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Attachment disorder behavior in early and middle childhood: associations with children's self-concept and observed signs of negative internal working models

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ABSTRACT

Most research on attachment in childhood is based on observation. In contrast, research on reactive attachment disorder (RAD) is mainly based on caregiver reports. Moreover, little is known about self-concept or internal working models (IWMs) of self and others in children with RAD. The present study examined whether caregiver reports and the frequency of observed signs of RAD reveal differences between children at risk for developing RAD symptoms and healthy controls in middle childhood. In addition, children's self-concept, observable signs of negative IWMs, and mental health were assessed. Results revealed that the RAD risk group showed increased reported and observed signs of RAD, a more negative self-concept, and more signs of negative IWMs compared to healthy controls. Signs of RAD in middle childhood were expressed trans-relational to both caregivers and strangers. Moreover, RAD symptoms were associated with negative self-concept, observed signs of negative IWMs, and poor mental health.

KEYWORDS

Attachment disorder; middle childhood; behavior observation; self-concept; internal working models; mental health

Attachment is a basic need throughout the lifespan and its organization is based on caregiving experiences in infancy, childhood, and adolescence (Ainsworth & Bowlby, 1991; Grossmann, Grossmann, Kindler, & Zimmermann, 2008). Depending on the intensity of negative caregiving experiences, children either develop insecure attachment patterns, attachment disorganization, or in case of severe deprivation or neglect even may develop attachment disorders (Lyons-Ruth & Jacobvitz, 2016; O'Connor et al., 2000; Soares et al., 2014; Zeanah & Gleason, 2015). Whereas insecure organized attachment and attachment disorganization are no signs of a clinical disorder but risk factors for later psychosocial maladjustment (Fearon & Belsky, 2011; Lyons-Ruth & Jacobvitz, 2016), attachment disorder already is a clinical disorder in itself (Zeanah & Smyke, 2008).

Diagnostic criteria of RAD

According to ICD-10, reactive attachment disorder (RAD; F94.1) is a disorder that starts in the first five years of life but is not restricted to that age and is characterized by

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persistent abnormalities in children's social relationships associated with emotional disturbances. Specifically, signs of RAD according to ICD-10 are strongly contradictory or ambivalent social reactions in different social contexts, which may vary from relationship to relationship. Children with RAD show emotional problems including social withdrawal, fearfulness, and hypervigilance as well as a loss of emotional receptiveness. Moreover, they show aggressive reactions to own or others' sadness or distress. However, social reciprocity or the establishment of social contacts with healthy adults may be possible as mentioned in criterion D (ICD-10; Criteria for Research; World Health Organization, 1993). According to DSM-5, RAD is characterized by a consistent pattern of inhibited, emotionally withdrawn behavior towards adult caregivers, which is manifested by rarely or minimally seeking or responding to comfort when distressed. Similarly to the ICD-10 criteria, RAD in the DSM-5 is also characterized by persistent social and emotional disturbances including minimally seeking or responding to comfort, minimal social and emotional responsiveness to others, limited positive affect, or episodes of unexplained irritability, sadness, or fearfulness that are evident even during nonthreatening interactions with adult caregivers (DSM-5; American Psychiatric Association, 2013). In DSM-5, patterns of extremes of insufficient care are a necessary and causal factor for attachment disordered behaviors. These experiences include social neglect or deprivation in the form of persistent lack of having met basic emotional needs for comfort, stimulation, and affection by caring adults, repeated changes of primary caregivers limiting opportunities to form stable attachments, or being reared in unusual settings that severely limit opportunities to form selective attachments (DSM-5). Therefore, children having experienced deprivation, neglect, or many changes in caregiving are expected to show a higher frequency or intensity of RAD symptoms and therefore can be perceived as a RAD risk group, especially if their negative caregiving environment does not change. One experimental longitudinal study has shown that children who stayed in institutions show increased signs of RAD symptoms as reported by caregivers even up to the age of 8 compared to children who were placed into high-quality foster care with foster parents who received intensive caregiving training (Smyke et al., 2012). A follow-up of this study revealed that caregiver-rated symptoms of RAD even slightly increase again at age 12 (Guyon-Harris et al., in press). Thus, signs of RAD are still reported by caregivers in older children and are more intense if children remained in the institution or were placed in foster care after 24 months (Smyke et al., 2012). According to this research, main signs of RAD in older children still are the poor discrimination of attachment figures, problems with social regulation of negative emotions (i.e. not seeking or accepting of comfort), poor social reciprocity, and problems with emotion regulation (Smyke et al., 2012).

