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“Dogs as Assistants in
Dyadic Pedagogue-child Interactions in
Residential Youth Welfare Services”

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1. Zusammenfassung

Das Ziel dieser Studie war herauszufinden, ob und wie sich Verhalten und Stressmanagement von Kindern(n=9) mit unsicherem bzw. desorganisiertem Bindungsmuster in Spielinteraktion mit einem Sozialpädagogen(n=7) durch die Anwesenheit und eventuelle Interaktion mit einem freundlichen Hund verändern. Bisherige Studien zeigen, dass Bindungsrepräsentationen kaum auf Tiere übertragen werden und dass diese in Interaktionen mit Therapeuten beruhigend und vertrauensbildend wirken. Zur Überprüfung dieser Hypothesen, wurden neun Kinder-Betreuer/innen Teams aus betreuten Wohngruppen während jeweils vier Spielsitzungen gefilmt und vorher und nachher von den Kindern und Sozialpädagogen Speichelproben zur Bestimmung des Stresshormons Kortisol entnommen. In zwei der vier Sitzungen war jeweils ein freundlicher Hund (n=2) anwesend.

In Anwesenheit des Hundes nahm Kortisol im Speichel aller beteiligter Betreuer/innen ab, was tendenziell auch bei den Kindern während des Spiels unabhängig der Anwesenheit eines Hundes der Fall war.

Im Zuge tiergestützter Interventionen wurden die Interaktionen entspannter und intensiver. Der Spielverlauf wurde seitens der Kinder weniger oft abrupt verändert und häufiger wurden Situationen verbal oder durch Handlungen erwidert. Des Weiteren wurde in der Anwesenheit eines Hundes mehr gelacht.

Bei allen Kindern und deren pädagogischen Betreuer/innen wurde während der tiergestützten Interventionen eine geringere Konfliktausspannung, sowie ein höheres Maß an Aufmerksamkeit für die soziale Umgebung beobachtet und bestätigten sich durch eine geringere Anzahl von Ticks. Die Spielsituation wurde in Anwesenheit des Hundes bei der Verhaltensanalyse positiver bewertet und die Kinder zeigten mehr Bindungssicherheit als ohne Hund. Diese Ergebnisse fördern gemeinsam mit anderen gut strukturierten Studien tiergestützte Interventionen im pädagogischen und therapeutischen Bereich.

Schlagwörter: Mensch-Tier Beziehung, bindungsgeleitetes Spiel, Stressmanagement, Bindung, Kortisol, tiergestützte Intervention, Hund

2. Abstract

The aim of this diploma thesis was to investigate whether and how insecurely attached children (n=9) show lower stress levels and more prosocial actions while engaging in a dyadic play intervention with their educator (n=7) in a residential youth welfare service program in the presence of a friendly dog (n=2).

This study is based on previously documented data, providing positive effects of animal-assisted interventions and human-animal interaction on children, such as stress reduction and improvement of mood and social interaction. Insecure attachment representations are associated with suboptimal stress regulation and less positive social behavior. It is assumed that these attachment patterns are transferred to other human relationships but not to animals as companions.

Nine groups each consisting of one child and one pedagogue in residential youth welfare service programmes were included in our interventions. Every team was recorded during a dyadic play intervention alternately twice in the presence of a friendly dog and twice in its absence.

All sessions were video-recorded in order to analyse the behavior of the children and their educators. To investigate cortisol levels, saliva samples were taken before and after each session of both the children and the pedagogues.

Analyses of saliva samples revealed a significant decrease in cortisol levels of all educators during sessions where a dog was present. In the case of the children's cortisol levels showed a decrease during all four sessions.

Behavior analysis showed a greater degree of intensity and calmness in dyadic child-pedagogue interaction. Significantly less evasions of the game situation were observed and children were more responsive and aware of their social surroundings when a dog was present. In addition, children laughed/smiled significantly more. Less dyadic tensions as well as inattention and less obsessive-compulsive behavior was observed while a dog was present.

The number of times children gave treats to a dog showed a strong correlation

to physical contact, talking to the dog and spatial orientation to the dog. Hence, positive correlations of handing out treats may play a significant role in animal-assisted interventions, in particular with dogs. These findings and other well-designed studies promote animal-assisted interventions as methods for pedagogy and therapy.

Keywords: animal-assisted intervention, insecure attachment, dyadic play intervention, youth welfare service, dog

3. Introduction

Historically, humans kept animals as livestock and companions (Wilson, 1984; Serpell, 1996). The human-wolf/dog relationship developed through the domestication of wolves about 35 000 years ago (Thalmann et al., 2013; Skoglund et al., 2015), which enabled a close accordance in stress models and social dispositions (Schleidt and Shalter, 2003) and supported the development of such a mutually stable and social relationship, in particular with dogs (Oeser, 2001). Humans' profound biophilia outclasses interest in nature, and manifested itself in socialization of wild animals and even then human-animal-relationships developed (Eriksson, 2000). The possible transfer of mood and basic homologous social models of vertebrates has been essential to human-animal interaction (Julius et al., 2013).

Boris Levinson, a child psychotherapist and pioneer of animal-assisted therapy, first observed and advocated the supporting effects of his domesticated dog in psychotherapy with children by chance. In accordance with that findings, companion animals provide a higher emotional security/affection and assist ego and overall health development, particularly for young emotionally disturbed, uncommunicative or withdrawn patients (Levinson, 1969). Further investigations verified that companion animals support social interaction and relationships among humans, functioning as a 'social catalyst' (McNicholas et al., 1993). Furthermore, research showed that people who grew up with companion animals show more empathy towards other people (Endenburg and Baarda, 1995) as well as possibly providing benefits in social development (Melson and Fine, 2006).

During the last decades the importance of attachment to others for overall health has become apparent. Accordingly, attachment in early childhood experience serves as a foundation for the regulation of emotions, emotional intelligence, empathy and social competence (Vaughn et al., 2001).

Aroused by mother-infant interaction and their experience of proximity and separation, infants develop "inner working models", which refer back to this behavior enabling foreseeability of the mother's and infant's behavior (Main et

al., 1985).

In order to secure protection for the child as well as reducing and buffering stress, a “behavioral system” is established during the first year after birth between children and their primary caregivers (Bowlby, 1969/1982).

According to variable mother-child bonds and environmental conditions, Mary Ainsworth and John Bowlby named different attachment strategies: “secure”, “insecure-avoidant”, “insecure-ambivalent” (Ainsworth & Bowlby, 1991) and “disorganized” (Main and Solomon, 1986) attachment style. Furthermore, it was found that general attachment representation among humans are not linked to an owner's bond with their companion animals (Kurdek, 2008), which may therefore enable new opportunities in pedagogic and therapeutic practice.

3.1. Stress Reactivity and the Role of Cortisol

A number of studies indicate that animal-assisted interventions have reassuring effects on the hormonal stress systems of humans, particularly on the modification of cortisol, epinephrine and norepinephrine, thus warranting further investigations. Studies proved that in the absence of a specific stressor, human-animal interaction leads to a lower heart rate (Kaminski et al., 2002; Cole et al., 2007; Handlin et al., 2011) and blood pressure (Nepps et al., 2014) but not in the controls without an animal's presence. In addition, Odebrecht et al. (2010) as well as Tarullo and Gunnar (2006) reviewed 40 studies of later consequences of sexual or physical abuse in early childhood in regard to the activation of immunological and neuroendocrine response, as well as Meewisse et al. (2007) who presented a meta-analysis of five studies regarding the same issue: a modification in stress regulation, hyper- or hyporelease of cortisol, in adults with early sexual or physical abuse has become apparent in both reviews.

Beyond mother-child bonds and attachment in adult relationships, it revealed, that domestic animals portray a consistent source of higher attachment security compared to their romantic partners (Beck and Madresh, 2008).

Personal matters are often communicated to companion animals rather than to other humans. Especially dogs may function as attachment figures for their owners and children in short-term situations irrespective for their human attachment (Kurdek, 2008). Serum cortisol levels of dog owners reduced more significantly while stroking their own or any dog than while reading a book (Odendaal, 2000; Odendaal and Meintjes, 2003). The cortisol levels of children with an insecure attachment bond to their parents, compared to those with a secure attachment bond, tended to be higher after exposure to an unfamiliar stimulus (Gunnar, 1998). Hence, particularly while undertaking stressful tasks, children with insecure attachment patterns may profit more from a dog's presence than from friendly humans as social support. A more effective buffer for children's salivary cortisol reaction with insecure attachment in school has been determined in a situation with a real dog present compared to a friendly human, especially during physical contact with the dog (Beetz et al., 2011). Significant stress reduction measured by serum and salivary cortisol after five minutes of interaction with a therapy dog in healthcare professionals was detected (Barker et al., 2005).

3.2. Social Effects

Close social relationships among humans enable positive affective states and are protective (Steptoe et al., 2005). The neuropeptide, oxytocin, is involved in widespread varieties of social behavior. Investigations of mammals, including humans, showed mutual effects of oxytocin, which stimulates prosocial behavior, reduces stress, increases pain-tolerance threshold and induces feelings of inner calm. Beyond that, studies proved a release of oxytocin in human-animal interactions inducing lower cortisol levels and blood pressure (Julius et al., 2013).

In different studies the relationship between health and owning a companion animal may be described by indirect effects (Serpell, 1991; Anderson et al., 1992; Dembicki and Anderson, 1996; Bauman, 2001), while direct effects of

human-animal-interaction were investigated in mostly short-term situations. Odendaal and Meintjes (2003) confirming a significant increase of serum oxytocin, prolactin, dopamine and beta-endorphin after a five to 24 minute period of stroking in both humans and dogs, while cortisol levels in humans decreased. A higher increase of oxytocin in owner-dog relationships points to a mutual dependence of the quality of relationships and the release of oxytocin. Moreover, a study described that an increase of oxytocin in urine of dog owners correlated positively with reciprocal gaze between owners and their dogs during social interaction which points to an interspecies attachment bond and mutual behavioral modulation (Nagasawa et al., 2009).

Effects on self-esteem and socialisation of primary school children were investigated, revealing that children who were looking after a domestic animal in their school classes improved their self-confidence significantly compared to a test group of the same age. Particularly those individuals with a low self-concept, before interacting with an animal, showed a higher significance (Bergesen, 1989). The mere observation and presence of an animal (DeSchraver and Riddick, 1990; Steptoe et al., 2005) could change physiological and psychological expression of anxiety and stress: a decrease in blood pressure and lower heart rates were noticed during interactions with a friendly dog or the mere presence of a dog (Allen, 1991, 2001, 2002; Friedmann et al., 1993, 2007).

In times of anxiety, stress, pain or grief adults as well as children prefer proximity to their domestic animals rather than the presence of family members or friends (Kurdek, 2009).

3.3. Aims

Based on the general conditionality of social behavior and stress regulation a connection between hormones and human-animal-interaction, as well as a connection between insecure/disorganised attachment styles of children in residential youth welfare services and social behavior can be expected and warrants further investigations. Although little is known about potential links between hormonal balances, behavior, human-animal-interventions and attachment, this study aims to demonstrate whether or not dogs have a positive influence on stress modulation and behavior, primarily on the children involved.

On the basis of the collected data it is possible to evaluate differences in communication and interaction patterns in situations with versus without a friendly dog's presence. Moreover we seek to reason the underlying mechanisms of how a dog affects these patterns through video tape and salivary cortisol level analysis.

Expectations were focussed on improving cooperation and attachment security during dyadic pedagogue-child play interactions, as well as a calmer state. In addition, a decrease of cortisol in saliva, especially while stroking a dog, less obsessive-compulsive behavior and less aggressive expressions were expected.

