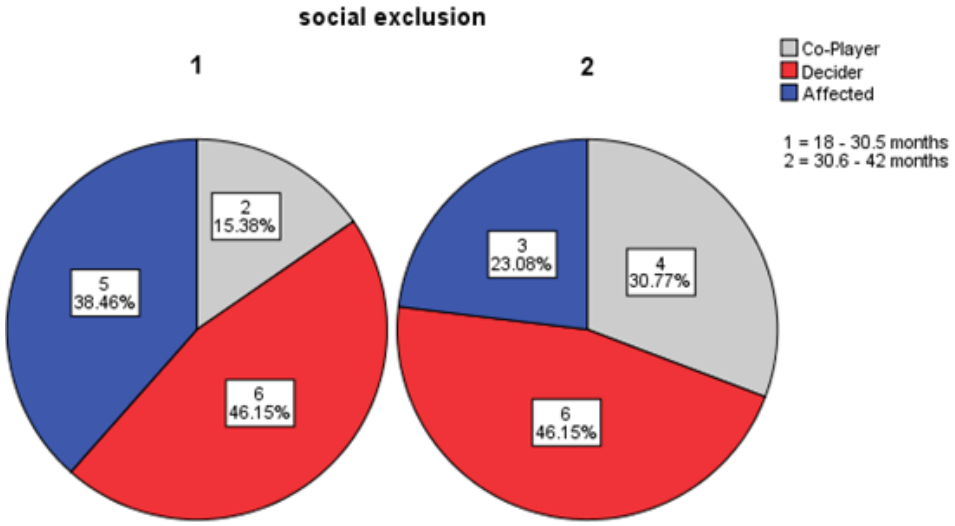

Figure 11. Chosen teddy in both groups by median in the social exclusion condition.

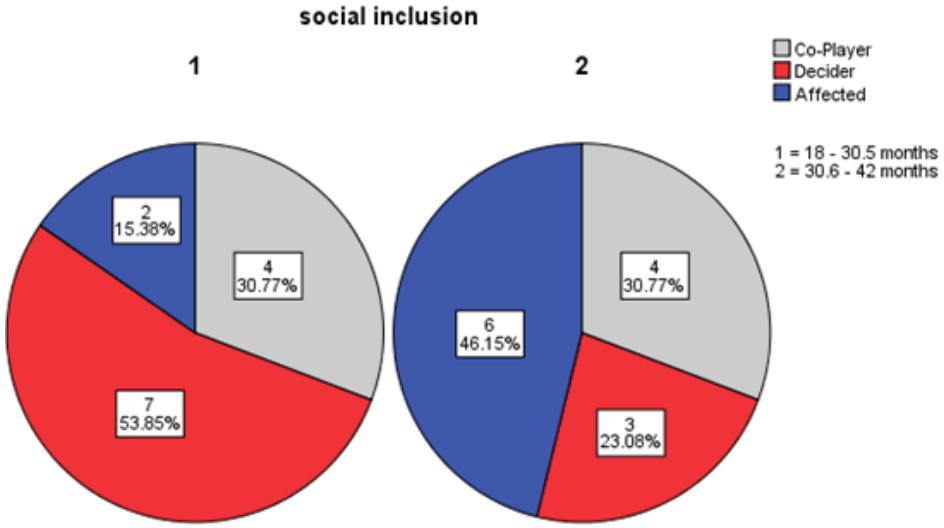

Figure 12. Chosen teddy in both groups by median in the social inclusion condition.

The Pearson Chi-Square test showed no differences in the preference of a teddy between the two age groups by median ($\chi(2) = 1.167$, $p = .558$) in the social exclusion condition. There were also no differences in the social inclusion condition ($\chi(2) = 3.600$, $p = .165$).

Second and third cortisol values did not correlate significantly with the chosen affected teddy or deciding teddy in both conditions.

Discussion

Summary of Hypotheses and Results

When children were shown the social exclusion condition, they were expected to react with negative emotions and an elevated cortisol level. However, when observing the social inclusion, no changes in the cortisol levels were expected.

Regarding the teddy selection, children, older than 24 months were expected to choose the socially excluded teddy in the social exclusion condition, while no preference was assumed with children, younger than 24 months. Also, it was expected that children would choose the teddy randomly in the social inclusion condition.

Concerning the cortisol levels after observing both conditions, no differences between the two age groups were expected.

Because of an unequal distribution in the two age groups (18-24 months and 25-42 months), the sample was divided into two groups by median (18-30.5 months and 30.6-42 months).

Cortisol. In the original age groups, results showed that there was a significant effect of time, meaning the cortisol levels changed between the three measurement points. Between baseline and post-test measurement, cortisol significantly increased, while between post-test and follow-up it decreased. No significant effect was found for condition, meaning cortisol values did not differ between the two conditions (social exclusion and social inclusion). Group by time interaction showed a significant effect in the younger group (18-24 months), indicating significant changes in cortisol between baseline and post-test as well as post-test and follow-up. At last, a significant effect was found in the interaction group by condition by time. In the younger age group by observing social inclusion, there was a significant effect in the second mean cortisol value. There was a trend toward significance between the two original age groups regarding the mean cortisol values.

In the groups by median however, there was no significant effect of time, only a significant decrease between the post-test and follow-up measures. Group by condition by time showed a significant effect in the younger group in the social inclusion condition between post-test and follow-up cortisol values.

Considering the difference between baseline and post-test, a significant correlation was found between the age of testing and the difference in the social

inclusion condition, meaning that the older the children were, the smaller the difference between baseline and post-test was.

Since similar cortisol values were found in both conditions (increase between baseline and post-test and decrease between post-test and follow-up), there were no differences between the two conditions. Contrary to our hypotheses, it was social inclusion that showed significant differences in time. Unexpected, the post-test cortisol value in the social inclusion condition was the highest. The first hypothesis is therefore rejected, since no higher distress levels by observing social exclusion were found.

Regarding the difference in cortisol levels between the two age groups, a trend towards significance between the two original age groups was found, however, this difference was not significant between the groups by median. Therefore, we can accept the fifth hypothesis, stating no differences in cortisol levels regarding the age groups.

Emotional State. For the analysis of emotional state of the children, only groups by median were considered, due to non-responsiveness and the lack of understanding the smiley-rating scale of the children in the younger age group (18-24 months). There was an improvement in the emotional state after observing social exclusion and there were no changes in the emotional state after observing social inclusion.

The second hypothesis is rejected, since no negative emotions were reported after observing social exclusion.

Teddy Selection. In the original age groups, the younger children chose equally the affected and decider in the social exclusion condition, while in the social inclusion, the decider and the co-player. Older children chose mostly the decider in social exclusion and the affected in social inclusion condition. But there was no significant difference in the teddy selection between the age groups and conditions.

In groups by median, the distribution of the teddy selection was quite different. In the social exclusion condition, both groups chose mostly the decider. In the social inclusion condition, younger children chose the decider as well, but the older children chose mostly the affected. Again, no significant difference in the teddy selection was found between the age groups and conditions.

Since children did not follow a certain pattern in the teddy selection in social exclusion, hypotheses three and four are rejected.

Interpretation

In general, the puppet show did not provoke expected changes in cortisol and emotional state of the children, which is contrary with many previous studies. Previous research found that children prefer prosocial figures (Hamlin & Wynn, 2011; Hamlin et al., 2007; Hamlin et al., 2013), and Roth-Hanania and colleagues (2011) revealed that children act prosocial upon observing pain of others. Many studies have reported increased cortisol and negative affective states after the induction of a (psychosocial) stressor (Engert et al., 2014; Fortunato et al., 2008; Gunnar et al., 1996; Kudielka et al., 2004; McCarthy et al., 2009; Yim et al., 2010). These findings could not be demonstrated in our study.

Due to the lack of data we received from the younger original age group, only the cortisol values could be interpreted as originally planned (18-24 months and 25-42 months). Further interpretations consider the age groups divided by median (18-30.5 months and 30.6-42 months).

The cortisol values did not show the hypothesized results. We assumed that children would show higher distress observing social exclusion and no changes in social inclusion. The opposite was found, showing no significant changes in observing social exclusion, but only a peak cortisol value in the post-test of the social inclusion condition in the younger original age group. In other studies, psychosocial stressors have always resulted in a significant difference between baseline and post-test (Fortunato et al. 2008; Kudielka et al., 2004; Yim et al., 2010; Miller, 2018), which was not the case in our study. These blunted cortisol values might be the result of the stress hyporesponsiveness period, where the negative regulation of the HPA axis is increased, while adrenal cortex sensitivity is decreased, meaning a lower increase in cortisol after the induction of the psychosocial stressor (Jansen et al., 1999; Maldonado et al., 2009). The whole procedure and the puppet show was an immense stress for especially the younger original age group, which could explain why they show higher overall cortisol values. We expected no differences in the cortisol levels between the two age groups, which was confirmed, and is also consistent with the current state of research stating a fully developed circadian

cortisol pattern from the age of one year (Bäumler et al., 2013; Gröschl et al., 2003; Price et al., 1983).