Assessment of RAD in children

Developmental psychologists mainly assess children's attachment patterns by observation (Ainsworth, Blehar, Waters, & Wall, 1978; Main & Cassidy, 1988; Moss, Bureau, Cyr, Mongeau, & St-Laurent, 2004). In this research tradition, caregiver reports on children's attachment patterns usually are seen as possibly biased by the caregiver's own attachment experiences or as unreliable. In contrast and coming from a clinical assessment tradition, the diagnosis of attachment disorder is mainly based on caregiver reports. Caregivers are either

interviewed about the child's behavior (e.g. Disturbances of Attachment Interview (DAI); Smyke & Zeanah, 1999) or directly rate the child's behavior in questionnaires (e.g. Relationship Problem Questionnaire; Minnis, Rabe-Hesketh, & Wolkind, 2002). All these assessment approaches have been validated. However, caregivers usually are neither trained clinicians nor had training in attachment assessment methods. In addition, caregivers' contact to the child in institutions may be restricted (e.g. because of rotating shifts, recent placement), questions may be misunderstood, or memory biases may affect caregiver's descriptions of the child's behavior. Therefore, and similar to standard attachment research, observation may complement these caregiver reports on RAD behaviors. Existing observation protocols for attachment disorder are mainly used to assess disinhibited attachment disorder behaviors or Disinhibited Social Engagement Disorder (Gleason et al., 2011; McLaughlin, Espie, & Minnis, 2010). Therefore, we developed an observation protocol and coding system for inhibited RAD symptoms for late preschool and middle childhood.

In order to observe the core RAD symptoms of persistent contradictory emotional reactions during social interactions, fearfulness (ICD-10), and the reduced social and emotional responsiveness to others, difficulties in seeking and accepting comfort, limited positive affect, unexplained and dysregulated negative affect (DSM-5) observations need to include the elicitation of negative emotions. The attachment system is activated in situations that elicit negative emotions that challenge or exceed a person's capacity for self-regulation, typically when a person experiences a potential danger, is frightened, but also when feeling fatigued or sick or when the wish for support from a caregiver is elicited when feeling sad (Ainsworth & Bowlby, 1991; Bretherton, 1996). Separation reunion procedures induce negative emotions in the child to make attachment behavior and exploratory behavior in contact with the caregiver observable in order to code the child's attachment related emotion regulation with the caregiver. However, short separations become less valid in eliciting negative emotions as children grow older and have developed more strategies and cognitive scripts how to cope with such situations. Longitudinal studies have shown that early attachment patterns mainly explain later social behavior or physiological stress reaction in older children or adolescents when they experience distress or negative emotions (Spangler & Zimmermann, 2014; Zimmermann, Maier, Winter, & Grossmann, 2001). Therefore, we chose an emotion eliciting social interaction context to age-appropriately elicit negative emotions and to observe the children's emotional and social behavior in dyadic interaction with adults when the child needs external emotion regulation. Losing a game is a valid elicitor of negative emotions like sadness or anger (Berlin & Cassidy, 2003) which both are attachment relevant emotions (Bowlby, 1973). Thus, we expect that signs of RAD as listed in ICD-10 and DSM-5 may be observable in these dyadic social interactions.

Self-concept and internal working models (IWMs) in children with RAD

According to attachment theory, children develop IWMs of their caregivers and themselves based on their attachment experiences (Bowlby, 1973; Bretherton & Munholland, 2008). Bowlby (1973) described the general aim of IWMs as controlling the attachment system and with growing age also influencing individual adaptation. Thus, IWMs control information processing in social and emotional situations as well as attachment and

exploration when the attachment system is activated (Dykas & Cassidy, 2011; Zimmermann, 1999).

Securely attached children, expect their caregivers to be emotionally responsive, effectively regulating their negative emotions, and supporting their autonomy. They develop a realistic positive and competent IWM of their self. Insecurely attached children expect their caregivers to be unresponsive and rejecting or unreliable and ineffective in comforting. Their IWM of the self is negative or idealized (Booth–Laforce et al., 2006; Cassidy, 1988; Verschueren, Marcoen, & Schoefs, 1996). Moreover, IWMs are also influencing the behavior towards strangers. Lütkenhaus, Grossmann, and Grossmann (1985) showed that securely attached preschoolers directly expressed their negative feelings to an unknown adult experimenter after having lost in a competitive game. In contrast, insecurely attached children look away from the experimenter when expressing negative emotions after losing the game and showed a neutral face or a false smile when looking at him. Thus, children's IWM, their social expectation, and their script of what to do in social situations when experiencing negative emotions are also activated while interacting with strangers.

However, IWMs of children with inhibited RAD are still to be examined. Given their extremely negative caregiving experiences, attachment disordered children's IWMs are expected to be far more negative than that of family reared children as Bowlby (1973) already assumed when discussing the effects of nurseries on children in the study by Tizard and Tizard (1971). These children might expect more rejection, ignoring or unpredictable reactions from adults (known or unknown). Therefore, we assume that children with RAD are more distrustful and vigilant towards negative reactions of others, and perceive themselves as highly incompetent compared to children living in their families. As there is an empirical lacuna on IWMs of children with RAD symptoms, we intend to examine whether at least in middle-childhood-specific behaviors (e.g. clear distrust in social interaction; false positive affect; negative utterances about oneself) may represent signs of negative IWMs of self and others at that age (Zimmermann & Iwanski, 2015). Similarly, as avoidance in the Strange Situation Procedure is interpreted as an observational sign of the assumed underlying working model of an insecurely attached child (Cassidy & Kobak, 1988), we propose that in an attachment perspective, distrust, false positive affect, and self-devaluation may be behavioral expressions of the underlying negative IWMs of attachment disordered children.