4. Methods

4.1. Subjects

All participants were housed at the Austrian social institution "Lebensraum Heidlmaier GmbH". Nine human teams, each one consisting of a pedagogue, child and dog were asked to take part on a voluntary basis with their legal guardians' approvals.

Two male and six female pedagogues, five boys and four girls between the ages of 5-12, mean age of 9.3 periodically, as well as two female dog owners of one male and one female dog participated.

Residential child and youth welfare services are situated in three different Austrian counties: Upper Austria, Lower Austria and Burgenland. The educational aims in intern local groups are among other things to stabilise their psychological state and lead them to self-reliability. The goal is to shift emphasis on their past families, consequently supporting a repeatedly peaceful unification with their relatives.

Video recordings took place with six children in Upper Austria and three in Lower Austria. Usually, two children or rather adolescents had one respective pedagogue as a contact partner. The videos were recorded with their respective caregivers. Two different pedagogues participated in three settings in Lower Austria, while five did as well in six settings in Upper Austria. The male dog plus its owner participated in eight of nine play teams, while the female dog took part in just one of nine play constellations.

The non-castrated male dog is a border collie mongrel and is living with a 28-year-old female owner. The animal is three years old and has successfully completed courses in agility, man-trailing as well as hunting-control.

The female dog is a four year old Rhodesian Ridgeback almost a fully qualified, spayed therapy dog which has successfully passed parts of the courses, but has not undergone its certification.

4.2. Procedure

After obtaining informed consent and collecting all questionnaires, play sessions were video-recorded separately in standardized situations. This monitoring was arranged twice in the presence of a dog and twice without a dog. Between two observations at least two days were planned in and one week between the same setup.

In order to find out how a dog's presence influences behavior and communication, video recordings were done to collect behavioral data on an individual basis. The footage was evaluated according to behavioral categories such as socio-positive and socio-negative interactions between children and pedagogues.

Yet another variable to measure the dog's effect on the situation, is the cortisol level measured in saliva samples. The hormone was analysed in the child as well as in the corresponding educator before and after every intervention.

Additional data related to the different relationships between the children and their educators, as well as general information about the children's and dog's history were collected via questionnaires. In order to avoid bias, all subjects were not informed about the exact question of interest.

Play sessions were "attachment-based interventions" in rooms of the respective children's home. A situation was created by the educator to attain accommodative sequences during the game. The intervention's development depended on the process of the game and was not predetermined. In order to keep measurements comparable, interventions with and without a dog present, should at least start in a similar way and involve the same toys. In doing so, the first of these related situations occurred with and without a dog alternately and in reverse to balance the effect of the first time being filmed.

If the child was not acquainted with the dog yet, a period of habituation would occur before they entered the room. A camera was set up in the prepared room. When the child and its educator entered, saliva samples were taken from the human participants before recording started. In sessions with a dog present, its owner was inside the room and adjusted the camera. The owner

was neither involved in the game, nor in the interaction between children and educators. Typical play sessions lasted 20 minutes (plus/minus two minutes) so that the second saliva samples could be taken exactly 25 minutes after the first ones.

Additionally, 10 treats were handed out to the children beforehand, which could be used before, while or after playing and shared with the play partner. The dog was not bound or on a leash in a particular place, but rather allowed to move freely and be involved in the play situation around the closed room. The dog's owner was present during the whole session.

In the control sessions without a dog, one additional person was present who adjusted the camera and was not involved in order to create comparable situations.

Succession of Task	Duration
drinking grape juice	1 min
Salivette 1	1 min
dyadic pedagogue-child play interaction (video-recorded)	20 min
drinking grape juice	1 min
Salivette 2	1 min

A salivette is used for saliva sampling.

TABLE 1. Procedure during a session for children and pedagogues

4.3. Video Recording

In order to analyse the subjects' behavior, each child-pedagogue team was recorded four times for 20 minutes. Videos were recorded between March and July in 2014. At the first meeting overall conditions were set up in order to create a situation that was as standardised as possible. The session started by situating of the video camera on a tripod at a selected point in the room to offer a clear view of the playing team.

While these precautionary measures were taken, the pedagogue started to prepare toys and the playing area together with the child.

Two videos were taken in the presence of a dog and without.

A stopwatch, sufficient memory space and accumulator capacity were prepared in advance.

4.4. Saliva Samples

During each of the four sessions two saliva samples were taken in 25 minute intervals from the child and the pedagogue to analyse their cortisol concentration level in their saliva. The samples were collected at similar time-points of the day to ensure that the initial hormonal balance and the condition on these particular days of all participants involved were similar.

Preparations included providing a cooler and writing a label with the subject's name as well as the date and place of the session. A stopwatch timed the start of the session by drinking grape juice (Traubensaft, Rauch). Afterwards a roll of synthetic fibre (Salivette, Sarstedt) made out of polypropylene and low density polyethylene was placed in the mouth for another 60 seconds.

The second sampling started after recording 23 minutes recording the dyadic pedagogue-child play intervention by drinking the grape juice, one minute rest and finally chewing the unused second gauze. The saliva samples were put into the cooler immediately and frozen in a freezer chest as soon as possible, where all samples were collected and kept until analysis.

According to the 10-30 minute peak in human's cortisol distribution in saliva, the setting was adapted correspondingly in the run-up (Kalman and Grahn, 2004).

4.5. Video Analysis

Behavior coding was conducted by two different observers, Katharina Hutter and Katrin Martens, using 'SOLOMON CODER Version beta 14.10.04 software' which developed by András Péter. The interreliability was tested at the beginning, midpoint and end with an accordance of altogether 87%.

After selecting the behavior of interest, the coding sheet was set up by assigning them to categories consisting of subordinated dedicated behavioral elements which could not co-occur within a paramount category. Coding behavior included pressing the button corresponding to the behavior on the video player. The data was collected in a table where all categories appear in columns, and points in time in rows. The buttons were at variance with each other because some were for coding frequencies, while others coded durations/percentages, which were also stated in output settings.

All saved configuration files were exported and arranged subsequently to the spreadsheet program of the 'Apache OpenOffice 4.1.1 software'.

Every video tape was coded under three different aspects: the child's behavior, the pedagogue's behavior and the attachment-based intervention. The same coding sheet was used for both subjects. A separate category ('Dog interaction') was only used for sessions when a dog was present, which depicts the dog's influence on the situation.

Due to personal reasons the fourth session could not be carried out with one of nine teams, leaving a gap in the data.

Behavioral category	Definition	Sampling method
<i>Dog interaction</i>	Body contact: The child or pedagogue comes into physical contact with the dog during a video session	Duration
	Talking to the dog: The child or pedagogue is talking to the dog, giving him tasks or calling its name in order to encourage it to come by	Duration
	Treat*: The dog gets fed with treats from 0 to 10 times	Point sampling
	Eye on the dog: One of the players is looking at the dog	Duration
<i>Attention</i>	Turn in play*: One of the players changes the play setting e.g. by coming up with new figures, changing the topic, etc.	Point sampling
<i>Exit of the game situation</i>	Exit of the game situation*: One of the players leaves their assigned role / made-up identity, mostly just for a few seconds. It often occurs through a verbal expression (then the button 'talking' is coded as well), but it is also coded for spatial exits of the game situation, e.g. leaving the room	Point sampling
	Non-responding during the game*: One of the players is acting in an apathetic, non-responsive way to a previous interaction, statement, decision, etc. of their play partner	Point sampling
<i>Obsessive-compulsive behavior</i>	Obsessive-compulsive behavior *: Obsessive-compulsive behavior include the child's or pedagogue's specific behavioral actions that are occurring out of insecurity, boredom, habit, stress, etc. The following behavior patterns could be interpreted as an unintentional, unconscious act under pressure. e.g. fixing glasses, scratching, clearing their throat, specific gestures and facial expression, fixing parts of the clothes, pressing lips together, touching face/legs/arms/knees/selective parts of the body, moving corner of the mouth, rubbing hands, blinking, propping head against hands, clicking their tongue, etc.	Point sampling
<i>Locomotion</i>	One of the players is moving around the room where the videos are recorded	
	Oriented towards the dog: One of the players moves towards the dog or at least in the dog's direction	Duration
	Sit: One of the players is just sitting or standing still. Also when holding toys	Duration
	Oriented towards play partner: One of the players moves towards his/her play partner	Duration

	Turned away from the play partner: One of the players moves away from the play partner	Duration
	Turned towards the toys: One of the players is moving towards the toy box, usually to get more/other toys or is playing while they are moving/standing/sitting/kneeing/etc.	Duration
	Sitting restlessly: One of the players is sitting/standing/kneeing very troubled/anxiously/uneasily/etc. in their space. It starts coding if two obsessive-compulsive behaviors are occurring in a row. One of the players might also be 'Sitting restlessly' while playing with toys. Besides 'Sitting restlessly' and 'Obsessive-compulsive behavior' may happen simultaneously, e.g. moving legs while sitting and scratching nose at the same time	Duration
<i>Interaction</i>	One of the players is interacting physically with their play partner or indirectly through items. This is only coded for the person who is interacting with the other one or when responding	Duration
<i>Vibe</i>	Laughing: One of the players is laughing or smiling	Duration
	Aggressive: One of the players is behaving aggressively during the session. This could happen through screaming, crying, scolding somebody, insulting, etc.	Duration
	Talking: One of the players is talking or just making incoherent sounds and noises within or beyond the play session. This button codes without a modifier	Duration
<i>Bonding-led intervention</i>	The bonding-led interventions are all rated for 30 seconds on three patterns in order to get an overview of the cooperation styles in the sequences.	
	Applicable*: the child accepts care and cedes control to the pedagogue, e.g. through accepting food, getting a ride, etc.	Point sampling
	Neutral*: The bonding-led interaction is situated between 'Applicable' and 'Not applicable'	Point sampling
	Not applicable*: The child is controlling the situation, no welfare is accepted on the part of the child and/or there is no cooperation between the play-partners	Point sampling

*Instant events

TABLE 2. Behavioral definitions of the coding sheet

4.6. Cortisol Analysis

Saliva analysis was performed using an enzyme-immunoassay (EIA) following the instructions of Palme and Möstl (1997) at the Department of Behavioural Biology of the University of Vienna. This method is routinely used for cortisol level analysis in human saliva. After analyses, absolute cortisol levels (ng/ml) as well as the differences between the first and second measurements were calculated from all participants involved. In case, subtraction of the first from the second measured value revealed a positive result, an increase of cortisol in the saliva samples was observed. Consequently a negative value was interpreted as a cortisol reduction.

4.7. Statistical Analysis

Data analysis was carried out with 'IBM SPSS 22 Statistics' comparing the same subjects in a dog's presence versus in its absence. Since data were not normally distributed (Shapiro-Wilk), adequate non-parametric tests were applied: Wilcoxon, Friedman, Mann-Whitney-U and Spearman-Rho. All significances ($p < 0.05$) are given two-tailed. Graphical illustrations were created with above-mentioned SPSS Software.

Analysis of behavior comprises significant differences in behavioral patterns with a dog's presence. Additionally, there is a difference in means of animal-assisted play interventions and sessions without a dog regarding the children's and their respective educator's behavior. Furthermore, intra- and inter-personal divergence was investigated. Since multiple comparisons of variables were made, Bonferroni correction was used to avoid family-wise error rate in multiple hypothesis testing.

Possible correlations between behavior and cortisol difference were investigated with the Spearman-rho correlation test and all four sampling dates were analysed considering the time factor with a non-parametric test in SPSS (Friedman).

5. Results

5.1. Cortisol Levels

While mean cortisol levels in children did not change when a dog was present, a significant decrease in pedagogues after an intervention with a dog was observed (Wilcoxon: $Z=-2.547$, $p=0.011$).