The smiley-rating scale was implemented with the intention to measure children's emotional state as well as the affected teddy's emotional state. We expected the measure to be easily understood and liked by the children. Many children did not understand the smiley-rating scale. We assume that some children have never been confronted with a Likert scale before and could not understand the meaning despite the explanation. Contrary to our hypothesis, stating the children would have negative emotions after observing social exclusion, the results actually showed no decrease in the emotional state. Other studies on the other hand, where children experienced stress, increased negative affect and decreased positive affect was reported after the induction of the stressor (Fortunato et al., 2008; Yim et al., 2010). Children might have already been able to differentiate between their and teddy's emotional state, remaining in a positive emotional state throughout the whole procedure, which represents an important developmental step in empathy development (Decety & Jackson, 2004; Decety & Meyer, 2008).

In the younger group by median, correlations between the second emotional state and the emotional state of the teddy were found in the social exclusion condition, which might be a sign of emotional contagion (Hatfield et al., 1994). This effect was not found in the younger group in social inclusion, since that condition does not involve others distress which would lead to a reflexive reaction (Light & Zahn-Waxler, 2012). In the other group by median, no connections were found, possibly due to the advanced development of the children.

Compassion refers not only to sharing the emotions, but also the need to relieve others pain (Burton, 2015; Goetz et al., 2010). In accordance to the definition, children showed no compassion in the social inclusion condition. In the social exclusion condition however, all children of the younger group by median, but only half of the older children showed compassion, which does not correspond to the definition. Compassion was measured with the question "Do you feel sorry for the teddy / Tut dir der Teddy leid", which could have been incomplete for the operationalization of compassion in the older group (30.6-42 months), as children of this age already differentiate various elements of empathy and compassion.

An interesting pattern was found in the teddy selection in groups by median (18-30.5 months and 30.6-42 months). While the younger group in the social

exclusion condition chose the teddy randomly, there was a clear pattern of avoiding the affected teddy in the older group. These children chose mostly the decider, followed by the co-player, which can be interpreted that they did not want to play with someone, who is socially excluded (Killen & Rutland, 2013). Rejected children are considered as unpopular by their peers (Lochman, Coie, Underwood, & Terry, 1993) that is why we assume that children in our study also rejected the social excluded teddy, and perceived it as unpopular. Furthermore it is know, that rejected children have difficulties making friends (Hart, 1993).

Another pattern can be observed in the social inclusion condition. The younger group favored the decider the most, which can be explained that at this age, children follow the authority, and rules of their caregiver. The older groups chose mostly the affected and co-player. We argue that the social inclusion condition implicated that the affected teddy is accepted, which gave the children impression to see him as a potential game partner. In comparison between the two conditions in the older group, it is visible that children act based on social norms. Children adapted their choice according to the decider's decision. If the affected teddy was excluded, the children refused to take him, while the included teddy was considered appropriate to play with. Contrary to our findings, other studies found out that children usually prefer a cooperative prosocial figure (Hamlin & Wynn, 2011; Hamlin et al., 2013; Hamlin et al., 2007).

Another connection we were interested in, was between the second and third cortisol values and the chosen teddy. We expected higher values of cortisol in the post-test measure when choosing the affected teddy in social exclusion condition. This would mean that the child experiences more stress upon observing social exclusion and would want to comfort the social excluded teddy. Our expectations were not met, meaning no interaction.

Limitations of our Research

Our study has some limitations. The first is definitely the small sample size, which was affected by the many rejections we received from kindergartens and parents as well as the limited time we had for the data collection. In case of a bigger sample, we would have more data to analyze and it would be easier to draw conclusions. Critical is, that the first age group had a smaller age range with seven months (18-24 months), and the older age group with 18 months (25-42 months).

Another problem is the unequal contribution of the two original age groups, with only six children in the younger group and 20 children in the older one. Comparisons between the two age groups are therefore tricky.

We did not always have the same conditions. One time, the child left to the playground and we had to take him back inside after 30 minutes for the third saliva sample. Sometimes, there were loud noises outside the testing room and that could have affected the child's concentration. Sometimes the kindergarten teacher was present to get the cooperation of the children. In most such cases the kindergarten teacher left after some time. Due to age, the unfamiliar situation and the missing relationship with the test conductors, the initial introductory phase varied in length, depending on the child. Differences may also arise as one of the test leaders already knew 15 children because of her work as a kindergarten teacher, while the other children were unknown to us.

It has to be considered that the data collection in a separate room with two unknown test conductors and also the duration of the data collection can be a stress factor for children, which could have led to distortions in the cortisol values. Even though saliva collection is a non-invasive method, children may have been stressed due to the unfamiliar experience and the fact that we were wearing gloves like they may know from doctors.

Only three saliva samples (baseline, post-test, follow-up) per child per condition were collected, so this could also present a limitation. If more saliva samples were taken, the pattern of the cortisol response could be more evident and detailed.

Limitations can also be found in the sample itself. Because of shyness, some children did not talk at lot and this affected our collection of qualitative data. Some were moody and their unmotivated participation may have impacted the results. On the other side, some children, especially the young ones, were really excited and happy to see the teddies, so they may not have understood what the play is about. This could have affected their cortisol response.

Regarding the puppet show, it must be mentioned that all teddies had a smile on their faces, which could interpreted wrong. The socially excluded teddy showed no emotions (e.g. crying, whining) or verbalized them (e.g. "I am very sad now"), which made it more difficult to understand the puppet play. Vaish et al. (2011) showed, that children reacted prosocial towards a harmed puppet, only when it was

expressing sadness. Even though the conversation of the teddies was short and clear, smaller children may not have caught everything the teddies were talking about, altering our results. In case of the youngest children who did not speak well we cannot be sure that they understood the content of the puppet play. The frequencies of the observed play may have been insufficient. Due to the within-subject design, children could have remember the procedure. Since the puppet show is an originally developed design and therefore no validity studies were carried out, it cannot be ascertained whether the puppet show successfully conveys social exclusion.

The concept of social exclusion in a ball tossing game, adopted by the Cyberball paradigm (Williams et al., 2000), may have been too complex for young children. Since empathy needs complex emotions and mental effort it cannot be assured that the children were capable of processing the puppet show. Perhaps we overestimated the difficulty of the design. Furthermore, in this study, the children only observed social exclusion and did not experience it themselves, as it happens in the Cyberball game.

A limitation was also the amount of questions we asked. Especially with the older children a general discussion about social exclusion and inclusion should have been implemented. An important question was forgotten, about why they chose the particular teddy. For further research, we would suggest asking more about the whole process, what their feelings and intentions were. Additionally, more variables could be considered to control for confounding effects (e.g. medication intake, parenting style, and bonding).

Since the whole study carried out by the authors themselves, a certain degree of subjectivity is inevitable.

Implementation for Further Research

Since our study focused on the interaction between empathy, stress and observation of social exclusion which had not been explored yet, it presents a significant contribution to developmental and clinical psychology.

There is a lot to consider for future research. First, a validity study regarding the puppet show should be carried out to make sure the stress induction is effective.

The sample size has to be bigger in order to see if there would be a significant change in cortisol, emotional state as well as a pattern in the teddy selection.

Therefore, data collection outside the kindergarten should be considered and a comparison with the kindergarten would be further possible. To get the cooperation of the youngest children, the assistance of the parents should be provided.

Because our sample was limited to toddlers further research could be carried out on older children, adolescents and children with illness and disorders.

Cortisol collection could also be done in the afternoon, since no drastic changes in the cortisol pattern occur (Gröschl et al., 2003), and for more valid results more saliva samples should be taken per child.

For greater objectivity, a double blind design should be chosen, which would avoid bias in the saliva collection and teddy selection process. The video recordings of the teddy selection process were very useful for an easier coding of the child's behavior. As an extension of the study, gazing direction and length should be investigated, to detect the focus of the children during the observation of the puppet show and teddy selection. Also, heart rate could reveal important information about the physiological reactions of the child.

If a bigger financial aid would be available, a mechanic puppet theater would be built, keeping the puppet show precisely consistent. Also, teddies with a neutral face expression should be used to minimize the unwanted influences. Since the conversation between the teddies did not have distress cues, it was harder for the children to understand the emotions of the affected teddy. Therefore, emotional cues like crying, complaining or whining should be used.

Regarding the smiley-rating scale, modifications for younger children should be considered, using fewer smileys (happy/neutral/sad) or even exchanging smileys with other more understandable symbols (e.g. sun/clouds/rain).

More questions about the puppet show should be asked to make sure they understand the play and whether they have already experienced similar in real life situations. To measure compassion, children should be asked how they would help the affected teddy. Since it has been shown that children avoid playing with the socially excluded teddy, questions about their choice and the reasons should be asked.

Conclusion

In our study, we measured the impact of observing social exclusion/social inclusion on stress (measured by cortisol) and the emotional state (measured by a

smiley-rating scale) of toddlers, aged 18-42 months. Teddy selection and compassion were also considered. Results confirmed only one hypothesis, that the teddy selection in the social inclusion condition was random. There was no significant cortisol increase and emotional state decrease in social exclusion condition.