Attachment disorder as a trans-relational construct?

Observed attachment patterns in infants usually are specific for one relationship (e.g. mother or father). However, attachment research repeatedly has shown that attachment patterns also influence behavior in other relationships beyond the caregiver–child relationship (Sroufe, Egeland, & Carlson, 1999; Thompson, 2016). Thus, individuals also behave towards others based on their IWMs and the social scripts they have learned. We expect this not only to be the case for organized or disorganized attachment but also for children with RAD. We propose that signs of RAD in older children do not characterize a single relationship to one caregiver but characterize a generalized, trans-relational behavior tendency in interaction with different adults. Having no preferred attachment figure is one sign of RAD as assessed in the DAI (Humphreys, Fox, Nelson, & Zeanah, 2017). Thus, children with RAD

typically do not differentiate in their emotional and social behaviors while interacting with known and unknown adults when emotionally aroused suggesting that RAD is not a specific disordered attachment pattern to one caregiver but is shown in interaction with many adults. This trans-relational pattern is expected to change when children differentiate their caregivers from other adults. If RAD would only characterize children in a specific relationship it could not be diagnosed in new foster care families or institutions and could not be assessed right after placement with a new caregiver. Therefore, we expect that signs of RAD can be observed in dyadic interactions with both familiar and unfamiliar adults. In contrast, children without RAD symptoms are expected to differentiate in their social and emotional reactions between adult caregivers and strangers.

Comorbidity of RAD

Growing up under conditions of deprivation, neglect or maltreatment not only increases the risk of developing RAD but also the risk of developing other forms of psychopathology even when children experience positive changes of their caregiving environment by adoption or foster care placement (Humphreys et al., 2017; Kennedy et al., 2016). The increase in attachment security explained the significant reduction in internalizing symptoms in formerly socially deprived children in foster care in infancy and toddlerhood but not in middle childhood (Humphreys et al., 2017). In the Bucharest Intervention Project, symptoms of RAD were moderately associated with externalizing and internalizing symptoms as well as ADHD in older children (Guyon-Harris et al., in press). Thus, it is relevant to examine possible comorbidity of RAD symptoms with other mental health problems when studying children with a history of neglect or maltreatment.

Aims of the current study

Most studies on attachment disorder focus on early childhood (Gleason et al., 2011), whereas studies focusing on middle childhood or adolescents (Minnis et al., 2009; Vervoort, De Schipper, Bosmans, & Verschueren, 2013) or inhibited attachment disorder are rare. Moreover, there are only few studies that use observation beside caregiver report on the inhibited form of RAD. Therefore, the present study focuses on school-aged children and the assessment of inhibited RAD behavior by observation and caregiver report. Moreover, the study aims to fill the research lacuna on IWMs in children at risk for developing RAD. Therefore, we created emotionally arousing dyadic interaction situations to make RAD behavior and signs of negative IWMs of children observable, and developed an observational coding system. The current study examines the validity of this assessment approach and associations with self-concept and mental health, addressing six research questions.

(1) Do school-aged children at risk for attachment disorder compared to non-clinical controls differ in signs of RAD as assessed by (a) caregiver questionnaire, (b) caregiver interview, and (c) direct observation of the child?
(2) Is there significant convergence between caregiver reports on signs of RAD in questionnaire and interview, and the frequency of RAD signs in direct observation?

(3) Do children show more observed signs of RAD in dyadic interaction with a familiar caregiver than with an adult stranger?
(4) Do children at risk compared to non-clinical controls have a more negative self-concept and show more observable signs of negative IWMs?
(5) Are negative self-concept and observable signs of negative IWMs significantly associated with reported and observed signs of RAD?
(6) Are signs of RAD significantly associated with mental health?

Method

Participants

Participants were 64 German children from different institutions and community controls with their main caregiver. Child age ranged from five to ten years (M = 7.86 years, SD = 1.27 years). The caregivers were mainly female (89%) with an age range from 21 to 57 years. Children in the control group (N = 32, 56% female) lived with at least one biological parent. The RAD risk group (N = 32, 66% female) consisted of children living in orphanages, foster families, or children's villages who have been taken out of their biological families because of severe neglect or maltreatment. Thus, all children of the risk group had a caregiving history that increases the risk of developing RAD. Mean age at placement was 45 months (ranging from 1 to 108 months). 91% of children in the risk group experienced one placement, one child experienced two, and one child four different placements. At the time of assessment of this study the mean duration of placement was 48 months (ranging from 7 to 107 months).

Procedure

In-home visits were conducted by pairs of two research assistants, who were trained in a standardized assessment procedure. Children were observed while interacting with their main caregiver and an unknown adult in several emotion-eliciting situations. Interactions were videotaped and later coded by independent, trained, blind, and reliable coders. Children's self-concept was assessed by reading the questions to the children and showing vignettes, caregivers' report on signs of RAD in a questionnaire and an interview.