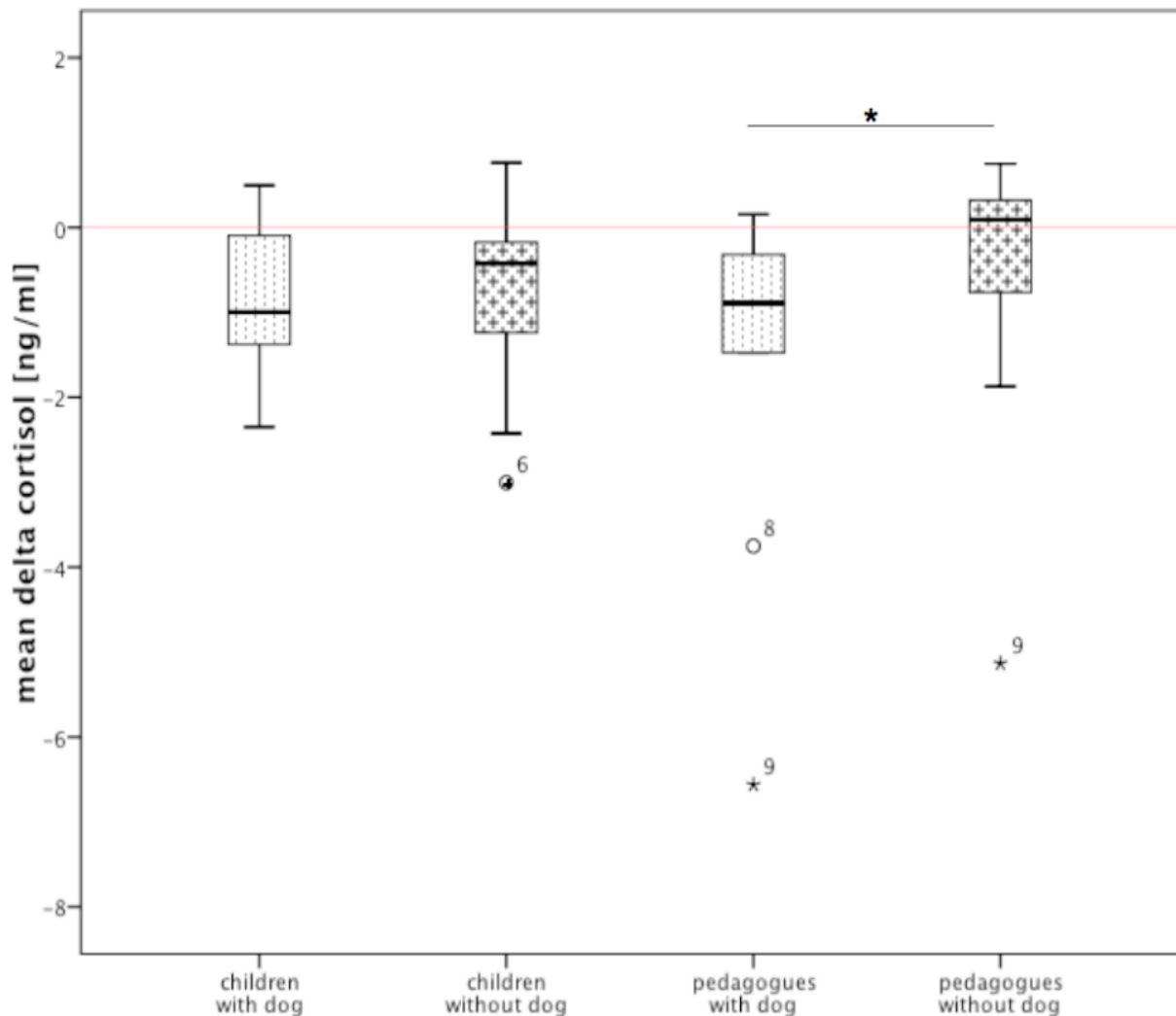


Fig. 1. Mean delta cortisol levels (second minus first sample) of all subjects involved: pedagogues show significantly higher cortisol levels in the absence of a dog: Wilcoxon: $Z=-2.547$, $p=0.011^*$.

On closer inspection, pedagogue's saliva analysis revealed a significant decrease in cortisol at the first (Wilcoxon: $Z=-2.073$, $p=0.038$) and third recorded session (Wilcoxon: $Z=-2.521$, $p=0.012$) with a dog present.

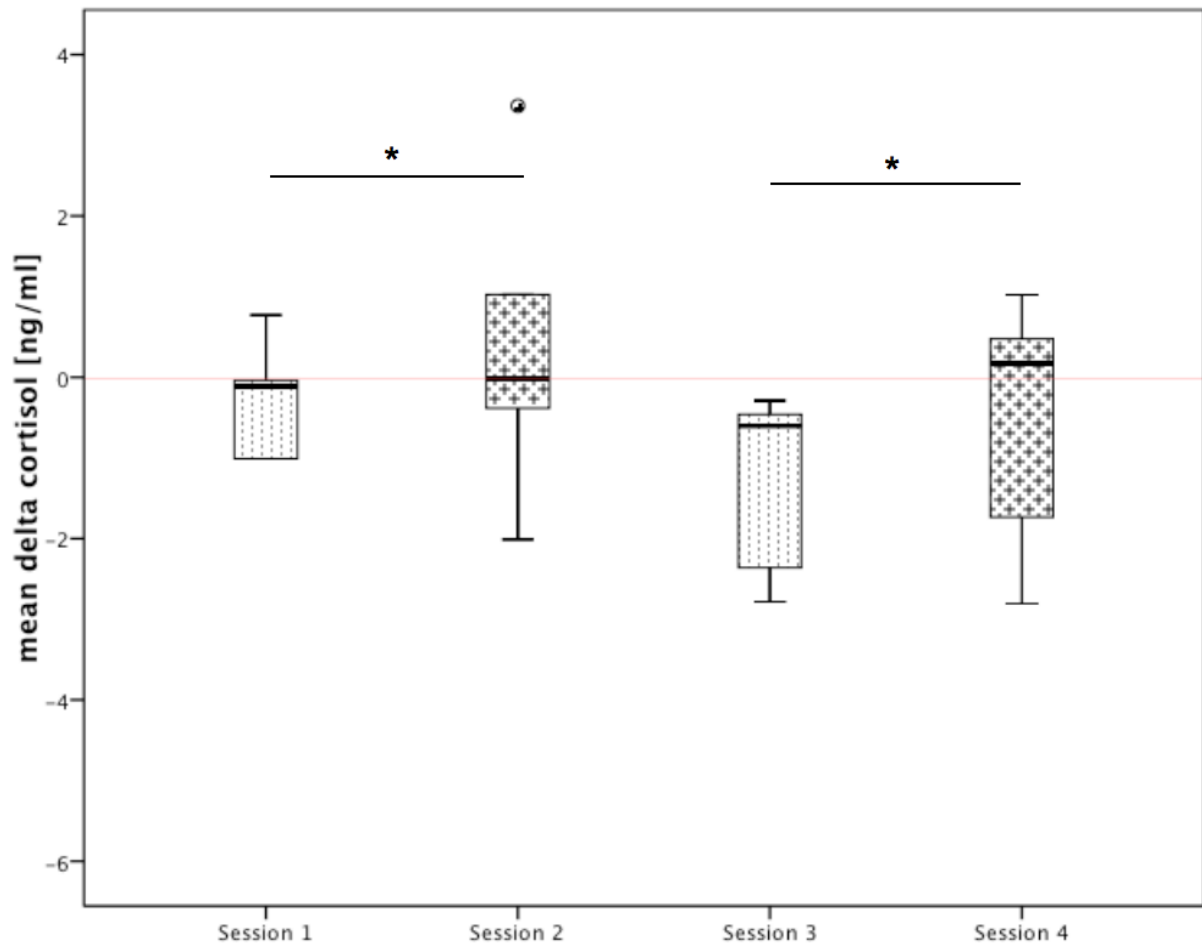


Fig. 2. Mean delta cortisol (second minus first sample) at four recorded sessions of all pedagogues involved: session 1: Wilcoxon: $Z=-2.073$, $p=0.038^*$) & session 3: Wilcoxon: $Z=-2.521$, $p=0.012^*$ with a dog, session 2 & 4 without a dog

Regarding children's saliva samples before and after interventions with a dog, a significant decrease of cortisol levels was only observed during the first session (Wilcoxon: $Z=-2.028$, $p=0.043$).

The following sessions revealed a similar trend, showing a reduction of cortisol when a dog was present, however no significance was reached (Wilcoxon: $Z=-1.481$, $p=0.139$).

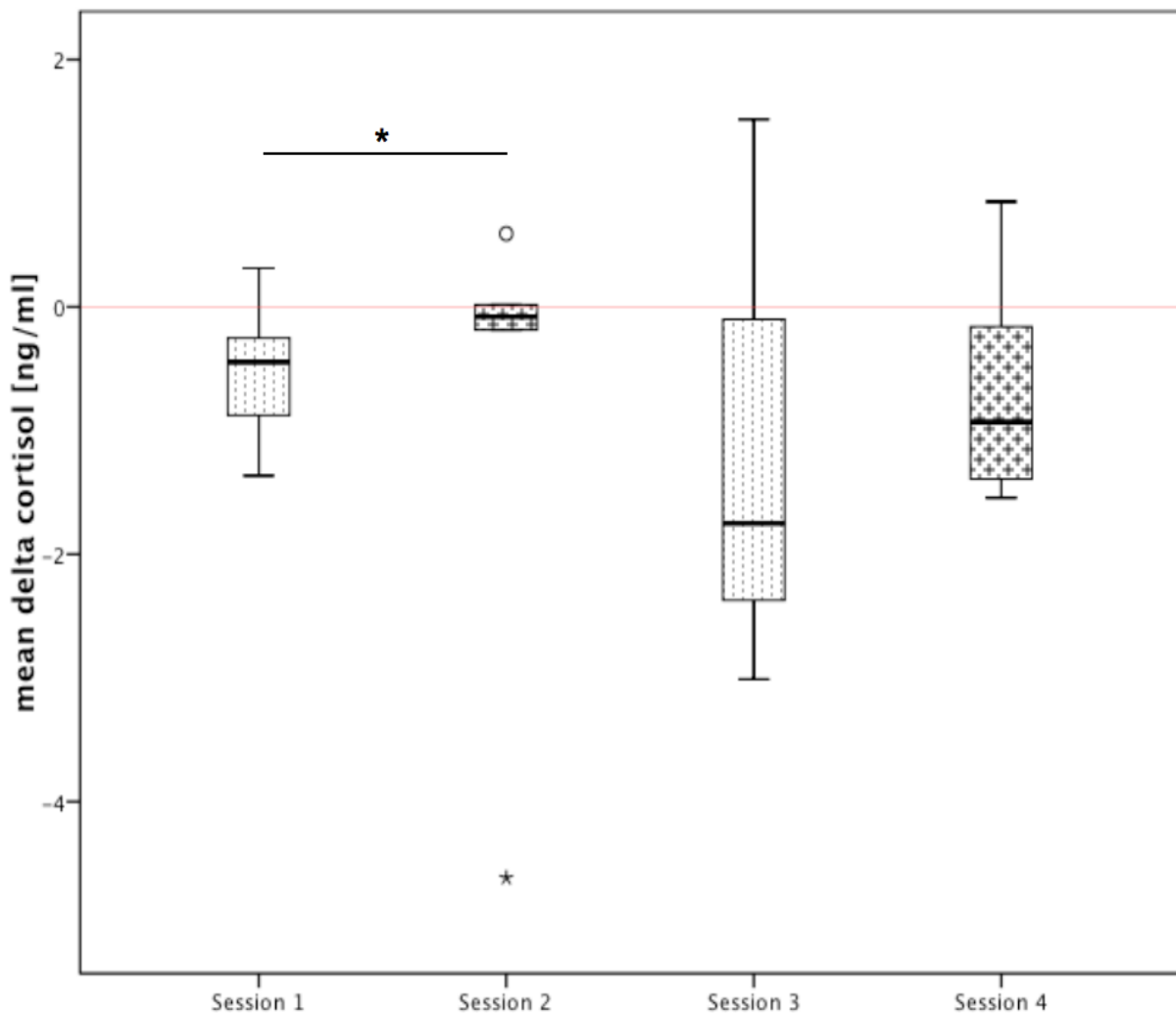


Fig. 3. Mean delta of cortisol (second minus first sample) of all children involved at four recorded sessions: session 1: Wilcoxon: $Z=-2.028$, $p=0.043^*$ & session 3 by trend: Wilcoxon: $Z=-1.481$, $p=0.139$ with a dog, session 2 & 4 without a dog

Examination of all 'Salivette 2' samples revealed significantly higher results among pedagogues in comparison to those of children during the second (Wilcoxon: $Z=-2.366$, $p=0.025$) and fourth (Wilcoxon: $Z=-2.240$, $p=0.018$) session both in the absence of a dog.