This study uses an original design created by the authors, and analyzes the interaction between empathy, stress and observation of social exclusion in very young children. Further studies should be carried out to examine this connection in more detail. Limitations and further implementations have been discussed.

References

Abrams, D., & Killen, M. (2014). Social exclusion of children: Developmental origins of prejudice. *Journal of Social Issues, 70*(1), 1-11.

Abrams, D., Hogg, M. A., & Marques, J. M. (Eds.). (2005). *The social psychology of inclusion and exclusion.* New York: Psychology Press.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th Ed.). Washington, DC: Author.

Arnold, L. E. (1990). *Childhood stress*. New York: John Wiley & Sons.

Asendorpf, J. B., Warkentin, V., & Baudonnière, P.M. (1996). Self-Awareness and other-Awareness II: Mirror self-recognition, social contingency awareness, and synchronic imitation*. Developmental Psychology*, *32(2),* 313-321.

Astington, J., & Hughes, C. (2011). Theory of mind: Self-reflection and social understanding. In P. C. Zelazo (Ed.), *The oxford handbook of developmental psychology* (Vol. 2: Self and other). New York: Oxford University Press.

Barry, P. D. (2002). *Mental health and mental illness, 7th Edition*. Philadelphia: Lippincott Williams and Wilkins.

Bartels, M., de Geus, E. J. C., Kirschbaum, C., Sluyter, F., & Boomsma, D. I. (2003). Heritability of daytime cortisol levels in children. *Behavior Genetics, 33*(4), 421-433. doi: 10.1023/A:1025321609994

Bass, E. C., Stednitz, S. J., Simonson, K., Shen, T., & Gahtan, E. (2014). Physiological stress reactivity and empathy following social exclusion: a test of the defensive emotional analgesia hypothesis. *Social Neuroscience, 9*(5), 504-513. doi:10.1080/17470919.2014.929533

Baston, C. D. (2009). These things called empathy: Eight related but distinct phenomena. In J. Decety & W. Ickes (Eds.). *The social neuroscience of empathy* (pp. 3-15). Cambridge, Massachusetts: the MIT Press.

Batson, C., & Shaw, L. (1991). Evidence for altruism: Toward a pluralism of prosocial motives. *Psychological Inquiry, 2(2),* 107-122.

Bäumler, D., Kirschbaum, C., Kliegel, M., Alexander, N., & Stalder, T. (2013). The cortisol awakening response in toddlers and young children. *Psychoneuroendocrinology, 38*(11), 2485-2492. doi:10.1016/j.psyneuen.2013.05.008

Bierhoff, H. (2017). Fairness. In M. A. Wirtz (Ed.), *Dorsch - Lexikon der Psychologie*. Retrieved [27.08.2017] form https://m.portal.hogrefe.com/dorsch/fairness/

Bischof-Köhler, D. (1991). The development of empathy in infants. In M. E. Lamb & H. Keller (Eds.), *Infant development: Perspectives from german-speaking countries* (pp. 245-273). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

Blackhart, G. C., Eckel, L. A., & Tice, D. M. (2007). Salivary cortisol in response to acute social rejection and acceptance by peers. *Biological Psychology, 75*(3), 267-276. doi:10.1016/j.biopsycho.2007.03.005

Bunea, I. M., Szentágotai-Tătar, A., & Miu, A. C. (2017). Early-life adversity and cortisol response to social stress: a meta-analysis. *Translational Psychiatry, 7*(12), 1274. doi:10.1038/s41398-017-0032-3

Burton, N. (2015). Empathy vs. sympathy. Retrieved [04.09.2018] from https://www.psychologytoday.com/us/blog/hide-and-seek/201505/empathy-vs-sympathy

Bush, L. K., Barr, C. L., McHugo, G. J., & Lanzetta, J. T. (1989). The effects of facial control and facial mimicry on subjective reactions to comedy routines. *Motivation and Emotion, 13,* 31–52.

Butterworth, G. (1992). Origins of self-perception in infancy. *Psychological Inquiry, 3(2),* 103-111. doi: http://dx.doi.org/10.1207/s15327965pli0302_1

Carter, C., Harris, J., & Porges, S. (2009). Neural and evolutionary perspectives on empathy. In J. Decety & W. Ickes (Eds.), *The social neuroscience of empathy* (pp. 169-182). Cambridge, Massachusetts: The MIT Press.

Carver, C. S., & Scheier, M. F. (1994). Situational coping and coping dispositions in a stressful transaction. Journal of Personality and Social Psychology, 66(1), 184-195. doi:10.1037/0022-3514.66.1.184

Carver, C. S., Lawrence, J. W., & Scheier, M. F. (1999). Self-discrepancies and affect: introducing the role of feared selves. *Personality and Social Psychology Bulletin, 25*(7), 783-792. doi:10.1177/0146167299025007002

Clements, A. D., & Parker, C. R. (1998). The relationship between salivary cortisol concentrations in frozen versus mailed samples. *Psychoneuroendocrinology, 23*(6), 613–616. doi:10.1016/S0306-4530(98)00031-6

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24(4), 385-396. doi:10.2307/2136404

Cooper C. L., & Marshall J. (1976). Occupational sources of stress: a review of the literature relating to coronary heart disease and mental ill health. *Journal of Occupational Health Psychology, 49*(1), 11–28. doi:10.1057/9781137310651_1

Cuff, B. M., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A review of the concept. *Emotion Review, 8(2),* 144-153. doi: 10.1177/1754073914558466

Davidov, M., Zahn-Waxler, C., Roth-Hanania, R., & Knafo, A. (2013). Concern for others in the first year of life: Theory, evidence, and avenues for research. *Child Development Perspectives, 7(2),* 126-131. doi: https://doi.org/10.1111/cdep.12028

de Vignemont, F., & Singer, T. (2006). The empathic brain: how, when, why? *Trends in Cognitive Sciences, 10(10)*, 435-441. doi: https://doi.org/10.1016/j.tics.2006.08.008

de Waal, F. B. (2012). Empathy in primates and other mammals. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 87-106). Cambridge, Massachusetts: The MIT Press.

Decety, J. (2010). The neurodevelopment of empathy in humans. *Developmental Neuroscience, 32(4),* 257-267. doi: 10.1159/000317771

Decety, J. (2011). Dissecting the neural mechanisms mediating empathy. *Emotion Review, 3(1),* 92-108. doi: http://dx.doi.org/10.1177/1754073910374662

Decety, J. (2012). Introduction: Why is empathy so important? In J. Decety (Ed.), *Empathy: From bench to bedside* (pp.vii-ix). Cambridge, Massachusetts: The MIT Press.

Decety, J., & Batson, C. D. (2007). Social neuroscience approaches to interpersonal sensitivity. *Social Neuroscience, 2(3-4)*, 151-157. doi: 10.1080/17470910701506060

Decety, J., & Ickes, W. (2009). *The social neuroscience of empathy.* Cambridge, Massachusetts: The MIT Press.

Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and Cognitive Neuroscience Reviews, 3(2)*, 71-100. doi: 10.1177/1534582304267187

Decety, J., & Meyer, M. (2008). Form emotion resonance to empathic understanding: A social developmental neuroscience account. *Development and Psychopathology, 20,* 1053-1089. doi:10.1017/S0954579408000503

Decety, J., & Michalska, K. J. (2012). How children develop empathy: The contribution of developmental affective neuroscience. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 167-190). Cambridge, Massachusetts: The MIT Press.

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research. *Psychological Bulletin, 130*(3), 355–391. doi:10.1037/0033-2909.130.3.355

Dimberg, U., Thunberg, M., & Elmehed, K. (2000). Unconscious facial reactions to emotional facial expressions. *Psychological Science, 11(1),* 86-89. doi: https://doi-org.uaccess.univie.ac.at/10.1111/1467-9280.00221

Dondi, M., Simion, F., & Caltran, G. (1999). Can newborns discriminate between their own cry and the cry of another newborn infant? *Developmental Psychology, 35(2),* 418-426.

Duesenberg, M., Weber, J., Schulze, L., Schaeuffele, C., Roepke, S., Hellmann-Regen, J., … Wingenfeld, K. (2016). Does cortisol modulate emotion recognition and empathy? *Psychoneuroendocrinology, 66*, 221-227. doi:10.1016/j.psyneuen.2016.01.011

Dymond, R. F. (1949). A scale for the measurement of empathic ability. *Journal of Consulting Psychology, 13(2)*, 127-133. doi: 10.1037/h0061728

Echols, S., & Correll, J. (2012). It's more than skin deep: Empathy and helping behavior across social groups. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 55-71). Cambridge, Massachusetts: The MIT Press.

Eisenberg, N., & Strayer, J. (1987). Critical issues in the study of empathy. In N. Eisenberg & J. Strayer (Eds.), *Cambridge studies in social and emotional development. Empathy and its development* (pp. 3-13). New York: Cambridge University Press.

Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2006). Prosocial development. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 646-718). Hoboken, New Jersey: John Wiley & Sons Inc.