Measures

Assessment of inhibited attachment disorder symptoms

We applied a multimethod approach of assessing symptoms of inhibited RAD using a questionnaire and interview for caregivers and a newly developed observation tool for attachment disordered behaviors in children.

Relationship Problem Questionnaire

The Relationship Problem Questionnaire (RPQ; Minnis et al., 2002) is an 18-item questionnaire for caregivers with a 4-point scale: "exactly like my child = 3", "like my child = 2", "a bit like my child = 1" and "not at all like my child = 0". The RPQ has four subscales: *inhibited RAD behaviors, disinhibited RAD behaviors, behavior inhibition*, and *emotional behavior problems* with good internal consistency in this study. Given the focus of this special issue, we only report the results on the *attachment inhibition subscale* (α = .69) which includes the following items (aggressive towards him/herself, no conscience, looks frozen with fear, refuses to be approached when approached, false quality of affection, and never know whether s/he will be friendly or unfriendly when approached). The RPQ was incomplete for one child of the non-clinical controls leading to data for 63 children.

Disturbances of Attachment Interview

The DAI is a semi-structured interview with a caregiver to assess signs of attachment disorder also in older children (Humphreys, Nelson, Fox, & Zeanah, 2016). It consists of 12 main questions on children's social and emotional behaviors. The caregivers' answers are coded by trained raters on a 3-point scale from 0 to 2 with higher scores indicating a more severe sign of the disorder. Given the focus of this special issue, we report results on the *Inhibited Attachment Disorder* scale as sum score questions 1 (rarely or minimally differentiates among adults), 2 (rarely or minimally seeks comfort preferentially from a preferred caregiver), 3 (rarely or minimally responds to comfort when hurt/frightened/distressed), 4 (rarely or minimally responds reciprocally to a caregiver), 5 (has emotion regulation difficulties; shows little positive affect; is irritable/sad) with a possible range from 0 to 10. The interviews were rated by three different coders after an extensive training and blind to any information about the sample. The inter-observer concordance was high with Cohen's Kappa > .62, rater agreement of >83% for all raters.

Observed attachment disorder behavior

Attachment disorder behavior was assessed during children's dyadic interactions with their primary caregiver and an adult stranger. We developed a new observation tool for attachment disordered behaviors in children (Coding of Attachment Disorder Behavior in Children (CADBC); Iwanski & Zimmermann, 2013) and coded inhibited and disinhibited attachment disorder behaviors.

We created a series of situations that elicit negative emotions and allow observing the children's reactions in dyadic interaction with the caregiver and an adult stranger. As separations from the caregiver are not always valid in eliciting negative emotions in older children and children from institutions all have experienced fundamental separations, we used an interactive situation where the child is losing in an interactive game, a situation which is known to elicit intense negative emotions (Berlin & Cassidy, 2003). In a standardized procedure, the child first plays with the familiar caregiver and then with a stranger. Both, caregiver and stranger first let the child win and then let the child lose. This report is based on the losing episodes of the competitive game "Halli Galli" which is appropriate for middle childhood. Children show the most intense negative emotions when losing as pretested in pilot studies (Iwanski & Zimmermann, 2015). One child of the risk group did not lose, so data analysis for observation is based on 63 children.

Observed signs of *inhibited RAD* behavior were coded by event sampling according to ICD-10 and DSM-5 descriptions of relevant symptoms, published research criteria, and additional coding criteria observed in pilot studies (Iwanski & Zimmermann, 2015; Zimmermann & Iwanski, 2013) and previously discussed in the European Attachment Disorder Consortium Meetings[1] (Teams by Gottfried Spangler, Isabel Soares, Helen Minnis, and Peter Zimmermann).

Our observation schedule for *inhibited RAD* behavior includes 16 different categories of inhibited attachment disorder symptoms: (1) contradictory ambivalent social reactions (e. g., simultaneous proximity seeking, avoiding eye-contact, and verbal resistance), (2) loss of receptiveness/child is not relievable (e.g. child cannot be soothed, not accessible when distressed), (3) lack of joy (e.g. no or minimal signs of joy), (4) withdrawal (e.g. child crouches down), (5) aggressive reaction to own distress (e.g. hitting oneself), (6) aggression towards others when distressed or seeing other's distress (e.g. hitting others), (7) hypervigilance/frozen watchfulness (e.g. observing the caregiver with lowered head and tense body), (8) dysregulated negative emotional reactions interfering with social exchange (e. g., social interaction disturbed or interrupted by child's emotional dysregulation), (9) lack of seeking comfort when distressed (e.g. child shows negative emotions and does not seek or communicate need for comfort), and (10) lack of eye contact when distressed (e. g., striking avoidance of eye-contact in negative mood). In addition, all forms of poor reciprocity in the form of *unpredictable-controlling behavior* in the observed dyadic interaction including children's (11) *bizarre behavior* (e.g. grimacing, strange vocalization), (12) *unpredictable change in social interaction* (e.g. sudden unexpected change from cooperation to rejection), (13) *unpredictable change of the underlying behavior pattern* (e.g. sudden unexpected change from happy to sad mood, shy to hyperactive), and (14) *sudden initiation of contact to the adult* when the interaction is going to end. Moreover, comparable to the DAI we coded children's *quality of reactions to offered comfort*. This category includes (15) *no observable reaction* to comfort, and (16) *avoidance* or *rejection* of comfort which both caregiver and strangers offered to the child as instructed. All 16 criteria were coded independently with both interaction partners in order to empirically examine children's reactions to familiar and unfamiliar adults. The CADBC also allows assessing *disinhibited attachment disorder/social disengagement disorder* behavior.