5.2. Behavior

Data analysis revealed behavior modifications within individuals and between children and pedagogues:

The comparison of how often children and pedagogues fed the dog with 'treats' revealed a significant difference between those two groups. The children handed out more 'Treats' than the pedagogues involved (Wilcoxon: $Z=-2.524$, $p=0.012$). Furthermore, children reacted less often in an apathetic, passive way than they did in sessions in which there was no dog present (Wilcoxon: $Z=-2.492$, $p=0.013$).

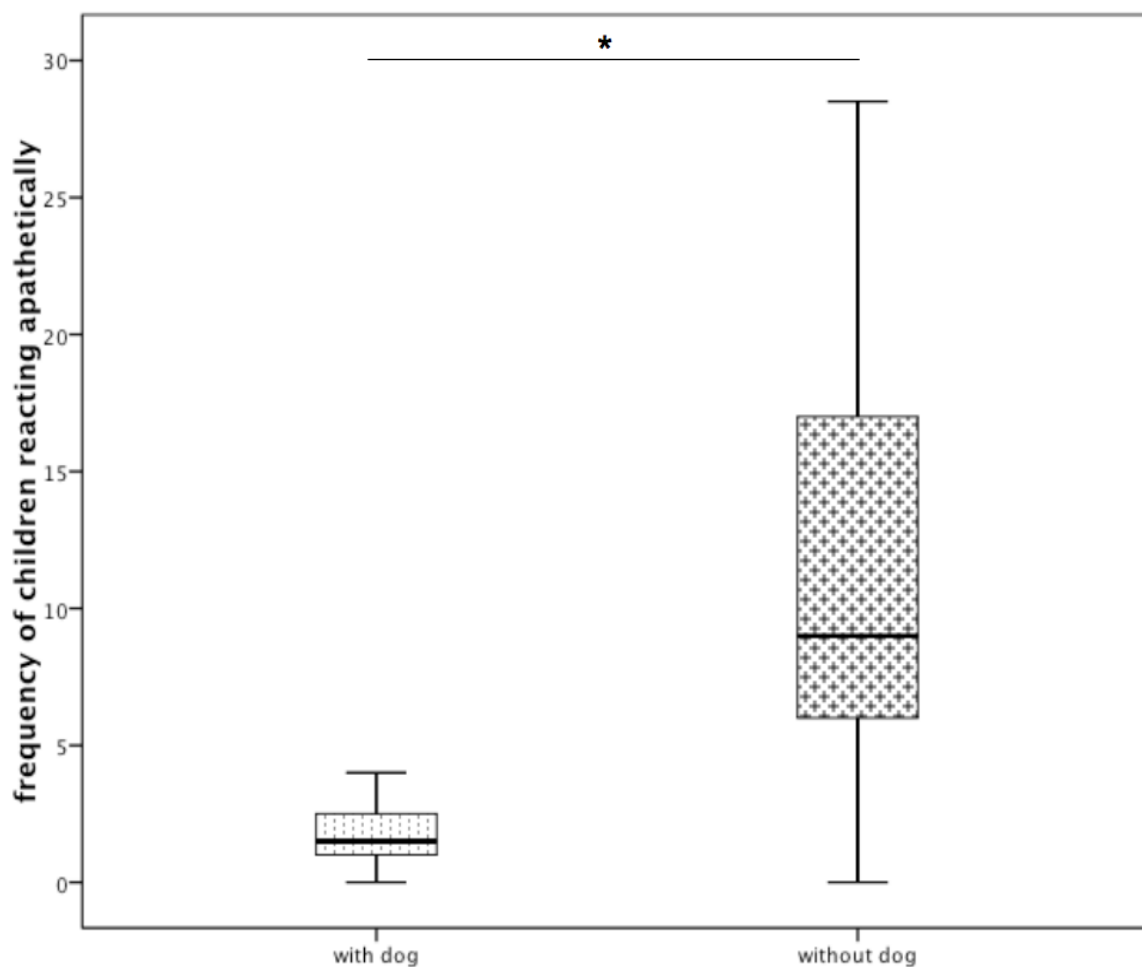


Fig. 4. Mean number of events children reacting apathetically in a non-responsive way: Wilcoxon: $Z=-2.492$, $p=0.013^*$, comparing sessions with and without a dog.

The intra-personal analysis of children's both sessions with a dog present and without one revealed a multitude of significant results. Children showed significantly less 'obsessive-compulsive behavior' during animal-assisted interventions (Wilcoxon: $Z=-2.547$, $p=0.011$), as well as lower frequency of not playing in terms of content or spatial (Wilcoxon: $Z=-2.555$, $p=0.011$) in dog-assisted interventions.

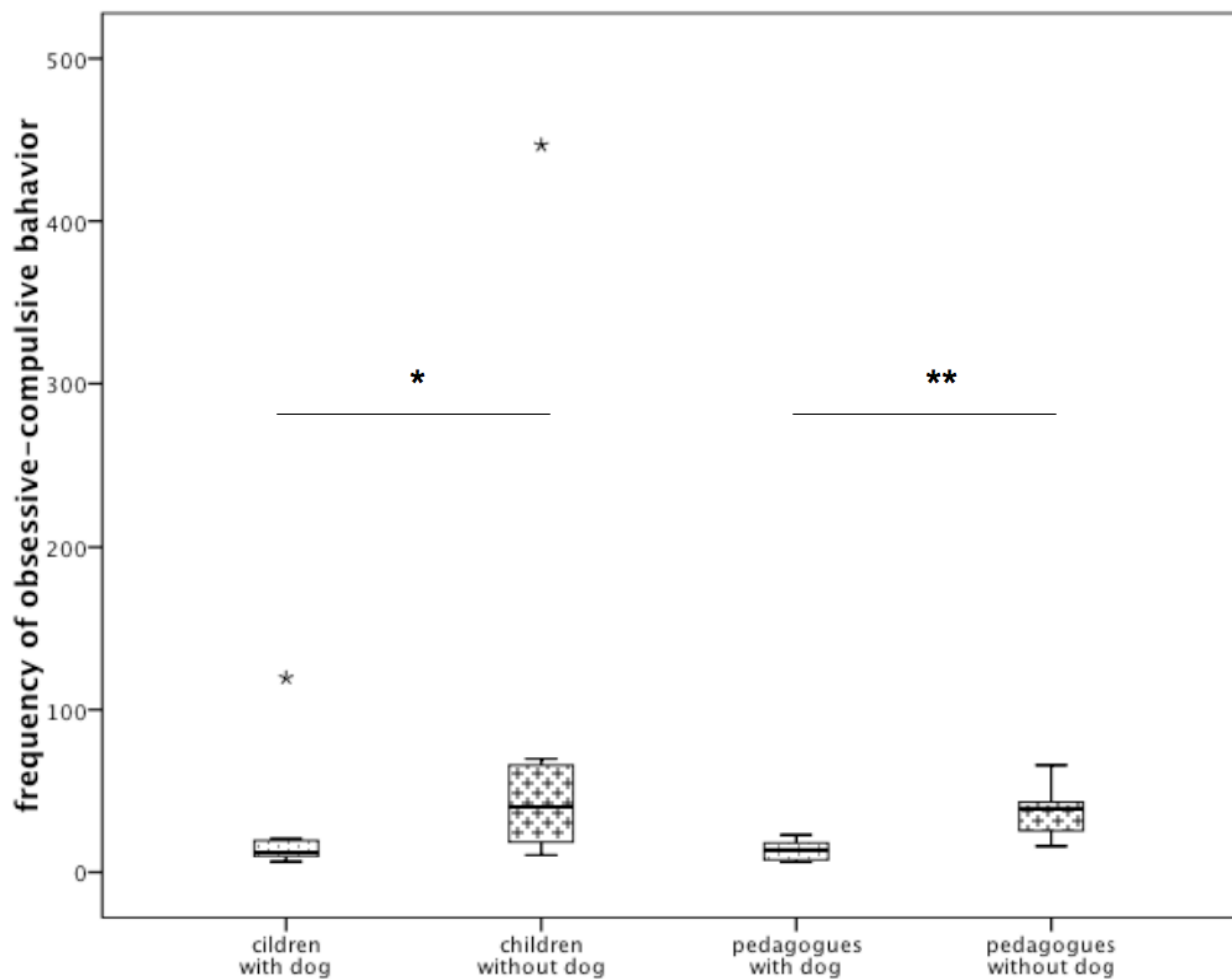


Fig. 5. Frequency of obsessive-compulsive behavior in regard to all children are depicted: Wilcoxon: $Z=-2.547$, $p=0.011^*$ and pedagogues: Wilcoxon: $Z=-2.670$, $p=0.008^{**}$ involved, comparing those sessions with and without a dog present.

With regard to all pedagogues involved, a comparison of all sessions showed two significant results: less obsessive-compulsive behavior (Wilcoxon: $Z=-2.670$, $p=0.008$) was revealed and they had a lower frequency out of playing

(Wilcoxon: $Z=-2.677$, $p=0.007$) in animal-assisted interventions.

In sessions without a friendly dog present children reacted more often in an aggressive way (Wilcoxon: $Z=-2.028$, $p=0.043$) and were more often sitting restlessly instead of playing (Wilcoxon: $Z=-2.310$, $p=0.021$) (Fig. 6.). It was noticeable that children left the play situation more frequently (Wilcoxon: $Z=-2.555$, $p=0.011$) and initiated more often changes in their fictitious characters (Wilcoxon: $Z=-1.960$, $p=0.05$) in a dog's absence.