Eisenberg, N., Fabes, R. A., Murphy, B., Karbon, M, Maszk, P., Smith, M., … Suh, K. (1994). The relations of emotionality and regulation to dispositional and situational empathy-related responding. *Journal of Personality and Social Psychology, 66(4),* 776–797.

Eisenberg, N., Shea, C. L., Carlo, G., & Knight, G. P. (1991). Empathy-related responding and cognition: A "chicken and the egg" dilemma. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Handbook of moral behavior and development, Vol. 1. Theory; Vol. 2. Research; Vol. 3. Application* (pp. 63-88). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

Eisenberg, N., Snjezana, H., & Edwards, A. (2012). Relations of empathy-related responding to children's and adolescents' social competence. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 147-163). Cambridge, Massachusetts: The MIT Press.

Eisenberg, N., Spinrad, T. L., & Sadovsky, A. (2006). Empathy-related responding in children. In M. Killen & J. G. Smetana (Eds.), *Handbook of moral development* (pp. 517-549). Mahwah, New Jersey: Lawrence Erlbaum Associates Publishers.

Ekman, P. (1970). Universal facial expressions of emotions. *California Mental Health Research Digest, 8(4)*, 151-158.

Ekman, P. (1999). Basic emotions. In T. Dalgleish & M. J. Power (Eds.), *Handbook of cognition and emotion* (pp. 45-60). New York: John Wiley & Sons Ltd.

Engert, V., Plessow, F., Miller, R., Kirschbaum, C., & Singer, T. (2014). Cortisol increase in empathic stress is modulated by emotional closeness and observation Modality. *Psychoneuroendocrinology, 45*, 192—201. doi:10.1016/j.psyneuen.2014.04.005

Fink, G. (2009). Stress: definition and history. In: *Encyclopedia of Neuroscience*. Oxford: Elsevier Ltd.

Franke, H. A. (2014). Toxic stress: effects, prevention and treatment. *Children, 1*(3), 390–402. doi:10.3390/children1030390

Gallagher, S., & Meltzoff, A. N. (1996). The earliest sense of self and others: Merleau-Ponty and recent developmental studies. *Philosophical Psychology, 9(2),* 211-233. doi: 10.1080/09515089608573181

Geraci, A., & Surian L. (2011). The developmental roots of fairness: infants' reactions to equal and unequal distributions of resources. *Developmental Science, 14(5),* 1012-1020. doi: 10.1111/j.1467-7687.2011.01048.x

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin, 136(3)*, 351-374. doi: http://dx.doi.org/10.1037/a0018807

Gröschl, M., Rauh, M., & Dörr, H. G. (2003). Circadian rhythm of salivary cortisol, 17-hydroxyprogesterone, and progesterone in healthy children. *Clinical Chemistry 49*(10), 1688-1691. doi:10.1373/49.10.1688

Gunnar, M. R., & Quevedo, K. (2007). The neurobiology of stress and development. *Annual Review of Psychology, 58*, 145-173. doi: 10.1146/annurev.psych.58.110405.085605

Gunnar, M. R., Brodersen, L., Krueger, K., & Rigatuso, J. (1996). Dampening of adrenocortical responses during infancy: normative changes and individual differences. *Child Development, 67*(3), 877-889. doi:10.2307/1131867

Hamlin, J. K. (2015). The case for social evaluation in preverbal infants: Gazing towards one's goal drives infants' preferences for helpers over hinderers in the hill paradigma. *Frontiers in Psychology, 5,* 1-9. doi: 10.3389/fpsyg.2014.01563

Hamlin, J. K., & Wynn, K. (2011). Young infants prefer prosocial to antisocial others. *Cognitive Development, 26(1)*, 30-39. doi: https://doi.org/10.1016/j.cogdev.2010.09.001

Hamlin, J. K., Ullman, T., Tenenbaum, J., Goodman, N., & Baker, C. (2013), The mentalistic basis of core social cognition: Experiments in preverbal infants and a computational model. *Developmental Science, 16*, 209-226. doi:10.1111/desc.12017

Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation by preverbal infants. *Nature, 450,* 557-559. doi:10.1038/nature06288

Hamlin, J. K., Wynn, K., & Bloom, P. (2010). Three-month-olds show a negativity bias in their social evaluations. *Developmental Science, 13,* 923-929. doi:10.1111/j.1467-7687.2010.00951.x

Hannibal, K. E., & Bishop, M. D. (2014). Chronic stress, cortisol dysfunction, and pain: a psychoneuroendocrine rationale for stress management in pain rehabilitation. *Physical Therapy, 94*(12), 1816–1825. doi:10.2522/ptj.20130597

Hanrahan, K., McCarthy, A. M., Kleiber, C., Lutgendorf, S., & Tsalikian, E. (2006). Strategies for salivary cortisol collection and analysis in research with children. *Applied Nursing Research, 19*(2), 95-101. doi:10.1016/j.apnr.2006.02.001

Hastings, P. D., Utendale, W. T., & Sullivan, C. (2007). The socialization of prosocial development. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research* (pp. 638-664). New York: Guilford Press.

Hastings, P. D., Zahn-Waxler, C., & McShane, K. (2006). We are, by nature, moral creatures: Biological bases of concern for others. In M. Killen & J. Smetana (Eds.), *Handbook of moral development* (pp. 483–516). Mahwah, New Jersey: Erlbaum.

Hatfield, E., Cacioppo, J., & Rapson, R. L. (1994). *Emotional contagion.* New York: Cambridge Press.

Hatfield, E., Rapson, R. L., & Le, Y.C. (2009). Emotional contagion and empathy. In J. Decety & W. Ickes (Eds.), *Social neuroscience. The social neuroscience of empathy* (pp. 19-30). Cambridge, Massachusetts: MIT Press. doi: http://dx.doi.org/10.7551/mitpress/9780262012973.003.0003

Haviland, J. M., & Lelwica, M. (1987). The induced affect response: 10-week-old infants' responses to three emotion expressions. *Developmental Psychology, 23(1)*, 97-104. doi: http://dx.doi.org/10.1037/0012-1649.23.1.97

Hay, D. F., Nash, A., & Pederson, J. (1981). Responses of six-month-olds to the distress of their peers. *Child Development, 52(3)*, 1071-1075. doi: 10.2307/1129114

Hein, G., & Singer, T. (2008). I feel how you feel but not always: the empathic brain and its modulation. *Current Opinion in Neurobiology, 18(2)*, 153-158. doi: https://doi.org/10.1016/j.conb.2008.07.012

Hennenlotter, A., Schroeder, U., Erhard, P., Castrop, F., Haslinger, B., Stoecker, D., …, Ceballos-Baumann, A. O. (2005). A common neural basis for receptive and expressive communication of pleasant facial affect. *NeuroImage, 26(2),* 581-591. doi: 10.1016/j.neuroimage.2005.01.057

Hoffman, M. L. (1975). Developmental synthesis of affect and cognition and its implications for altruistic motivation. *Developmental Psychology, 11(5),* 607-622. doi: http://dx.doi.org/10.1037/0012-1649.11.5.607

Hoffman, M. L. (2000). *Empathy and moral development: Implications for caring and justice*. Cambridge, UK: Cambridge University Press.

Hoffman, M. L. (2001). Prosocial behavior and empathy: Developmental processes. In N. J. Smelser & P. B. Paul (Eds.), *International encyclopedia of the social and behavioral sciences* (pp. 12230-12233). doi: https://doi.org/10.1016/B0-08-043076-7/01739-3

Holmes, T. H. (1978). Life situations, emotions, and disease. *Psychosomatics, 19*(12), 747-54. doi:10.1016/S0033-3182(78)70891-1

IBM Corp. (2012). *IBM SPSS Statistics for Windows/ Version 21.0.* Armonk, New York: IBM Corp.

Jacobson, G. (1994). The meaning of stressful life experiences in nine- to eleven-year old children: a phenomenological study. *Nursing Research, 43*(2), 95-100.

Jansen, L. M. C., Gispen-de Wied, C. C., Jansen, M. A., van der Gaag, R. J., Matthys, W., & van Engeland, H. (1999). Pituitary–adrenal reactivity in a child psychiatric population: salivary cortisol response to stressors. *European Neuropsychopharmacology, 9*(1-2), 67-75. doi:10.1016/S0924-977X(98)00003-0

Jörg, S. & Kellner, I. (1983). *Der Ernst des Lebens*. Stuttgart: Thienemann.

Keil, M. F. (2012). Salivary Cortisol: A tool for biobehavioral research in children. *Journal of Pediatric Nursing, 27*(3), 287–289. doi:10.1016/j.pedn.2012.02.003

Killen, M., & Rutland, A. (2013). *Children and social exclusion: morality, prejudice, and group identity.* West Sussex: Blackwell.