The frequencies of all 16 categories were *z*-transformed to control for variability in frequency of single variables. *Z*-scores were added to a sum score for children's signs of inhibited RAD in dyadic interaction with the caregiver, a stranger, and an overall RAD score as mean score of both dyadic interactions. Internal consistency of the CADBC was good with $\alpha = .83$ for the overall inhibited RAD score, $\alpha = .82$ for the caregiver RAD score, and $\alpha = .65$ for the stranger RAD score.

Observed signs of negative IWMs

Based on assumptions of attachment theory (Bowlby, 1973; Bretherton, 1996) we also coded observational signs of children's *Negative IWMs* of self and others during the interaction. Individuals build working models to interpret and forecast the responses of their caregivers and working models of the self about how acceptable one is and whether one can expect support from caregivers. Bowlby (1973) clearly emphasized children's tendencies to generalize working models and proposed that children in

nurseries not only feel unwanted by their former and current caregivers but also by anyone. Thus, similarly as attachment patterns in the SSP are interpreted as observable signs of children's underlying IWMs and not as the immediate response to caregiver's current behavior (Cassidy & Kobak, 1988), we adopted this idea in our coding procedure of observable signs of negative IWMs of children with a history of neglect. As insecurely attached children do not express their negative emotions directly to a stranger after experiencing failure (Lütkenhaus et al., 1985), we concluded that similarly not communicating negative emotions to adult caregivers and adult strangers may also be expected in children with more extreme negative caregiving experiences. We assumed that children's expectations of adults' unpredictability or rejection when expressing their need for help and also their negative working model of self can be observed by at least three categories: (1) *observable signs of distrust in adults* (e.g. verbally imputing negative intentions to the adult), (2) *expressing false positive affect towards adult* (e.g. false smile when losing), and (3) *direct utterances of negative IWM of self* (e.g. child's comments on own incompetence). The absolute frequency of all three categories were *z*-transformed and then added to one score (α = .56) for interaction with the main caregiver, the stranger, and as mean score for both interaction partners, representing the frequency of observable signs of negative IWMs.

The observed signs of inhibited attachment disorder and the observed signs of negative IWMs were independently coded by two blind reliable coders. 50 single episodes were used as reliability set with Cohen's kappa > .70 (> 80% agreement) for all single categories. Moreover, randomly selected videos were additionally coded by both raters and disagreement was discussed. Observational data of one child of the RAD risk group was missing.

Self-concept

Children's self-concept was assessed with the Harter Self-Concept Scale (Harter, 2012), combining the cognitive competence (six items, α = .67) and peer-acceptance (six items, α = .73) subscales of the German version of the Harter Self-Concept Scale (Asendorpf & Van Aken, 1993) and the behavioral conduct subscale (six items, α = .61) from the original questionnaire (Harter, 2012). We used these subscales as we did not expect effects of negative caregiving environments on children's athletic self-concept. Children were presented vignettes or sentences and children's responses were coded on a 4-point scale. Each child was first asked whether the child presented in the vignette/sentence is like him/her or not and then was asked to differentiate very similar/dissimilar from similar/dissimilar using an iconic scale. An overall score of children's self-concept was computed as mean of all three subscales (α = .74). For one child of the risk group, the Harter scales were not available, so data analysis is based on 63 children.

Children's mental health

Children's mental health and prosocial behavior was assessed by means of the German version of the Strengths and Difficulties Questionnaire (SDQ, Klasen, Woerner, Rothenberger, & Goodman, 2003). Caregivers rated items on a 3-point Likert scale (0 = "not applicable" to 2 = "clearly applicable") resulting in five subscales: *emotional*

problems (α = .69), *conduct problems* (α = .60), *hyperactivity* (α = .83), *peer problems* (α = .75), and *prosocial behavior* (α = .62). For one child of the control group, the SDQ was not available. Data analysis is based on 63 children.

Results

Preliminary analyses

Inhibited RAD behavior

Inhibited RAD behavior was assessed in a multimethod approach by use of the RPQ (Minnis et al., 2002), the DAI (Smyke & Zeanah, 1999), and the CADBC (Iwanski & Zimmermann, 2013). Table 1 shows means and standard deviations of signs of RAD as reported by the primary caregiver (RPQ and DAI) and frequency of RAD behaviors coded by blind and reliable coders (CADBC). Data of 63 caregiver questionnaire reports (RPQ), 64 caregiver interview reports (DAI), and 63 observations (CADBC) were available.