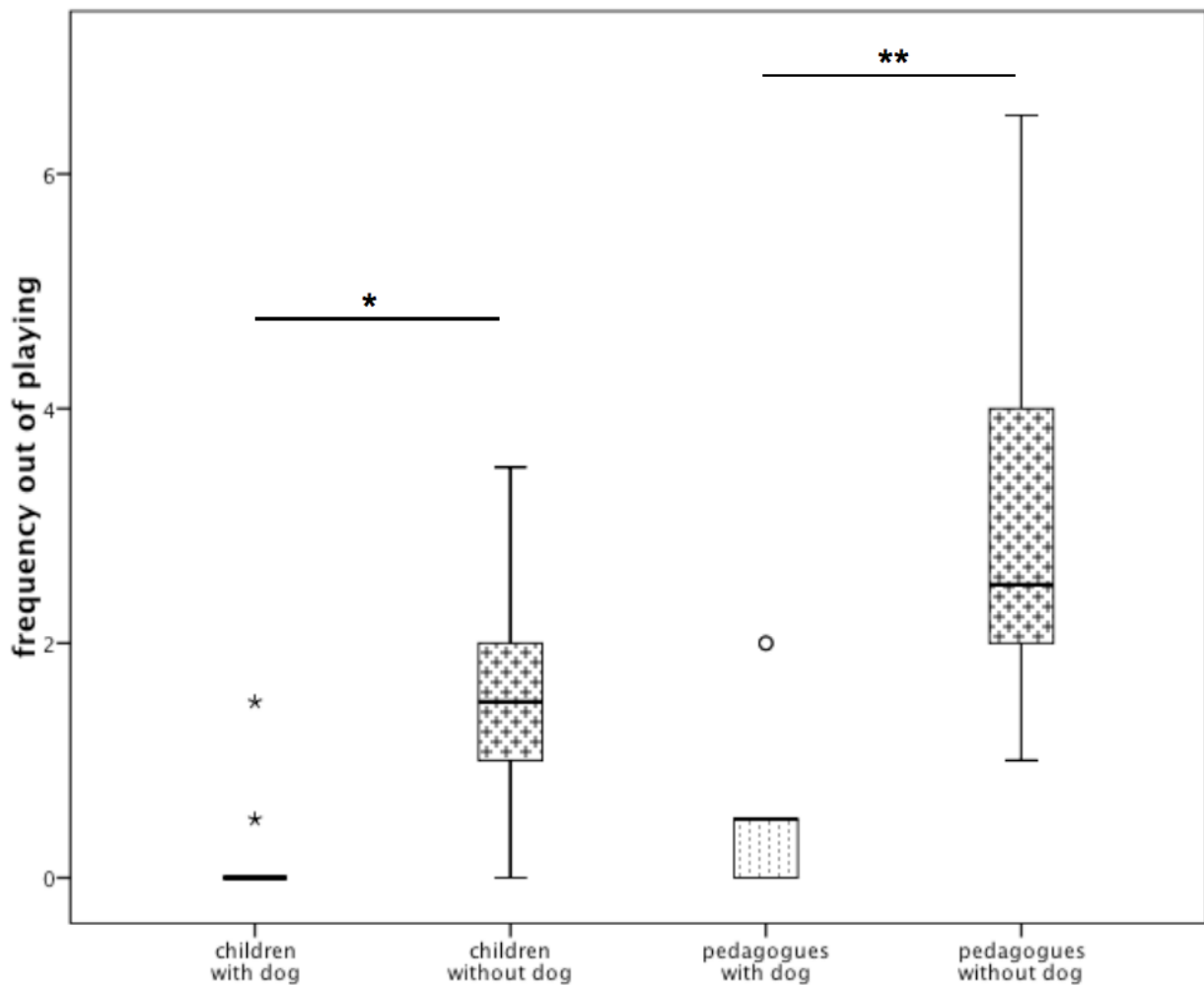


Fig. 6. Mean frequency on the part of children not playing: Wilcoxon: $Z=-2.555$, $p=0.011^*$ and pedagogues: Wilcoxon: $Z=-2.677$, $p=0.007^{**}$ at all four interventions.

Regarding the number and duration of laughing or smiling during the interventions a significant increase was observed in children playing with a dog (Wilcoxon: $Z=-2.666$, $p=0.008$). A similar trend was revealed for pedagogues (Fig. 7.).

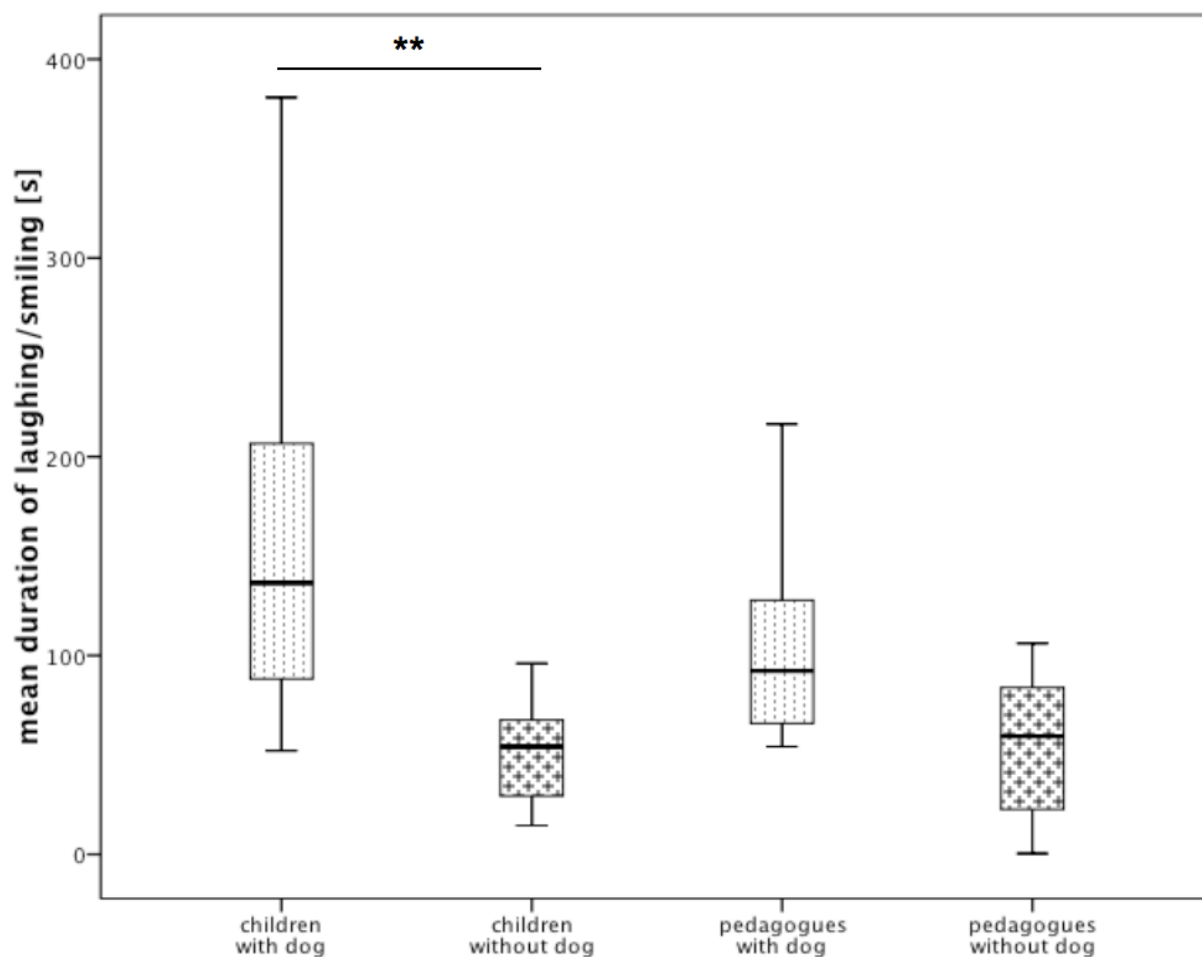


Fig. 7. Box-plot show mean duration of laughing/smiling in children (Wilcoxon: $Z=-2.666$, $p=0.008^{**}$) and pedagogues by trend during sessions with and without a dog present.

The dyadic play intervention revealed that during the presence of a dog a stronger attachment security was observed in every child analysed (Wilcoxon: $Z=-2.668$, $p=0.008$).

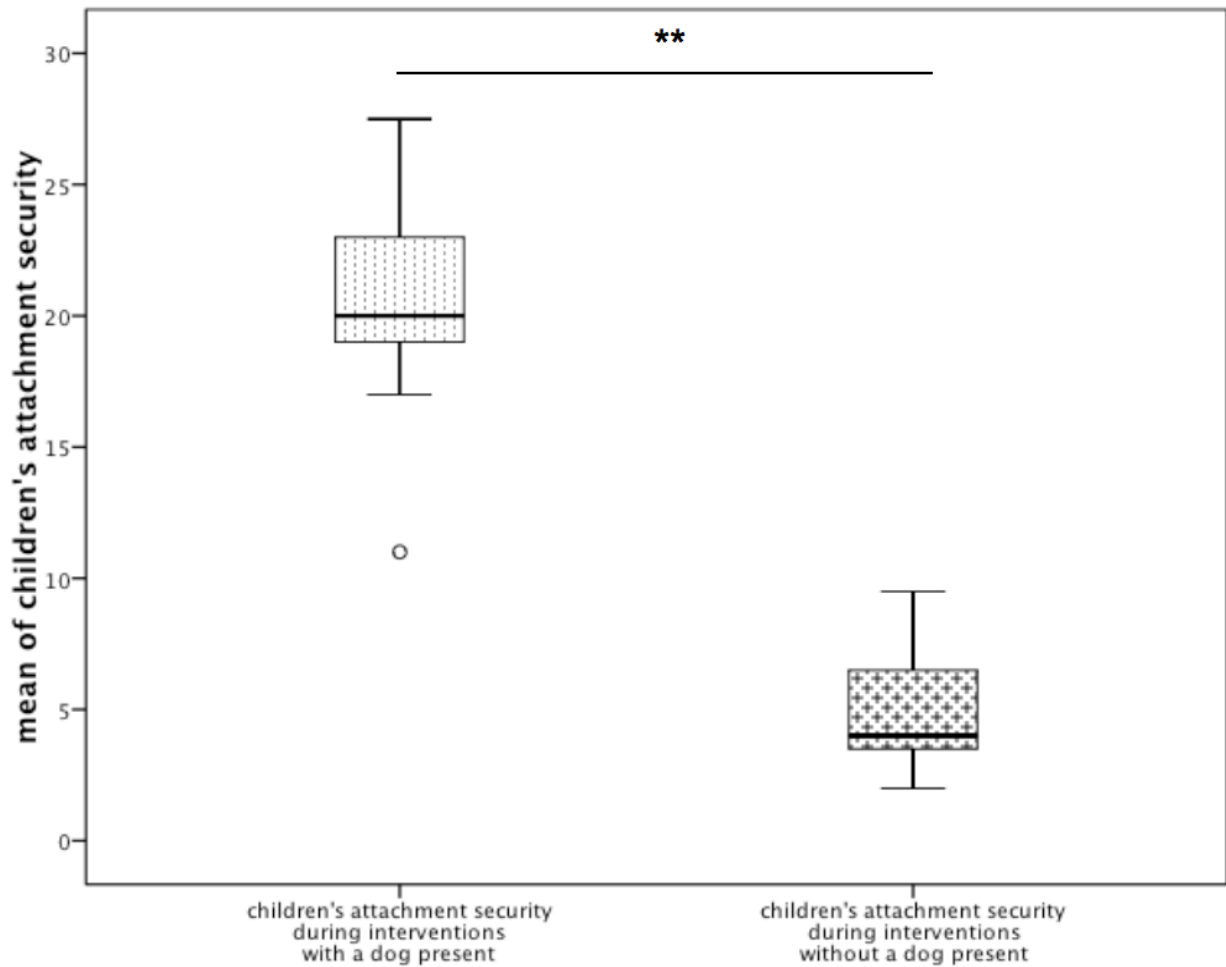


Fig. 8. Dyadic play intervention comparing the two sessions with and without a dog present are depicted as box-plots (Wilcoxon: $Z=-2.670$, $p=0.008^{**}$).

Furthermore, the results indicated that among the play partners the play intervention showed significantly less security in those children where no dog was present (Wilcoxon: $Z=-2.670$, $p=0.008$).

The number of times children gave 'treats' to the dog during animal-assisted interventions correlated positively with the following behavioral categories: Amount of time 'talking to the dog' (Spearman's: $n=9$, $r_s=0.941$, $p=0$), 'physical contact with the dog' (Spearman's: $n=9$, $r_s=0.820$, $p=0.007$) and 'spatial orientation towards the dog' (Spearman's: $n=9$, $r_s=0.795$, $p=0.001$).