Killgore, W. D., & Yurgelun-Todd, D. A. (2007). Unconscious processing of facial affect in children and adolescents. *Social Neuroscience, 2(1),* 28-47. doi: 10.1080/17470910701214186

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The 'trier social stress test'--a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology, 28*(1-2), 76-81. doi:10.1159/000119004

Knafo, A., Zahn-Waxler, C., Van Hulle, C., Robison, J. L., & Rhee, S. H. (2008). The developmental origins of a disposition toward empathy: Genetic and environmental contributions. *Emotion, 8(6)*, 737-752. doi: 10.1037/a0014179

Kudielka, B. M., Buske-Kirschbaum, A., Hellhammer, D. H., & Kirschbaum, C. (2004). HPA axis responses to laboratory psychosocial stress in healthy elderly adults, younger adults, and children: impact of age and gender. *Psychoneuroendocrinology, 29*(1), 83-98. doi:10.1016/S0306-4530(02)00146-4

Lamm, C., Batson, C. D., & Decety, J. (2007). The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal. *Journal of Cognitive Neuroscience, 19(1),* 42-58. doi: 10.1162/jocn.2007.19.1.42

Lazarus R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.

Levenstein, S., Prantera, V., Varvo, V., Scribano, M. L., Berto, E., Luzi, C., & Andreoli, A. (1993). Development of the perceived stress questionnaire: a new tool for psychosomatic research. *Journal of Psychosomatic Research, 37*(1), 19–32. doi:10.1016/0022-3999(93)90120-5

Lewis, K. L., & Hodges. S. D. (2012). Empathy is not always personal as you may think: The use of stereotypes in empathic accuracy. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 73-84). Cambridge, Massachusetts: The MIT Press.

Lewis, M., & Brooks-Gunn, J. (1979). *Social cognition and the acquisition of self*. New York: Plenum Press.

Light, S,. & Zahn-Waxler, C. (2012). Nature and forms of empathy in the first years of life. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 109-130). Cambridge, Massachusetts: The MIT Press.

Lupien, S. J., Maheu, F., Tu, M., Fiocco, A., & Schramek, T. E. (2007). The effects of stress and stress hormones on human cognition: implications for the field of brain and cognition. *Brain and Cognition, 65*(3), 209–237. doi:10.1016/j.bandc.2007.02.007

Maldonado, E. F., Trianes, M. V., Cortes, A., Moreno, E., & Escobar, M. (2009). Salivary cortisol response to a psychosocial stressor on children diagnosed with attention-deficit/hyperactivity disorder: differences between diagnostic subtypes. *The Spanish Journal of Psychology, 12*(2), 707-714. doi:10.1017/S1138741600002079

Massey, F. J. (1951). The Kolmogorov-Smirnov Test for Goodness of Fit. Journal of the *American Statistical Association, 46*(253), 68-78.

McCarthy, A. M., Hanrahan, K., Kleiber, C., Zimmerman, M. B., Lutgendorf, S., & Tsalikian, E. (2009). Normative salivary cortisol values and responsivity in children. *Applied Nursing Research, 22*(1), 54–62. doi:10.1016/j.apnr.2007.04.009

McEwen, B. S. (1998). Stress, adaptation, and disease. Allostasis and allostatic load. *Annals of the New York Academy of Sciences 840*(1), 33-44. doi:10.1111/j.1749-6632.1998.tb09546.x

Miller, J. G. (2018). Physiological mechanisms of prosociality. *Current Opinion in Psychology, 20*, 50-54. doi:10.1016/j.copsyc.2017.08.018

Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological Bulletin, 103(3)*, 324-344. doi: http://dx.doi.org/10.1037/0033-2909.103.3.324

Mindes, G., & Jewett, J. (1997). Reviews of research: childhood stress. *Childhood Education, 73*(3), 172-173. doi:10.1080/00094056.1997.10522682

Murphy, F. C., Nimmo-Smith, I., & Lawrence, A. D. (2003). Functional neuroanatomy of emotions: A meta-analysis. *Cognitive Affective Behavioral Neuroscience, 3(3),* 207-33. doi: 10.1111/j.0963-7214.2006.00411.x

Myers, D. G. (2007). *Psychology, 8th Edition*. New York: Worth Publishers.

Neisser, U. (1991). Two perceptually given aspects of the self and their development. *Developmental Review, 11(3)*, 197-209. doi: https://doi.org/10.1016/0273-2297(91)90009-D

Nelder, J., & Wedderburn, R. (1972). Generalized Linear Models. *Journal of the Royal Statistical Society, Series A (General)*, *135,* 370–384. doi:10.2307/2344614

Nichols, S. R., Svetlova, M., & Brownell, C. A. (2009). The role of social understanding and empathic disposition in young children's responsiveness to distress in parents and peers. *Cognition, Brain, Behavior : An Interdisciplinary Journal*, *13(4),* 449-478.

Nielsen, L. (2002). The simulation of emotion experience: On the emotional foundations of theory of mind. *Phenomenology and the Cognitive Sciences, 1(3),* 255–286. doi: 10.1023/A:1021359916894

Nyström, P. (2008) The infant mirror neuron system studied with high density EEG. *Social Neuroscience, 3(3-4),* 334-347. doi: 10.1080/17470910701563665

Papathanasiou, I. V., Tsaras, K., Anna Neroliatsiou, A., & Aikaterini Roupa, A. (2015). Stress: concepts, theoretical models and nursing interventions. *American Journal of Nursing Science, 4*(2-1), 45-50. doi:10.11648/j.ajns.s.2015040201.19

Phillips, M. L., Ladoucer, C. D., & Drevets, W. C. (2008). A neural model of voluntary and automatic emotion regulation: implications for understanding the pathophysiology and neurodevelopment of bipolar disorder. *Molecular Psychiatry, 13(9),* 833-857. doi: 10.1038/mp.2008.65

Pocock, G., Richards, C. D., Richards, D., & Richards, D. A. (2013). *Human physiology. Fourth Edition.* Oxford: Oxford University Press.

Price, D. A., Close, G. C., & Fielding, B. A. (1983). Age of appearance of circadian rhythm in salivary cortisol values in infancy. *Archives of Disease in Childhood, 58*(6), 454-456.

Pruessner, J. C., Wolf, O. T., Hellhammer, D. H., Buske-Kirschbaum, A., von Auer, K., S.Jobst, S., F.Kaspers, F., & Kirschbaum, C. (1997). Free cortisol levels after awakening: a reliable biological marker for the assessment of adrenocortical activity. *Life Sciences, 61*(26), 2539-2549. doi:10.1016/S0024-3205(97)01008-4

Rime, B. (2009). Emotion elicits the social sharing of emotion: Theory and empirical evidence. *Emotion Review, 1(1),* 60-85. doi: https://doi.org/10.1177/1754073908097189

Rochat, P. (2002). *The infant's world*. Cambridge, Massachusetts: Harvard University Press.

Rochat, P., & Striano, T. (2002). Who's in the mirror? Self-other discrimination in specular images by four- and nine-month-old infants. *Child Development, 73,* 35–46.

Roth-Hanania, R., Davidov, M., & Zahn-Waxler, C. (2011). Empathy development form 8 to 16 months: Early signs of concern for others. *Infant Behavior & Development, 34,* 447-458. doi: 10.1016/j.infbeh.2011.04.007

Russell, J. (1996). *Agency and its role in mental development.* Hove: Psychology Press.

Scheler, M. (1954). *The nature of sympathy.* London: Routledge and Kegan Paul.

Schmidt, M. F., & Sommerville, J. A. (2011). Fairness expectations and altruistic sharing in 15-month-old human infants. *PlosOne, 6(10)*. doi:10.1371/journal.pone.0023223

Schulz, P., & Scholtz, W. (1999). The Trier Inventory for the Assessment of Chronic Stress (TICS): Scale construction, statistical testing, and validation of the scale work overload. *Diagnostica, 45*(1), 8-19. doi:10.1026/0012-1924.45.1.8

Seiferling, N., Turgut, S., & Lozo, L. (2017). Emotionsregulation. In M. A. Wirtz (Ed.), *Dorsch-Lexion der Psychologie*, 18. Auflage. Bern: Hogrefe.

Selye, H. (1975). Confusion and controversy in the stress field. *Journal of Human Stress 1*(2), 37-44. doi:10.1080/0097840X.1975.9940406

Selye, H. (1976). *The stress of life*. New York: McGraw-Hill.

Sen, A. (2000). *Social exclusion: concept, application, and scrutiny.* Philippines: Asian Development Bank.

Shamay-Tsoory, S. G., Aharon-Peretz, J, & Perry, D. (2009). Two systems for empathy: a double dissociation between emotional and cognitive empathy in inferior frontal gyrus versus ventromedial prefrontal lesions. *Brain, 132(Pt 3)*, 617-627. doi: 10.1093/brain/awn279

Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., Garner, A. S., … Wood, D. L. (2011). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*(1). doi:10.1542/peds.2011-2663

Simner, M. L. (1971). Newborn's response to the cry of another infant. *Developmental Psychology, 5,* 136-150.