Table 1 shows that inhibited RAD symptoms rated by the caregivers with the RPQ showed a maximum score of 9.00 given a possible range from 0 to 18, the inhibited RAD score in the DAI showed a maximum of 5.00 with a possible range of 0 to 10. The CADBC–RAD score reveals a maximum of 198 single observed events during both dyadic interactions. Self-concept scores reached the maximum of the scale of 4.00. The frequencies of the observed signs of negative IWM range from no signs of negative IWM to a maximum of overall 13 events in both dyadic interactions. SDQ scores range from no mental health problems to clinically relevant problems.

Differences in RAD Symptoms and Observed Signs of Negative IWMs between the RAD Risk Group and Non-Clinical Controls

Next, we examined whether the RAD risk sample and the control group differ in signs of RAD for all three assessment approaches (see Table 2). The observational data (CABDC) represent the sum of the *z*-standardized frequencies of all RAD categories to control for differences in the frequency of single RAD signs. ANOVAs revealed significantly higher

Table 1. Descriptive statistics of variables.

RAD Symptoms	*N*	*M*	*SD*	Min.	Max.
RPQ (questionnaire)	63	1.41	2.18	0.00	9.00
DAI (interview)	64	1.08	1.23	0.00	5.00
CADBC (observation)	63	44.70	33.25	5.00	198.00
Signs of IWMs of Self and Others					
Harter Self-Concept Scale	63	3.13	0.38	2.17	4.00
Observed Signs of Negative IWM					
Overall	63	3.16	3.16	0.00	13.00
With caregiver	62	1.35	1.65	0.00	7.00
With stranger	63	1.83	2.23	0.00	8.00
SDQ					
Emotional problems	63	2.30	2.13	0.00	8.00
Conduct problems	63	2.79	2.02	0.00	8.00
Hyperactivity	63	3.65	2.61	0.00	10.00
Peer problems	63	1.73	2.06	0.00	9.00
Prosocial behavior	63	7.51	1.83	3.00	10.00

N = Sample size, *M* = Mean, *SD* = Standard deviation, Min. = Minimum, Max. = Maximum; RPQ = Relationship Problems Questionnaire, DAI = Disturbances of Attachment Interview, CADBC = Coding of Attachment Disorder Behavior in Children, SDQ = Strengths and Difficulties Questionnaire, IWM = Internal Working Models.

Table 2. Differences in inhibited RAD behavior, self-concept, and observed signs of negative IWMs between children of the RAD risk group and non-clinical controls.

RAD symptoms	Children at risk Mean (SE)	Non-clinical controls Mean (SE)	*F*
Caregiver Report			
RPQ	2.41 (0.46)	0.39 (0.14)	16.95***
DAI	1.56 (0.25)	0.59 (0.13)	11.70**
Observation CADBC			
Overall score	0.12 (0.09)	−0.11 (0.05)	8.32**
With caregiver	0.10 (0.13)	−0.09 (0.05)	4.44*
With stranger	0.13 (0.08)	−0.13 (0.06)	7.64**
IWM of Self			
Harter Self-Concept	3.00 (0.07)	3.25 (0.06)	7.35**
Observed Signs of Negative IWM			
Overall	1.22 (0.70)	−1.18 (0.37)	12.58**
With caregiver	0.65 (0.41)	−0.61 (0.24)	8.45**
With stranger	0.59 (0.41)	−0.57 (0.24)	6.66*

CADBC are *z*-scores; RPQ = Relationship Problems Questionnaire, DAI = Disturbances of Attachment Interview, CADBC = Coding of Attachment Disorder Behavior in Children, SDQ = Strengths and Difficulties Questionnaire, IWM = Internal Working Model; *$p < .05$; **$p < .01$; ***$p < .001$.

RAD symptoms in the RAD risk group as reported by the their caregivers in the RPQ ($F(1,61) = 16.95$, $p < .0001$; Cohen's $d = 1.05$) and the DAI ($F(1,61) = 11.70$, $p = .001$; Cohen's $d = 0.87$) compared to caregiver reports on non-clinical controls.

In addition, ANCOVAs controlling for the duration of the dyadic interactions showed a significantly higher frequency of observed CADBC RAD symptoms in the RAD risk group compared to non-clinical controls for both dyadic interaction situations ($F(1,60) = 8.32$, $p = .005$; Cohen's $d = 0.74$), and the dyadic interaction with the caregiver ($F(1,59) = 4.44$, $p = .04$; Cohen's $d = 0.54$), and the stranger ($F(1,60) = 7.64$, $p = .008$; Cohen's $d = 0.71$). Thus, children of the RAD risk group show more signs of RAD in both caregiver reports and in direct observation compared to the control group.