One child as well as five pedagogues never handed out treats during animal-assisted play interventions, while all other children plus their respective

educators did.

In addition, the better the pedagogues were able to care for the children while playing (Spearman's: $n=9$, $r_s=0.767$, $p=0.016$), the more the children had their eyes on the dog (Spearman's: $n=9$, $r_s=0.767$, $p=0.016$) and the more the children talked in the play situation (Spearman's: $n=9$, $r_s=0.669$, $p=0.049$).

Additionally, the Spearman-rho correlation test revealed the longer children interacted with their respective educator physically or indirectly through items, the less obsessive-compulsive behavior was apparent (Spearman's: $n=9$, $r_s=-0.773$, $p=0.015$). The more the children had an eye on the video camera, the higher their cortisol levels were (Spearman's: $n=9$, $r_s=-0.740$, $p=0.023$).

There is a strong correlation between the longer children are 'playing' actively, the less 'orientation towards the dog' (Spearman's: $n=9$, $r_s=-0.867$, $p=0.002$) and the fewer apathetic reactions (Spearman's: $n=9$, $r_s=-0.782$, $p=0.013$) were noticeable. Spearman-rho correlation test showed that the frequencies of not playing correlated significantly with the number of 'turns in play' (Spearman's: $n=9$, $r_s=0.739$, $p=0.023$).

It has exhibited that the more children's obsessive-compulsive behavior became apparent in control sessions the longer they were 'sitting restlessly' (Spearman's: $n=9$, $r_s=0.833$, $p=0.055$), the less interaction between the play partners was observable (Spearman's: $n=9$, $r_s=-0.686$, $p=0.041$) and the more their cortisol levels decreased while playing (Spearman's: $n=9$, $r_s=0.767$, $p=0.016$).

Regarding the educators involved the results showed a correlation between the number of events of 'exits of the game situation' and 'turns in play' (Spearman's: $n=9$, $r_s=0.794$, $p=0.011$).

Moreover, the more 'treats' were handed out by pedagogues, the more they talked to the dog (Spearman's: $n=9$, $r_s=0.980$, $p=0$) and the less cortisol was released in the pedagogue's saliva (Spearman's: $n=9$, $r_s=0.745$, $p=0.021$). Additionally, it was found, that the more pedagogues had an eye on the video camera during playing, the longer they sat restlessly (Spearman's: $n=9$,

$r_s=0.824$, $p=0.006$) and the higher their cortisol levels were (Spearman's: $n=9$, $r_s=-0.782$, $p=0.013$). Another pattern found was that the more pedagogues were talking with the friendly dog, the more their cortisol levels decreased (Spearman's: $n=9$, $r_s=0.712$, $p=0.031$). Furthermore, physical contact between the play partners correlated positively with the duration of pedagogue's having an eye on the dog (Spearman's: $n=9$, $r_s=0.750$, $p=0.020$).

At meetings without a dog present the pedagogues' behavior showed a correlation between having an 'eye on the camera' and 'turned away from play partner' (Spearman's: $n=9$, $r_s=0.797$, $p=0.01$) as well as between having an 'eye on the camera' and the duration of 'sitting restlessly' (Spearman's: $n=9$, $r_s=0.667$, $p=0.05$). Additionally, it was revealed that the more pedagogues were playing actively, the more their cortisol levels decreased (Spearman's: $n=9$, $r_s=0.783$, $p=0.013$) in those sessions held without the presence of a dog.

6. Discussion

We found that in the presence of a dog the dyadic child-pedagogue interaction was more intense and calm, strengthened by the fact that there is significantly less obsessive-compulsive behavior, less time 'out of play' and a longer they were laughing or obviously smiling. This conforms with results on sixty-nine female and male psychiatric inpatients who were observed to have significant behavior modifications with animal-assisted versus non-animal-assisted rehabilitation therapy over four weeks (more social interaction, more smiling, being more helpful, active and responsive to surroundings; Marr et al., 2000). Furthermore, children showed more attachment security towards their respective pedagogues in the presence of a friendly dog and less in its absence. This parallels findings by Martin and Farnum (2002) found that children with pervasive developmental disorders were more focused and aware in their social environments as well as exhibiting a more playful mood when in the presence of a therapy dog versus a stuffed dog or a nonsocial toy. Children behaved less often in an aggressive manner, induced less game changers in their fictional characters and were sitting restlessly for a shorter amount of time in a dog's presence. Besides, Kotrschal and Ortbauer (2003) observed a reduction in behavioral extremes, such as aggressiveness and hyperactivity, in an elementary school classroom in Vienna after partial presence of a friendly dog. Additionally, a higher state of inner calmness and a reduction in dyadic tension of conflict with a dog's presence may explain less obsessive-compulsive behavior of all subjects involved. A 12-weeks therapeutic horseback riding intervention exhibited effects on social function in children with autism: greater social motivation, sensory seeking/sensitivity and less distractibility, sitting restlessly as well as inattention (Bass et al., 2009).

Behavioral results in children and pedagogues would allow to predict lower cortisol levels at the presence of the dog. Indeed, pedagogues' cortisol levels were significantly lower after dyadic play interventions in a dog's presence, while children's cortisol levels showed a significant decrease at the first meeting with a dog. Regarding children's cortisol levels during all four

interventions only a trend in the decrease of cortisol levels was observed. This may be attributed to possible expectations children had beforehand. A decrease in cortisol levels may have a connection to children calming down while playing. Furthermore, pedagogues' significant decrease in cortisol levels could have positively influenced the children's behavior and the structure of the bonding-led intervention. Apart from decreasing heart rates and anxiety, Cole et al. (2007) evaluated significant decreases in epinephrine and norepinephrine levels during and after 12-minute dog-assisted hospital visits in adult patients with advanced heart failure versus visitor and control groups.

Analysis of children's behavior during all four sessions showed the more treats children gave to the dog, the more physical contact, orientation towards the dog and the longer children talked to the dog. Obviously, handing out treats is a way to intensify human-dog interaction. In a dog's absence children's obsessive-compulsive behavior co-occurred with the duration of sitting restlessly and an increase of cortisol levels. Effects of a dog present could have been extended in a long term study, where children may accept the dog as an attachment figure.

Regarding pedagogue's behavior analysis it became obvious that the more pedagogues were talking with the dog and the more treats were handed out, the lower their cortisol levels were. The more the pedagogues had an eye on the dog, the more physical interaction with the children was noticeable. Hence, a dog may reduce inner tensions and influence prosocial behavior even in adults. Other studies have discovered that the amount/intensity of petting/striking a dog has a positive effect on the stress levels of children with insecure attachment styles (Beetz et al., 2011). Additionally, the more time pedagogues spent playing, the more their cortisol levels decreased in a dog's absence.

A cortisol decrease and a higher motivation for interaction during dog-assisted interventions is not assuming causality and therefore may be interpreted from both perspectives.

Physiological and psychological effects on stress modulation and behavior by human-animal-interaction can be connected with the activation of the oxytocin

system, which plays an essential role in attachment, biophilia (Wilson, 1984), breastfeeding, sex (Insel, 2010), and other important processes.

Furthermore, a release of oxytocin deactivates the hypothalamic–pituitary–adrenal axis in humans and animals, particularly in response to a social stress stimuli (Heinrichs et al., 2003) and suggests a human-animal bond.

To conclude, significantly lower cortisol levels, especially among pedagogues, as well as a reduction of cortisol release in saliva among insecurely attached children is caused by the mere presence of a dog.

Additionally, a higher inner state of calmness and a more intensive interaction style manifested in a dog's presence. In this study children were more often attentive and focused during dyadic play interventions, which points to a higher degree of empathy and awareness of their social environment in the presence of a friendly dog. This qualitative behavior and salivary cortisol level analysis of children with pervasive developmental disorders and/or insecure attachment styles and their respective pedagogues indicate specific benefits of animal-assisted interventions/therapy in residential youth welfare services. Mental representation of bonding/attachment may not transfer to companion animals, which opens up new methods in pedagogic and therapeutic interventions, especially for human individuals with an inappropriate childhood. Interaction with companion animals offers communication in a clear, direct and non-judgemental way, which seems to exchange old habits as well as enabling relieved communication. A dog may pave the way for pedagogues/therapists and young emotionally disturbed, uncommunicative or withdrawn children as Levinson already noticed in 1969 and warrants further investigation.

7. Appendices

Additionally, four different questionnaires were handed out to in order to get background information on the dogs their owners, as well as on the children's and pedagogues' daily life. The following aspects were determined:

7.1. Appendix A

Questionnaires were filled out together with the children in order to find out about their relationship with their respective educator according to the Likert scale. Therefore, the children rated their educator's helpfulness, attention, empathy, trust, etc.

Mein Betreuer und ich – Kinderfragebogen

Name des Kindes:

Name des Bezugsbetreuers:

	Trifft absolut nicht zu	Nicht wirklich	Neutral, nicht sicher	Trifft etwas zu	Trifft absolut zu
1. Mein Betreuer ist immer für mich da, wenn ich seine Hilfe brauche.					
2. Mein Betreuer beachtet mich immer.					
3. Mein Betreuer beschwert sich bei anderen Erwachsenen über mich (z.B. bei anderen Betreuern oder bei meinen Eltern).					
4. Mein Betreuer vertraut mir.					
5. Mein Betreuer weiß, was ich gut kann.					
6. Wenn ich traurig bin oder mir Sorgen mache, hilft mein Betreuer mir, dass es mir wieder besser geht.					
7. Mein Betreuer lobt mich vor den anderen Kindern.					
8. Mein Betreuer hätte es lieber, dass ich anders wäre.					
9. Mein Betreuer gibt mir das Gefühl, dass ich gut für die Gruppe bin.					

10. Mein Betreuer glaubt mir, dass ich mich anstrengen will.					
11. Meinem Betreuer gefällt meistens nicht, was ich tue.					
12. Mein Betreuer mag mich nicht in seiner Nähe haben.					
13. Mein Betreuer ist nie für mich da, wenn ich ihn brauche.					
14. Mein Betreuer lobt mich, wenn ich etwas gut gemacht habe.					
15. Ich kann meinen Betreuer immer ansprechen, wenn ich das möchte.					

7.2. Appendix B

All pedagogues were asked to judge their child-pedagogue-relationship as well. Their opinion on the relationship, especially those aspects regarding openness, expression of feelings and confidence/trust on the part of the child, was rated according to the Likert scale.

Kinder-Betreuer Beziehungsskala

Name Kind:

Name Erzieher:

Bitte schätzen Sie ein, in welchem Ausmaß jede der folgenden Aussagen zurzeit auf die Beziehung zu diesem Kind zutrifft. Benutzen Sie die vorliegende Skala, kreisen Sie für jede Aussage die zutreffende Zahl ein!