Singer, T. (2006). The neuronal basis and ontogeny of empathy and mind reading: Review of literature and implications for future research. *Neuroscience and biobehavioral reviews, 30(6)*, 855-863. doi: 10.1016/j.neubiorev.2006.06.011

Sloane, S., Baillargeon, R., & Premack, D. (2012). Do infants have a sense of fairness? *Psychological Science, 23(2), 196-204.* doi: 10.1177/0956797611422072

Smith, S. M., & Vale, W. W. (2006). The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress. *Dialogues in Clinical Neuroscience, 8*(4), 383–395.

Stephens, M. A. C., & Wand, G. (2012). Stress and the hpa axis: role of glucocorticoids in alcohol dependence. *Alcohol Research: Current Reviews, 34*(4), 468–483.

Stocks, E. L., Lishner, D. A., & Decker, S. K. (2009). Altruism or psychological escape: Why does empathy promote prosocial behaviour? *European Journal of Social Psychology, 39(5),* 649-665. doi: https://doi.org//10.1002/ejsp.561

Thoma, M. V., La Marca, R., Brönnimann, R., Finkel, L., Ehlert, U., & Nater, U. M. (2013). The effect of music on the human stress response. *PLoS ONE, 8*(8), e70156. doi:10.1371/journal.pone.0070156

Tobia, V., Riva, P., & Caprin, C. (2016). Who are the children most vulnerable to social exclusion? the moderating role of self-esteem, popularity, and nonverbal intelligence on cognitive performance following social exclusion. *Journal of Abnormal Child Psychology, 45*(4), 789-801. doi:10.1007/s10802-016-0191-3

Ulrich-Lai, Y. M., & Herman, J. P. (2009). Neural regulation of endocrine and autonomic stress responses. *Nature Reviews Neuroscience, 10*(6), 397–409. doi:10.1038/nrn2647

Ungerer, J. A., Dolby, R., Waters, B., Barnett, B., Kelk, N., & Lewin, V. (1990). The early development of empathy: Self-regulation and individual differences in the first year. *Motivation and Emotion, 14(2),* 93-106. doi: http://dx.doi.org/10.1007/BF00991638

Urbaniak, G. C. & Plous S. (1997). *Research Randomizer*, www.randomizer.org. Retrieved on 15.06.2018.

Vaish, A., & Warneken, F. (2012). In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 131-146). Cambridge, Massachusetts: The MIT Press.

Vaish, A., Missana, M., & Tomasello, M. (2011). Three-year-old children intervene in third-party moral transgressions. *British Journal of Developmental Psychology, 29,* 124-130.

Varvogli, L., & Darviri, C. (2011). Stress management techniques: evidence-based procedures that reduce stress and promote health. *Health Science Journal, 5*(2), 74-89.

Warneken, F., & Tomasello, M. (2009). The roots of human altruism. *British Journal of Psychology, 100(3),* 455-471. doi:10.1348/000712608X379061

Williams, K. D. (1997). Social ostracism. In R. M. Kowalski (Ed.), *Aversive Interpersonal Behaviors* (pp. 133–170). New York: Plenum. doi:10.1007/978-1-4757-9354-3_7

Williams, K. D., Cheung, C. K., & Choi, W. (2000). Cyberostracism: Effects of being ignored over the internet. *Journal of Personality and Social Psychology*, 79, 748- 762. doi: 10.1037//0022-3514.79.5.748

Wynn, K., & Bloom, P. (2014). The moral baby. In M. Killen & J. G. Smetana (Eds.), *Handbook of moral development,* second edition. New York: Psychology Press.

Yim, I. S., Quas, J. A., Cahill, L., & Hayakawa, C. M. (2010). Children's and adults' salivary cortisol responses to an identical psychosocial laboratory stressor. *Psychoneuroendocrinology 35*(2), 241-248. doi:10.1016/j.psyneuen.2009.06.014

Zahavi, D., & Overgaard S. (2012). Empathy without isomorphism: A phenomenological account. In J. Decety (Ed.), *Empathy: From bench to bedside* (pp. 3-20). Cambridge, Massachusetts: The MIT Press.

Zahn-Waxler, C. (1991). The case for empathy: A developmental perspective. *Psychological Inquiry, 2(2),* 155-158.

Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E., & Chapman, M. (1992). Development of concern for others. *Developmental Psychology, 28(1),* 126-136. doi: http://dx.doi.org/10.1037/0012-1649.28.1.126

Zahn-Waxler, C., Robinson, J. L., & Emde, R. N. (1992). The development of empathy in twins. *Developmental Psychology, 28(6)*, 1038-1047. doi: http://dx.doi.org/10.1037/0012-1649.28.6.1038

Zegans, L. (1982). Stress and the development of somatic disorders. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: theoretical and clinical aspects* (p. 134-152). New York: Free Press.

List of Figures

List of Tables

List of Abbreviations

ACTH	Adrenocorticotropic hormone
ASD	Acute stress disorder
EEG	Electroencephalography
ERG	Electroretinography
GAS	General Adaptation Syndrome
GLM	General linear model
HPA axis	Hypothalamic-pituitary-adrenal axis
mOFC	Medial part of the orbitofrontal prefrontal cortex
mPFC	Medial prefrontal cortex
OFC	Orbitofrontal cortex
PFC	Prefrontal cortex
PSQ	Perceived Stress Questionnaire
PSS	Perceived Stress Scale
PTSD	Post-traumatic stress disorder
SAM	Sympathetic-adrenomedullary system
STS	Superior temporal sulcus
TICS	Trier Inventory for Chronic Stress
TPJ	Temporoparietal junction
TSST	Trier Social Stress Test

Appendix A

Abstract

Empathy defines an emotional response as the perception of a sensation, emotion, a psychological state in another person. Stress is a physical or mental reaction to a stressor. The current study examines the impact of observing social exclusion and social inclusion on stress (cortisol) and the emotional state (smiley-rating scale), as well as the empathy and compassion development. It was hypothesized that children would react with a higher cortisol level and negative emotions upon observing social exclusion and prefer the socially excluded teddy. The research design was a field experiment with a within-subject design. Therefore, 26 toddlers, aged 18-42 months, distinguished into two age groups (18-24 and 25-42 months), were shown a puppet show. Saliva samples and emotional states were collected three times. In the analysis, the sample was divided into groups by median because of the lack of data. The results confirmed only one hypothesis, stating no differences between the age groups in regard to cortisol levels. There was no significant increase in cortisol and no negative emotional state in the observation of social exclusion, and no pattern in the selection of teddy. The opposite was found, showing no changes in observing social exclusion, but only a peak cortisol value in the post-test of the social inclusion condition in the younger group. In regard to the selection of the teddy, it was visible that children act based on social norms. We propose, that children adapted their choice according to the decider's decision. Limitations and further implications were discussed.

Keywords: Compassion, Empathy, Stress, Social Exclusion, Social Inclusion, Toddlers

Zusammenfassung

Empathie definiert eine emotionale Reaktion aufgrund der Wahrnehmung einer Empfindung, Emotion, eines psychologischen Zustandes bei einer anderen Person. Stress ist eine körperliche oder geistige Reaktion auf einen Stressor. Die aktuelle Studie untersucht die Auswirkungen der Beobachtung von sozialer Exklusion und sozialer Inklusion auf Stress (Cortisol) und den emotionalen Zustand (Smiley-Rating-Skala) sowie die Entwicklung von Empathie und Mitgefühl. Es wurde hypothetisiert, dass Kinder bei der Beobachtung sozialer Exklusion mit einem höheren Cortisolspiegel und negativen Emotionen reagieren und den sozial exkludierten Teddy bevorzugen. Das Forschungsdesign war ein Feldexperiment mit einem within-subject Design. Daher wurde 26 Kleinkinder im Alter von 18 bis 42 Monaten, die in zwei Altersgruppen (18-24 und 25-42 Monate) aufgeteilt wurden, ein Puppenspiel gezeigt. Speichelproben und emotionale Zustände wurden dreimal erhoben. Für die Analyse wurde die Stichprobe aufgrund des Mangels an Daten nach Median eingeteilt. Die Ergebnisse bestätigten eine Hypothese, die keine Unterschiede bezüglich der Cortisolspiegel zwischen den Altersgruppen annahm. Es gab keinen signifikanten Cortisolanstieg und keinen negativen emotionalen Zustand bei der Beobachtung von sozialen Exklusion, sowie kein Muster bei der Auswahl des Teddys. Es wurde das Gegenteil gefunden, da es keine Veränderungen bei der Beobachtung der sozialen Exklusion gab, sondern nur ein erhöhter Cortisolwert im Post-Test der sozialen Inklusionsbedingung in der jüngeren Gruppe gefunden wurde. In Bezug auf die Auswahl des Teddys wurde sichtbar, dass Kinder nach sozialen Normen handeln. Wir gehen davon aus, dass Kinder ihre Wahl entsprechend der Entscheidung des Entscheiders angepasst haben. Limitationen und weitere Implikationen wurden diskutiert.

Appendix B

Demographic Questionnaire

DEMOGRAFISCHER FRAGEBOGEN

Name des Kindes_____

Geschlecht ☐ männlich ☐ weiblich Geburtsdatum_____

Geschwister ☐ nein ☐ ja, wenn ja

Anzahl _____ Geschlecht & Alter der Geschwister_____

Muttersprache des Kindes_____

In welchem Monat und Jahr hatte ihr Kind den Kindergarteneintritt?