Differences in Self-Concept and Observed Signs of Negative IWMs between Children at Risk for RAD and Non-Clinical Controls

Similarly, we examined group differences in children's self-concept and observed signs of negative IWMs (see Table 2). Non-clinical controls had a significantly more positive self-concept compared to children from the RAD risk group ($F(1,61) = 7.35$, $p = .009$; Cohen's $d = 0.69$). An ANCOVA controlling for duration of dyadic interaction showed that children of the RAD risk group showed more observed signs of negative IWMs (CADBC) in the overall dyadic interaction score compared to non-clinical controls ($F(1,60) = 12.58$, $p = .001$; Cohen's $d = 0.91$). This also was the case for the dyadic interaction with the caregiver ($F(1,59) = 8.45$, $p = .005$; Cohen's $d = 0.74$) and the adult stranger ($F(1,60) = 6.66$, $p = .01$; Cohen's $d = 0.66$). In an exploratory analysis, we examined the number of children in each group who expressed any sign of observed negative IWM to both caregiver and stranger compared to the number of children who did not. In the RAD risk group, 21 out of 24 children who expressed negative IWM to the caregiver also expressed it to the stranger. Only 5 children (16%) of the RAD risk group did not express signs of negative IWM at all. In the control group, all 15 children who expressed negative

IWM to the caregiver also expressed it to the stranger. However, 16 children (50%) of the control group did not show signs of negative IWM at all.

Concordance of RAD measures

Next, we examined whether caregiver reports of RAD symptoms in the questionnaire and interview were associated with observed RAD symptoms. Results showed moderate but significant positive associations between inhibited RAD scales of RPQ and DAI (r = .29, p = .02). Observed CADBC overall RAD scores also were significantly positively associated with the caregiver reported DAI inhibited RAD scale (r = .29, p = .02). However, RPQ caregiver reports were not significantly associated with observed CADBC RAD coding (r = .18, ns).

Looking more specifically, whether caregiver reports would be associated with children's behavior in dyadic interaction with the caregiver but not with the stranger we found that caregiver reported DAI inhibited scores correlated significantly positively with the observed RAD symptoms towards the stranger (r = .33, p = .008; [95%CI .09 to .60] whereas the association with observed sings of RAD score while interacting with the caregiver (r = .21, p = .11; [95%CI −.04 to .47]) only showed a trend. As differences in significance between correlations do not automatically imply differences in the underlying associations, we tested, whether the correlations between DAI inhibited RAD score and observed signs of RAD with caregiver and stranger are significantly different (Steiger, 1980), which was not the case (z = .97, p = .17). Thus, caregiver DAI ratings of children's RAD signs are positively and comparably associated with observed signs of RAD while interacting with caregiver and stranger.

Observed RAD signs in interaction with caregiver and stranger

A core characteristic of attachment is the selection of specific attachment figures. In contrast, children with RAD do not select a specific attachment figure. Indeed, also the DAI assesses whether a child has no preferred attachment figure. The observational approach chosen here offers the possibility to test whether children show signs of RAD in dyadic interaction with both their familiar caregivers and a stranger or whether children differentiate between them, showing signs of RAD more often to the caregiver compared to the stranger. First, we tested whether children's RAD behavior towards their caregivers is associated with their RAD behavior to a stranger. We found a moderate but significant positive association between observed RAD symptoms towards the caregiver and the unknown adult (r = .50, p < .0001). Thus, children who showed more RAD symptoms towards their caregiver also tended to show more RAD symptoms towards the stranger. Next, we examined in 2 × 2 MANCOVA with dyadic interaction partner (caregiver vs. stranger) as within subject factor and risk status (RAD risk group vs. controls) as between subject factor whether children differ in the mean frequency of their RAD behavior towards the caregiver and the stranger and whether this depends on risk group status. The frequency of observed signs of RAD towards caregiver and stranger did not differ significantly and there was no significant interaction effect between risk status and dyadic interaction partner on observed signs of RAD. Thus, RAD symptoms in middle childhood in this sample are expressed at a similar frequency during the interaction with the stranger and the caregiver. We conclude that observed RAD symptoms are expressed with "trans-relational" consistency.

Table 3. Correlations between signs of inhibited RAD and observed signs of negative IWMs and self-concept.

	IWM			
	Observed Signs of Negative IWM			Harter
RAD Symptoms	With caregiver	With stranger	Overall	Self-concept
Report				
RPQ	.25+	−.07	.12	−.18
DAI	.17	.05	.13	−.25*
CADBC Observation				
Overall score	.60***	.34**	.55***	−.25*
With caregiver	.54***	.18	.40**	−.27*
With stranger	.55***	.37**	.56***	−.19

CADBC scores controlled for duration of dyadic interaction; +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Associations Between Signs of RAD, Self-Concept, and Observed Signs of Negative IWMs

Next, we examined the relation between RAD intensity and children's self-concept, and observed signs of negative IWMs (see Table 3). Inhibited RAD as reported by the caregiver in the RPQ was neither significantly associated with observed signs of children's negative IWM nor with their self-concept. Inhibited RAD symptoms reported in the DAI were significantly associated with a more negative self-concept but not with observed signs of negative IWM. However, the frequency of observed signs of RAD was significantly associated with a higher frequency of observed signs of negative IWM in the dyadic interaction with the caregiver, the stranger, and the overall score. In addition, children's self-concept was significantly negatively associated with observed symptoms of RAD in interaction with the caregiver and the overall observed RAD score. Thus, children with more observed RAD symptoms report a more negative self-concept and show more observed signs of negative IWM during social interactions.