Trifft absolut nicht zu	Nicht wirklich	Neutral, nicht sicher	Trifft etwas zu	Trifft absolut zu
1	2	3	4	5

1.	Dieses Kind und ich teilen eine gefühlvolle, warme Beziehung.	1 2 3 4 5
2.	Dieses Kind und ich scheinen immer miteinander zu „kämpfen“.	1 2 3 4 5
3.	Wenn dieses Kind etwas bedrückt, sucht es Trost bei mir.	1 2 3 4 5
4.	Dieses Kind fühlt sich unwohl, wenn ich es körperlich berühre oder wenn ich ihm körperlich zu nahe komme.	1 2 3 4 5
5.	Dieses Kind schätzt die Beziehung, die es zu mir hat.	1 2 3 4 5
6.	Dieses Kind wirkt verletzt oder verlegen, wenn ich es verbessere.	1 2 3 4 5
7.	Wenn ich dieses Kind lobe, strahlt es vor Stolz.	1 2 3 4 5
8.	Auf eine Trennung von mir reagiert dieses Kind stark.	1 2 3 4 5
9.	Dieses Kind erzählt mir spontan über sich.	1 2 3 4 5
10.	Dieses Kind ist stark abhängig von mir.	1 2 3 4 5
11.	Dieses Kind wird schnell wütend über mich.	1 2 3 4 5

12.	Dieses Kind versucht, mir zu gefallen.	1 2 3 4 5
13.	Dieses Kind fühlt sich von mir ungerecht behandelt.	1 2 3 4 5
14.	Dieses Kind fragt mich um Hilfe, obwohl es keine Hilfe benötigt.	1 2 3 4 5
15.	Es fällt mir leicht, die Gefühle dieses Kindes nachzuempfinden.	1 2 3 4 5
16.	Dieses Kind verbindet mich in erster Linie mit Strafe und Kritik.	1 2 3 4 5
17.	Dieses Kind ist eifersüchtig oder gekränkt, wenn ich mich mit anderen Kindern beschäftige.	1 2 3 4 5
18.	Wenn ich dieses Kind zurechtweise, bleibt es stur oder wird wütend.	1 2 3 4 5
19.	Ein Blick oder der Ton meiner Stimme genügt, damit dieses Kind sein Fehlverhalten korrigiert.	1 2 3 4 5
20.	Der Umgang mit diesem Kind kostet mich viel Energie.	1 2 3 4 5
21.	Ich habe festgestellt, dass dieses Kind mein Verhalten oder meine Umgangsweisen nachahmt.	1 2 3 4 5
22.	Wenn dieses Kind mit einer schlechten Stimmung aus der Schule/von der Arbeit kommt, weiß ich, dass wir einen schwierigen Tag zusammen haben werden.	1 2 3 4 5
23.	Die Gefühle dieses Kindes mir gegenüber sind unvorhersehbar oder können sich plötzlich ändern.	1 2 3 4 5
24.	Ich fühle mich unwohl dabei, wie dieses Kind und ich miteinander auskommen.	1 2 3 4 5
25.	Dieses Kind quengelt oder schreit, wenn es etwas von mir möchte.	1 2 3 4 5
26.	Dieses Kind manipuliert und hintergeht mich.	1 2 3 4 5
27.	Dieses Kind teilt mir offen seine Gefühle und Erfahrungen mit.	1 2 3 4 5
28.	In den Interaktionen mit diesem Kind fühle ich mich zufrieden und wirksam.	1 2 3 4 5

7.3. Appendix C

One questionnaire included general information about the children, such as age, sex, the caregivers in their household, the frequency of visiting home, as well as their past experience with dogs.

Demographische Daten zum Kind

CODE Kind:

CODE Erzieher:

Name des Hundes:

Geschlecht des Kindes: ☐ männlich ☐ weiblich

Alter des Kindes zum Zeitpunkt der Datenaufnahme:

Alter: _____Jahre

Seit wann lebt das Kind im Heim?

Zeitraum: _____Jahre, _____Monate

4. Wie lange arbeiten Kind und Erzieher bereits zusammen?

Zeitraum: _____Jahre, _____Monate

Wie lange kennt das Kind den Hund?

Zeitraum: _____Jahre, _____Monate, _____Wochen

☐ noch gar nicht

6. Wie oft fährt das Kind nach Hause zu den Eltern?

- ☐ regelmäßig jedes Wochenende
- ☐ regelmäßig jedes zweite Wochenende
- ☐ ein mal im Monat
- ☐ in den Ferien
- ☐ nie
- ☐ sonstiges: _____

7. Wie viele Personen (das Kind mit einberechnet) leben im Haushalt?

_____Personen

8. Wie viele Geschwister hat das Kind? Leben diese bei den Eltern?

_____Schwestern, davon _____ bei den Eltern

_____Brüder, davon _____ bei den Eltern

9. Lebt ein Hund in der Familie?

☐ Ja ☐ Nein

7.4. Appendix D

The dog owners were questioned about their dog's age, sex, passed courses and their daily environment.

Fragebogen für Hundehalter

Der Fragebogen wird anonymisiert und vertraulich behandelt!

Name des Hundes: _____

Allgemeine Angaben zu Ihrer Person (im folgenden Besitzer genannt)

Geschlecht des Besitzers: ☐ männlich ☐ weiblich

Alter des Besitzers zum Zeitpunkt der Datenaufnahme:

Alter: _____Jahre

Wie viele Personen (Sie mit einberechnet) leben im gemeinsamen Haushalt?

_____Personen

4. Davon Kinder unter 14 Jahren: _____

5. Sind diese Personen (Mehrfachantwort möglich):

___nicht verwandt ___Eltern ___Partner/Ehegatte ___andere Familienmitglieder
___Kinder

6. Leben Sie mit Ihrem Hund in einem gemeinsamen Haushalt?

☐ Ja ☐ Nein

7. Sind Sie Erstbesitzer Ihres Hundes?

☐ Ja ☐ Nein

8. a) Sind Sie die einzige Hauptbezugsperson des Hundes?

☐ Ja ☐ Nein

b) Wenn nein, wie viele Hauptbezugsperson des Hundes gibt es außer Ihnen noch:

_____Personen

9. Sind Sie überwiegend für die Versorgung des Hundes verantwortlich?

☐ Ja ☐ Nein ☐ gleichmäßig aufgeteilt

10. Ist dies Ihr erster Hund?

☐ Ja ☐ Nein

11 a) Leben weitere Tiere im Haushalt?

☐ Ja ☐ Nein

b) Wenn ja, welche und wie viele: _____

Allgemeine Angaben zum Hund

1. Rasse Ihres Hundes: _____

2. Geschlecht Ihres Hundes: ☐ männlich ☐ weiblich

3. a) Ist Ihr Hund kastriert?

☐ Ja, operativ ((Entfernung der Eierstöcke/Hoden oder Unterbindung der Samenleiter/Eileiter)

☐ Ja, chemisch (z.B. Hormonspritze/Implantat)

☐ Nein

4. Alter und Geburtsdatum des Hundes:

a) Alter: _____Jahre; b) Geburtsdatum (TT.MM.JJJJ): _____

5. Wie alt war Ihr Hund, als Sie ihn übernommen haben: _____

6. Von wo haben Sie Ihren Hund übernommen:

☐ Züchter ☐ Tierhandlung ☐ Tierheim

☐ Freund/Verwandten ☐ Privatwurf (nicht von Freunden/Verwandten)

Sonstiges _____

7. Gewicht Ihres Hundes: _____

8. Haben Sie mit Ihrem Hund eine Hundeschule besucht?

☐ Ja ☐ Nein

9. Haben Sie mit Ihrem Hund andere Kurse als Grundgehorsam besucht?

☐ Ja ☐ Nein

10. Wenn ja, welche?

7.5. Appendix E

Guideline for the dog's owner:

In addition to a verbal agreement the proceedings and important overall conditions are defined by a written guideline. The aim of the study was kept secret in order to avoid prejudice.

Liebe Hundebesitzer,

vielen Dank, dass Sie und Ihr Hund uns bei der Studie „Hund als pädagogischer Assistent in betreuten Wohngruppen“ unterstützen. Damit die Datenaufnahme in einer möglichst standardisierten Situation ablaufen kann und die Ergebnisse somit vergleichbar sind, müssen einige Regeln beachtet werden. Daher erhalten Sie hiermit einen Ablaufplan, an dem Sie sich orientieren können.

Leitfaden für Hundebesitzer

Ablauf

Wenn das Kind den Hund noch nicht kennt, gibt es eine Eingewöhnungsphase
Der Raum für die bindungsgeleitete Intervention ist vorbereitet mit Spielzeug, Kamera, Speichelproben
Kind und Erzieher sowie Hundehalter mit Hund betreten den Raum
Das Kind bekommt 10 Leckerlis, die es dem Hund später geben kann, wenn es möchte
Speichelproben von Kind und Erzieher werden entnommen
Die Kamera wird gestartet, ich verlasse den Raum
Das Spiel zwischen Kind und Erzieher beginnt und dauert ca. 20 Minuten
ich komme zurück, um 25 Minuten nach der ersten Speichelprobe die zweite zu nehmen
Alle können den Raum verlassen

Ihre Aufgaben

Bitte übernehmen Sie die Kameraführung und filmen Sie so, dass möglichst viel von den Interaktionen zwischen Kind, Hund und Erzieher zu sehen ist

Lassen Sie sich in kein Gespräch verwickeln

Ignorieren Sie Ihren Hund und das Geschehen und halten sich möglichst im Hintergrund

Greifen Sie nur ein, wenn die Situation es erfordert (zum Beispiel bei Gefahr!)

Danke für die Zusammenarbeit!

7.6. Appendix F

Guideline for the pedagogues:

Preparations and processes during the sessions are fixed through another guideline in which a temporal frame and playful openness is communicated.

The aim of the study was kept secret in order to avoid prejudice as well.

Liebe Pädagogen,

vielen Dank, dass Sie uns mit Ihrer Arbeit bei der Studie „Hund als pädagogischer Assistent in betreuten Wohngruppen“ unterstützen. Damit die Datenaufnahme in einer möglichst standardisierten Situation ablaufen kann und die Ergebnisse somit vergleichbar sind, müssen einige Regeln beachtet werden. Daher erhalten Sie hiermit einen Ablaufplan, an dem Sie sich orientieren können.

Leitfaden für Pädagogen Datenaufnahme während einer bindungsgeleiteten Intervention

Ablauf:

Vor einer Spielsituation mit Hund gibt es eine Eingewöhnungsphase, wenn das Kind den Hund noch nicht kennt

Der Raum für die bindungsgeleitete Intervention wird vorbereitet mit Spielzeug, Kamera, Speichelproben

Sie und das Kind (evtl. auch Hund und Hundehalter) betreten den Raum

Das Kind bekommt 10 Leckerlis, die es dem Hund später geben kann, wenn es möchte

Speichelproben von Ihnen und dem Kind werden entnommen

Die Kamera wird gestartet, ich oder Hundeführer bleiben anwesend und filmen

Das Spiel zwischen Ihnen und dem Kind beginnt und dauert ca. 20 Minuten

25 Minuten nach der ersten Speichelprobe nehme ich die zweite

Alle können den Raum verlassen

Wichtig für Ihre Arbeit:

Dieselbe Spielsituation soll für zwei Interventionen **2 mal** aufgebaut werden und ein mal mit, ein mal ohne Hund als Basis dienen. Insgesamt sollen 4 Aufnahmen pro Kind gemacht werden, also 2 verschiedene Situationen.

Der Verlauf des Spiels ist nicht vorgegeben

Das Kind kann den Hund mit Leckerlis locken oder belohnen oder sich auf das Spielzeug konzentrieren. Dabei kann es erfahren, wann der Hund am liebsten zu ihm kommt – wenn es eher ruhig oder laut und aggressiv ist

Bitte timen Sie die Intervention auf **20 Minuten** (+/- 2), damit die Speichelproben in immer gleichen Abständen genommen werden können

Die Kameraführung wird von einer weiteren Person übernommen, bitte beachten Sie diese **nicht!**

Danke für die Zusammenarbeit!