_____

Mit wieviel Monaten, hat ihr Kind zu sprechen begonnen?

_____

Mit wieviel Monaten, hat ihr Kind zu gehen begonnen?

_____

Alter der Mutter_____ ☐ Keine Angaben

Alter des Vaters_____☐ Keine Angaben

Nationalität der Mutter _____ ☐ Keine Angaben

Nationalität des Vaters _____ ☐ Keine Angaben

Berufstätigkeit der Mutter _____ ☐ Keine Angaben

Berufstätigkeit des Vaters _____ ☐ Keine Angaben

BITTE WENDEN

Höchste abgeschlossene Ausbildung:

Mutter	**Vater**
☐ Pflichtschule	☐ Pflichtschule
☐ Lehre	☐ Lehre
☐ Meisterprüfung	☐ Meisterprüfung
☐ Fachschule	☐ Fachschule
☐ Matura	☐ Matura
☐ Universitätsabschluss/FH	☐ Universitätsabschluss/FH
☐ Sonstiges	☐ Sonstige
☐ Keine Angaben	☐ Keine Angaben

Monatliches Netto-Einkommen:

Vater	**Mutter**
☐ 0-500 €	☐ 0-500 €
☐ 501-1000 €	☐ 501-1000 €
☐ 1001-1500 €	☐ 1001-1500 €
☐ 1501-2000 €	☐ 1501-2000 €
☐ 2001-3000 €	☐ 2001-3000 €
☐ mehr als 3000 €	☐ mehr als 3000 €
☐ keine Angaben	☐ keine Angaben

Dieser Fragebogen wurde ausgefüllt von ☐ Mutter ☐ Vater

Wohnort_____

Kontaktdaten (Email/Telefonnummer)_____

_____

Wenn zutreffend bitte ankreuzen:

☐ Ja, ich möchte über die Studienergebnisse per Email informiert werden (Emailadresse muss dafür oben vollständig und richtig angegeben werden)

Die Daten werden nicht an dritte Personen weitegegeben und dienen nur zur Beantwortung unserer Forschungsfrage

Appendix C

Smiley-Rating Scale

Appendix D

Work sheet

Code: _____

Name: _____ Kindergarten: _____

Geburtsdatum: _____ Testalter:_____

Video erlaubt: ☐ ja ☐ nein

Erhebungstag 1 Datum:_____

Version:_____ Durchgänge: ____ Randomisierung unsere Sicht: _____

Mitspieler (l): _____ Entscheider (m): _____ Betroffene (r): _____

Cortisolerhebung 1: _____  ☐	Cortisolerhebung 2: _____  ☐
Cortisolerhebung 3: _____  ☐	Smiley-Skala verstanden ☐ Ja ☐ Nein ☐ Teilweise

Was bedeutet dieser Smiley (Glücklich) / wie geht es dem diesen Smiley ☐ Keine Angaben
Was bedeutet den dieser Smiley (Traurig) / wie geht es diesem Smiley ☐ Keine Angaben
Und wie geht es diesem Smiley (Neutral) ☐ Keine Angaben
Kannst du mir den Smiley zeigen der a) glücklich ist b) traurig ist ☐ Keine Angaben
Wie fühlt sich das Kind (Traurig) ☐ Keine Angaben ☐ Nicht erhoben
Wie fühlt sich das Kind (Glücklich) ☐ Keine Angaben ☐ Nicht erhoben
Was magst du am meisten = Apfel, Birne, Banane Zeig mir anhand der Smiley wie du dich fühlst wenn ihr dir (Lieblingsfrucht) gebe ☐ Keine Angaben ☐ Nicht erhoben

Mit welchem Teddy möchtest du spielen??

Kannst du mir erzählen was du gesehen hast? Kannst du mir erzählen wie die Teddys gespielt haben?

Was denkst du, wie sich der Teddy fühlt, der mitspielen durfte/ nicht mitspielen durfte? Ratingskala zeigen: kannst du mir zeigen, wie sich der Teddy fühlt der mitspielen durfte/ nicht mitspielen dufte

Code: _____

...wie fühlst du dich? Ratingskala zeigen: Kannst du mir zeigen, wie du dich fühlst

Compassion: Machst du dir Sorge um den Teddybär. Tut dir der Teddy leid?

Anmerkungen:_____

Erhebungstag 2 Datum:_____

Version:_____ Durchgänge: ____ Randomisierung unsere Sicht: _____

Mitspieler (l): _____ Entscheider (m): _____ Betroffene (r): _____

Cortisolerhebung 1: _____  ☐	Cortisolerhebung 2: _____  ☐
Cortisolerhebung 3: _____ 	Smiley-Skala verstanden Ja Nein Teilweise

Was bedeutet dieser Smiley (Glücklich) / wie geht es dem diesen Smiley ☐ Keine Angaben
Was bedeutet den dieser Smiley (Traurig) / wie geht es diesem Smiley ☐ Keine Angaben
Und wie geht es diesem Smiley (Neutral) ☐ Keine Angaben
Kannst du mir den Smiley zeigen der a) glücklich ist b) traurig ist ☐ Keine Angaben
Wie fühlt sich das Kind (Traurig) ☐ Keine Angaben ☐ Nicht erhoben
Wie fühlt sich das Kind (Glücklich) ☐ Keine Angaben ☐ Nicht erhoben
Was magst du am meisten = Apfel, Birne, Banane Zeig mir anhand der Smiley wie du dich fühlst wenn ihr dir (Lieblingsfrucht) gebe ☐ Keine Angaben ☐ Nicht erhoben

Mit welchem Teddy möchtest du spielen??

Kannst du mir erzählen was du gesehen hast? Kannst du mir erzählen wie die Teddys gespielt haben?

Was denkst du, wie sich der Teddy fühlt, der mitspielen durfte/ nicht mitspielen durfte? Ratingskala zeigen: kannst du mir zeigen, wie sich der Teddy fühlt der mitspielen durfte/ nicht mitspielen dufte

...wie fühlst du dich? Ratingskala zeigen: Kannst du mir zeigen, wie du dich fühlst

Compassion: Machst du dir Sorge um den Teddybär. Tut dir der Teddy leid?

Appendix E

Information Sheet Kindergarten

Sehr geehrtes Kindergartenteam,

Im Zuge unsere Masterarbeit an der Fakultät für Psychologie der Universität Wien, führen wir eine Studie mit Kindern im Alter zwischen 18-42 Monaten durch. Da ein Einschlusskriterium in die Untersuchung der Kindergartenbesuch ist, erheben wir unsere Daten in diversen Kindergärten in Wien und Oberösterreich.

Abbildung des Puppentheaters

Unsere Forschungsfrage bezieht sich darauf, wie Kinder von 18 - 42 Monaten auf die **Beobachtung sozialer Interaktion** reagieren und inwieweit **emotionale Reaktion** bereits bei kleineren Kindern eine Rolle spielt. Dazu werden die Kinder ein Puppentheater beobachten und Fragen beantworten. Zusätzlich erheben wir Speichelproben um das Cortisolniveau festzustellen, welches ein Indikator für die emotionale Erregung ist. Für genauere Informationen über die Studie liegt das Informationsblatt für die Eltern bei.

Mit jedem Kind erheben wir an zwei Tagen (im Abstand von 7-14 Tagen) und möchten hiermit um die Möglichkeit der Datenerhebung in Ihrem Kindergarten bitten.

Ablauf der geplanten Studie:

1. Wir würden Sie bitten ein Inserat für unsere Studie an den Elterntafeln anzubringen
2. Die gruppenführenden Pädagogin bitten wir den Eltern der Kinder im jeweiligen Alter (18-42 Monaten) ein Informationsblatt mitgeben
3. Zu einem späteren Zeitpunkt bitten wir Sie einen demografischen Fragebogen und eine Einverständniserklärung in einem unverschlossen Kuvert mitzugeben
4. Die Eltern sollten dieses verschlossen wieder im Kindergarten abgeben
5. Gesammelt holen wir die Kuverts ab und werten diese aus
6. Es folgt die Terminvereinbarung mit Ihnen für die Erhebungstage. Jedes Kind wird von uns zweimal in die Untersuchung einbezogen, in Abstand von 7-14 Tagen. Die Erhebungen finden immer nur vormittags statt. Je nach Anzahl der Kinder werden sich mehrere Erhebungstage ergeben

Wichtige Informationen

- Für eine gute Kommunikation bitten wir um eine Ansprechperson im Kindergarten, der auch wir jederzeit bei Fragen zur Verfügung stehen
- Das Einverständnis der Eltern, für die Teilnahme ihres Kindes wird schriftlich erhoben. Zusätzlich erheben wir die Einverständnis für eine Videoaufzeichnung
- Sollte das Kind eine Teilnahme verwehren, wird die Studie abgebrochen
- Sollte ein Kind nicht mit uns mitkommen wollen, kann die Teilnahme, wenn möglich, auch in Begleitung einer Person des Kindergartens bzw. einem Elternteil stattfinden. Das würden wir im Einzelfall mit unserer Kontaktperson besprechen

BITTE WENDEN

- Wir planen, besonders für die jüngeren Kinder, eine kurze Kennenlernphase der Kinder beim freien Spiel im Gruppenraum ein. Dafür berücksichtigen wir die Empfehlung unserer Kontaktperson, ob diese an einem separaten Tag oder am Erhebungstag stattfindet
- Alle Materialien (Inserat, Informationsblatt für die Eltern, Fragebogen und Einverständniserklärung) werden von uns an Sie übergeben – es ergeben sich keine Kosten für Sie
- Wir bitten um das Aus- und Einsammeln eines Kuverts
- Für die Datenerhebung haben wir alle nötige Materialien mit, wir brauchen lediglich einen Kindersessel und einen separater Raum für eine ungestörte Datenerhebung
- Wir erheben immer nur vormittags
- Jedes Kind holen wir je für 20-30 Minuten aus der Gruppe und bringen es in die jeweilige Gruppe zurück
- Jedes Kind erhält nach der Teilnahme ein kleines Geschenk
- Der Name Ihres Kindergartens wird selbstverständlich nirgends aufscheinen. Ebenso werden auch die Daten der Kinder anonymisiert. Die gesamten Studiendaten werden sicher an der Universität Wien im Büro von Frau Silani, PhD verwahrt.

Unsere Forschung liefert einen wichtigen Beitrag zur Forschung und wir würden uns daher sehr über Ihre Unterstützung freuen!

Mit freundlichen Grüßen , Psychologiestudentinnen

Stürmer Carolina a01168231@unet.univie.ac.at
Zupanc Julija a01630614@unet.univie.ac.at

Appendix F

Insertion

Teilnehmer/Innen gesucht

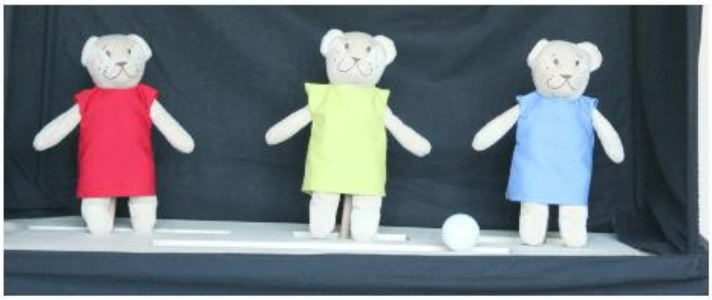

Abbildung des Puppentheaters

Im Rahmen unserer **Masterarbeit** an der Fakultät für Psychologie der Universität Wien, führen wir in diversen Kindergärten eine Studie zu sozialen Beziehungen durch.

Unsere Forschungsfrage bezieht sich darauf, wie sehr junge Kinder auf die **Beobachtung sozialer Interaktion** reagieren und inwieweit emotionale Reaktion bereits eine Rolle spielt.

Dazu werden Kinder im Alter von **18-42 Monaten** mit guten Deutschkenntnissen gesucht.

Für die Durchführung werden die Kinder an zwei Tagen ein Puppentheater beobachten und anschließend offene Fragen beantworten. Die Durchführung dauert je nach Alter des Kindes 20-30 Minuten.

In den nächsten Tagen werden wir oder Ihre gruppenführende Kindergartenpädagogin an Sie herantreten, um bei bestehendem Interesse, weitere Information zu geben. Außerdem können Sie uns jederzeit kontaktieren.

Wir würden uns sehr über Ihre Unterstützung freuen!

Psychologiestudentinnen,

Carolina Stürmer a01168231@unet.univie.ac.at
Julija Zupanc a01630614@unet.univie.ac.at

Appendix G

Information Sheet Parents

Psychologische Studie - Erforschung emotionaler Reaktion bei Kindern

Im Rahmen unserer Masterarbeit an der Fakultät für Psychologie der Universität Wien, führen wir in diversen Kindergärten eine Studie zu sozialen Beziehungen durch.
Unsere Forschungsfrage bezieht sich darauf, wie Kinder zwischen 18 - 42 Monaten auf die **Beobachtung von sozialer Interaktion** reagieren und inwieweit **emotionale Reaktion** bereits bei kleineren Kindern eine Rolle spielt.

Dazu kommen wir zwei Mal zu Ihrem Kind ihn den Kindergarten und arbeiten mit ihrem Kind beide Male im Einzelsetting. Nach einer kurzen Kennenlern- und Spielphase, bitten wir ihr Kind sich auf einen Stuhl vor einem Puppentheater zu setzen und mehrfach ein kurzes **Theaterstück** zu beobachten. Anschließend stellen wir ihrem Kind Fragen bezüglich des Theaterstücks. Dauer der Erhebungsphase wird an beiden Erhebungstagen, abhängig vom Alter Ihres Kindes, je zwischen 20-30 Minuten dauern.

Abbildung des Puppentheaters

An beiden Erhebungszeitpunkten entnehmen wir ihrem Kind **Speichelproben** mit Hilfe einer Salviette. Es handelt sich hierbei um eine Saugrolle die ihr Kind in den Mund nimmt. Dies dient zur Erhebung des Cortisol, welches ein Indikator für emotionale Reaktion ist. Diese Erhebungsmethode ist **nicht invasiv** und hat **keine Auswirkung** auf ihr Kind. Ihr Kind erhält nach jeder Teilnahme ein kleines Geschenk.

Vorab bitten wir Sie, einen Fragebogen auszufüllen den Sie im Kindergarten abgeben bzw. uns per Email schicken können. Ihre Anwesenheit ist während der Studie nicht nötig. Da wir aber auch mit sehr jungen Kindern arbeiten, kann die Kindergartenpädagogin oder im Einzelfall ein/e Erziehungsberechtigte/r teilnehmen. Sollten wir Ihre Anwesenheit benötigen, würden wir Kontakt zu Ihnen aufnehmen.

Alle Daten und Angaben sind anonym und werden streng vertraulich behandelt, sowie selbstverständlich nicht an Dritte weitergegeben. Sie dienen lediglich dazu, unsere Forschungsfragestellung zu beantworten und werden an der Fakultät für Psychologie im Büro von Frau Silani, PhD sicher verwahrt.
Die Studie wird gefilmt, das Material dient wiederum ausschließlich für die Datenerhebungen unserer Masterarbeit und wird für keine weiteren Studien verwendet.

Sollte ihr Kind vor oder während der Erhebungszeit eine Teilnahme trotz Ihrem Einverständnis verwehren, wird die Untersuchung selbstverständlich sofort abgebrochen und ihr Kind zurück in die Gruppe begleitet.

Falls Sie einverstanden sind, ihr Kind teilnehmen zu lassen, leisten Sie und ihr Kind damit einen wesentlichen Beitrag zu unserer wissenschaftlichen Forschung.
Herzlichen Dank für Ihre Unterstützung!

Psychologiestudentinnen der Universität Wien
Stürmer Carolina a01168231@unet.univie.ac.at
Zupanc Julija a01630614@unet.univie.ac.at

Abbildung des Puppentheaters

Ich bin hiermit einverstanden, dass mein Kind _____ geboren am _____ an der **Studie** teilnehmen darf und die Ergebnisse in anonymisierter Form verwendet werden dürfen und, dass meinem Kind Speichelproben angenommen werden dürfen.

Ort, Datum _____ Unterschrift _____

Ich bin hiermit einverstanden, dass mein Kind _____ geboren am _____während der **Studie gefilmt** wird.

Ort, Datum _____ Unterschrift _____

Appendix H

Photo of Puppet Theater

Appendix I

Conversation between the Teddies

Co-player (“Mitspieler”) on the right side, the decider (“Entscheider”) in the middle and the affected teddy (“Betroffene”) on the left side of the stage.

Condition – social exclusion

[0:08] [Decider and co-player enter the stage]

Decider: [0:15] Möchtest du mit mir Ball spielen?

Co-player: [0:16] Ja gerne

[0:17-0:27][Decider and co-player play ball together]
[0:24] [Affected enters the stage]

Affected: [0:27] Darf ich mitspielen?

Decider: [0:28] Nein

Affected: [0:30] Ich möchte aber mitspielen

Decider: [0:31] Nein, geh weg!

[0:32] [Affected leaves the stage]
[0:32-0:42][Decider and co-player continue playing ball]
[0:43] [Decider and co-player leave the stage

Condition- Social inclusion

[0:08] [Decider and co-player enter the stage]

Decider: [0:15] Möchtest du mit mir Ball spielen?

Co-player: [0:17] Ja gerne

[0:17-0:27] [Decider and co-player play ball together]
[0:24] [Affected enters the stage]

Affected: [0:28] Darf ich mitspielen?

Decider: [0:29] Ja gerne, wir spielen Ball

[0:31-0:42][Affected plays ball with decider and co-player]
[0:43] [Decider, co-player and affected leave the stage]