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9. References

- Ainsworth, M. D. S., & Bowlby, J., 1991. *An ethological approach to personality development*. American Psychologist. 46: 331-341.
- Allen, K., Blascovich, J., Mendes, W. B., 2002. *Cardiovascular Reactivity and the Presence of Pets, Friends, and Spouses: The Truth about Cats and Dogs*. Psychosom Med. 64:727-739.
- Allen, K., Shykoff, B. E., Izzo, J. L. Jr., 2001. *Pet Ownership, but not ACE Inhibitor Therapy, Blunts Home Blood Pressure Responses to Mental Stress*. Hypertension. 38:815-820.
- Allen, K. M., Blascovich, J., Tomaka, J., Kelsey, R. M., 1991. *Presence of human friends and pet dogs as moderators of autonomic responses to stress in women*. J Pers Soc Psychol. 61(4):582-589.
- Anderson, W. P., Reid, C. M., Jennings, G. L., 1992. *Pet ownership and risk factors for cardiovascular disease*. The Medical Journal of Australia. 157(5):298-301.
- Barker, S. B., Knisely, J. S., McCain, N. L., Best, A. M., 2005. *Measuring stress and immune response in healthcare professionals following interaction with a therapy dog: a pilot study*. Psychological Reports. 96(3): 713-729.
- Bass, M. M., Duchowny, C. A., Llabre, M. M., 2009. *The Effect of Therapeutic Horseback Riding on Social Functioning in Children with Autism*. J Autism Dev Disord. 39(9):1261-1267.
- Bauman A. E., Russell, S. J., Furber, S. E., Dobson, A. J., 2001. *The epidemiology of dog walking: an unmet need for human and canine health*. The Medical Journal of Australia. 175(11-12): 632-634.
- Beck, L., Madresh, E. A., 2008. *Romantic Partners and Four-Legged Friends: An Extension of Attachment Theory to Relationships with Pets*.

Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 21(1): 43-56(14)

- Beetz, A., Kotrschal, K., Turner, D. C., Hediger, K., Uvnäs-Moberg, K., Julius, H.,** 2011. *The effect of a real dog, toy dog and friendly person on insecurely attached children during a stressful task: an exploratory study.* Anthrozoös A Multidisciplinary Journal of The Interactions of People & Animals. 24(4): 349–368(20).
- Bergesen, F. J.,** 1989. *The effects of the pet facilitated therapy on the self-esteem and sozialization of primary school children.* Paper presented at the 5th International Conference on the Relationship Between Humans and Animals.
- Bowlby, J.,** 1969/1982. *Attachment and Loss.* Vol. 1: Attachment. New York, Basic Book.
- Cole, K. M., Gawlinski, A., Steers, N., Kotlerman, J.,** 2007. *Animal-assisted therapy in patients hospitalized with heart failure.* American Journal of Critical Care. 16(6): 575-585.
- Dembicki, D., Anderson, J.,** 1996. *Pet ownership may be a factor in improved health of the elderly.* J Nutr Elder. 15(3):15-31.
- DeSchraver, M., Riddick, Cutler, C.,** 1990. *Effects of watching aquariums on elders' stress.* Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 4(1):44-48(5).
- Endenburg, N., Baarda, B.,** 1995. *The Role of Pets in Enhancing Human Well-Being: Effects on Child Development.* In: The Waltham Book of Human-Animal Interactions, Pergamin Press, Oxford..
- Eriksson, B.,** 2000. *The social significance of pet-keeping among Amazonian Indians.* In A.L. Podberscek, E. S P. & Serpell, J. A., 2000. *Companion Animals and us: Exploring the relationship between people and pets.* Cambridge University Press. pp. 7-26.
- Friedmann, E., Thomas, S. A., Cook, L. K., Tsai, C., Picot, S.,** 2007. *A friendly dog as potential moderator of cardiovascular response to speech in*

older hypertensives. Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 20(1):51-63(13).

Friedmann, E., Locker, B., Zuck, B., Lockwood, R., 1993. *Perception of animals and cardiovascular responses during verbalization with an animal present. Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 6(2):115-134(20).*

Gunnar, M. R., 1998. *Quality of early care and buffering of neuroendocrine stress reactions: Potential effects on the developing human brain. Preventative medicine. 27(2): 208-211.*

Handlin, L., Hydbring-Sandberg, E., Nilsson, A., Ejdebäck, M., Jansson, A., Unväs-Moberg, K., 2011. *Short-term interaction between dogs and their owners – effects on oxytocin, cortisol, insulin and heart rate – an exploratory study. Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 24(3): 301-315(15).*

Heinrichs, M., Baumgartner, T., Kirschbaum, C., Ehler, U., 2003. *Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. Biol. Psychiatry. 54(12): 1389-1398.*

Insel, T. R., 2010. *The challenge of translation in social neuroscience: a review of oxytocin, vasopressin and affiliative behavior. Neuron. 65(6): 768-779.*

Julius, H., Beetz, A., Kotrschal, K., Turner, D., Unväs-Moberg, K., 2013. *Attachment to pets. An Integrative View of Human-Animal Relationships with Implications for Therapeutic Practice. Cambridge, USA: Hogrefe Publishing.*

Kalman, B. A., Grahn, R. E., 2004. *Measuring salivary cortisol in the behavioral neuroscience laboratory. Journal of Undergraduate Neuroscience Education. 2(2), A41-A49.*

Kaminski, M., Pellino, T., Wish, J., 2002. *Play an pets: The physical and emotional impact of child-life and pet therapy in hospitalized children. Children's Health Care. 31(4): 321-335.*

- Kotrschal, K., Ortbauer, B., 2003.** *Behavioral effects of the presence of a dog in a classroom.* Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. Volume 16, Number 2, (13):147 – 159.
- Kurdek, L.A. 2009.** *Pets dogs as attachment figures for adult owners.* Journal of Familiy Psychology 23(4):439-446.
- Kurdek, L.A. 2008.** *Pets dogs as attachment figures.* Journal of Social and Personal Relationships. 25(2): 247-266.
- Levinson, B. M., 1969.** *Pet-oriented Child Psychotherapy.* IL, Springfield. Charles C. Thomas: 41-45.
- Main, M., Solomon, J., 1986.** *Discovery of an insecure-disorganized/disoriented attachment pattern: Procedures, findings and implications for the classification of behavior.* In *Affective Development in infancy*, pp.95-124, (ed.) Brazelton, T.B., Yogman, M.W. Ablex Publishing.
- Main, M., Kaplan, N., Cassidy, J., 1985.** *Security in infancy, childhood and adulthood: A move to the level of representation.* Monographs of the Society for Research in Child Development. 50(1-2): 66-104.
- Marr, C. A., French, L., Thompson, D., Drum, L., Greening, G., Mormon, J., Henderson, I., Hughes, C. W., 2000.** *Animal-Assisted Therapy in Psychiatric Rehabilitation.* Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals. 13(1): 43-47(5).
- Martin, F., Farnum, J., 2002.** *Animal-Assisted Therapy for Children with Pervasive Developmental Disorders.* Western Journal of Nursing Research. 24(6): 657–670.
- McNicholas, J., Collis, G. M., Morley, I. E., Lane, D. R., 1993.** *Social communication through a companion animal: The dog as a social catalyst.* In: Nichelmann, M., Wierenga, H. K., Braun, S. (Eds.), *Proceedings of the International Congress on Applied Ethology*, Berlin: Humboldt University. pp. 368-370.
- Meewisse, M. L., Reitsma, J. B., de Vries, G.-J., Gersons, B. P. R., Olf, M., 2007.** *Cortisol and post-traumatic stress disorder in adults: systematic review and meta-analysis.* The British Journal of

Psychiatry. 191(5): 387-392.

- Melson, G. F., Fine, A. H., 2006.** *Animals in the lives of children.* In Handbook on Animal-Assisted Therapy. Sand Diego:Elsevier. pp. 207-226.
- Nagasawa, M., Kikusui, T., Onaka, T., Ohta, M., 2009.** *Dog's gaze at its owner increases owner's urinary oxytocin during social interaction.* Hormones and Behavior, 55(3):434-441.
- Nepps, P., Stewart, C. N., Bruckno, S. R., 2014.** *Animal-Assisted Activity: Effects of a Complementary Intervention Program on Psychological and Physiological Variables.* Journal of Evidence-Based Complementary and Alternative Medicine. 19(3): 211-215.
- Oeser, E., 2001.** *Der Anteil des Hundes an der Menschwerdung des Affen: Von Platon zu Lorenz.* In: Kotrschal, K., Müller, G., Winkler, H. (eds) *Konrad Lorenz und seine verhaltensbiologischen Konzepte aus heutiger Sicht.* Fürth: Filander Verlag. pp. 225-232.
- Odebrecht, S., Nunes, V., Watanabe, M. A. E., Morimoto, H. K., Moriya, R., Reiche, E. M. V., 2010.** *Impact of childhood sexual abuse on activation of immunological and neuroendocrine response.* Aggression and Violent Behavior. 15(6): 440-445.
- Odendaal, J. S. J., Meintjes, R. A., 2003.** *Neurophysiological correlates of affiliative behaviour between humans and dogs.* The Veterinary Journal. 165(3):296-301.
- Odendaal, J. S. J., 2000.** *Animal-assisted therapy – magic or medicine?* Journal of Psychosomatic Research. 49(4): 275-280.
- Schleidt, W. M., Shalter, M. D., 2003.** *Co-evolution of humans and Canids. An alternative view of dog domestication: Homo homini lupus?* Evolution and Cognition. 9(1): 57-72.
- Serpell, J., 1996.** *In the Company of Animals: A Study of Human-Animal Relationships.* Cambridge University Press.
- Serpell, J., 1991.** *Beneficial effects of pet ownership on some aspects of*

human health and behaviour. J R Soc Med. 84(12):717-720.

- Skoglund, P., Ersmark, E., Palkopoulou, E., Dalén, L., 2015.** *Ancient wolf genome reveals an early divergence of domestic dog ancestors and admixture into high-latitude breeds*. Current Biology. 25(11): 1515-1519.
- Steptoe, A., Wardle, J., Marmot, M., 2005.** *Positive affect and health-related neuroendocrine, cardiovascular, and inflammatory processes*. Proc Natl Acad Sci USA. 102(18):6508-6512.
- Tarullo, A. R., Gunnar, M. R., 2006.** *Child maltreatment and the developing HPA axis*. Hormones and Behavior. 50(4):632-639.
- Thalmann, O., Shapiro, B., Cui, P., Schuenemann, V.J., Sawyer, S.K., Greenfield, D.L., Germonpré, M.B., Sablin, M.V., et al. ,2013.** *Complete mitochondrial genomes of ancient canids suggest a European origin of domestic dogs*. Science. 342(6160): 871-874.
- Vaughn B. E., Heller C. & Bost, K. K., 2001.** *Bindung und Gleichaltrigenbeziehungen während der frühen Kindheit*. In Suess, G. J., Scheuerer Englisch, H., Pfeifer, W.-K. P (eds.): Bindungstheorie und Familiendynamik. Anwendung der Bindungstheorie in Beratung und Therapie. Gießen: Psychosozial-Verlag. pp. 53-82.
- Wilson, E. O., 1984.** *Biophilia*. Harvard University Press. Cambridge, MA.

10. Curriculum Vitae

Personal Information:

Name: Hutter Katharina
Citizenship: Austria

School education:

09/1997 – 06/2001 Public elementary school
09/2001 – 06/2005 Private primary school
09/2005 – 06/2009 Private secondary school

University:

Since 10/2009 Biology and Mathematic lectureship studies
at the University of Vienna

Since 04/2014 Elaboration of Diploma thesis
"Dogs as Assistants in Dyadic Pedagogue-child-
Interactions in Residential Youth Welfare Services"
Supervisor: Univ. Prof. Mag. Dr. Kurt Kotrschal,
Department of Behavioural Biology,
University of Vienna, IEMT Austria

Working experiences

and volunteer activities:

2010	internship child care
2010	camera promotion
2011	internship child care
2013	after school care
2014	after school care
2015	promotion for teaching professions

Congress contributions:

2014 collaboration at Congress "ISAZ 2014" (=International Society for Anthrozoology) Animals and Humans together: Integration in Society,
Organized by the Work Group for Human-Animal Relationships, Department of Behavioural Biology, Faculty of Life Sciences, University of Vienna.