In addition, the children's reported self-concept was significantly negatively associated with observed signs of negative IWM during interaction with the caregiver ($r = -.29$, $p = .03$) but not with the stranger ($r = -.19$, ns). Children with many signs of observed negative IWM in dyadic interactions have a more negative self-concept.

Comorbidity of RAD symptoms

Finally, we examined the possible comorbidity of signs of RAD and mental health problems assessed by the SDQ. Table 4 shows that inhibited RAD scores, reported and observed, were moderately positively associated with all SDQ problem scales and

Table 4. Correlations between of signs of inhibited RAD and comorbid mental health problems.

	SDQ				
	Emotional Problems	Conduct Problems	Hyper-activity	Peer Problems	Prosocial Behavior
RAD Symptoms					
Caregiver Report					
RPQ	.53***	.57***	.34**	.35**	−.29*
DAI	.22+	.48***	.40***	.43***	−.35**
CADBC Observation					
Overall score	.39**	.42***	.36**	.30*	−.40***
With caregiver	.36**	.36**	.25+	.24+	−.38**
With stranger	.37**	.39**	.39**	.31*	−.31*

CADBC scores controlled for duration of interaction; +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

negatively with prosocial behavior. Thus, children with a high number of attachment disorder symptoms as rated by caregivers or observed were described by their caregivers as showing more emotional, conduct, and peer problems and hyperactivity, as well as lower levels of prosocial behavior.

Discussion

We examined, whether children at risk of developing RAD who were taken out of their family of origin because of a caregiving history of neglect or maltreatment, and now live in institutions, foster families, or children's villages show more signs of inhibited RAD compared to non-clinical controls. We compared three assessment approaches, a direct rating of symptoms by the caregiver using the RPQ, an interview approach, where the caregiver's answers are coded by trained raters, and an observational approach, where children's behavior is coded in a social dyadic context while eliciting negative emotions. The results show that children of the RAD risk group had higher RAD scores as reported by their caregivers and also showed significantly a higher frequency of observed signs of inhibited RAD compared to non-clinical controls. The results provide first support that signs of RAD, as listed in ICD-10 and DSM-5, can be elicited and observed during dyadic social interactions that induce negative emotions in children and activate their need for comfort or social regulation by adults. Interestingly, this was the case while interacting with the caregiver and an adult stranger. The results seem to support the etiological hypothesis that children who have experienced neglect and social and emotional deprivation earlier in life show a higher prevalence of inhibited attachment disorder (Steele & Steele, 2014; Zeanah & Gleason, 2015). The RAD risk group in this study consists of school-aged children who now live in institutions or children's villages and some in foster care. Results of the Bucharest Intervention Project suggest that RAD symptoms in infants and toddlers can diminish if children are raised in high quality foster care in early childhood. However, the same study also shows that at ages 8 and 12, an age similar to that of this sample, children from both the care as usual group still living in institutions and the foster care group had a higher RAD score in the DAI compared to the never institutionalized group (Humphreys et al., 2017). Thus, although no longitudinal study, this study shows similar results in children in middle childhood when comparing children at RAD risk with children without extreme negative caregiving experiences. Signs of RAD in a group of children who have experienced intense neglect or maltreatment and were taken out of their families of origin as a consequence of these experiences show increased signs of RAD, as reported by their caregivers who know their former caregiving history as well as independently observed in dyadic social interactions by trained raters blind to children's caregiving history. This emphasizes the validity of the observational approach applied here.

The observational approach in the assessment of signs of RAD was chosen in an attachment tradition where attachment patterns usually are not coded based on caregiver ratings but on observation of the child's interactive behavior in a distressing, emotion eliciting social situation. We therefore also examined whether the caregivers' ratings or descriptions of the child's RAD behavior can be observed independently. We found some evidence for convergence between the different RAD assessment approaches. The two caregiver reports were positively but moderately associated,

showing some concordance. Observation of RAD symptoms with the CADBC system correlated significantly positively with the caregivers' DAI ratings. Therefore, we see this as supporting evidence for some convergent validity. However, the positive associations with RPQ ratings were not significant. Thus, observation of RAD signs is associated more clearly with the interview approach of the DAI where caregiver's answers on questions on signs of RAD are interpreted by qualified coders as compared to the direct ratings of children's symptoms by caregivers who usually have no or little clinical or observational training. However, this topic needs further examination and replication. Future research needs to examine whether the frequency of RAD behavior as assessed here needs to be accompanied by additional intensity ratings of observed RAD symptoms. Moreover, the associations between the three approaches in this study are only moderate although comparable to the associations found between other attachment measures like SSP classifications and attachment security in the AQS of $r = .25$ (Cadman, Diamond, & Fearon, 2018).

The results of this study show that the RAD scores in non-clinical controls are not zero, neither in caregiver ratings nor observation. Thus, there is evidence that single signs of RAD may well be reported by caregivers or observed in children with no history of neglect. This is similar to results from the Bucharest Intervention Project where DAI inhibited RAD scores in the never institutionalized group were low but not zero (Smyke et al., 2012). In our perspective, practitioners should bear in mind not to overgeneralize single signs of RAD.

We also examined group differences in self-concept and as an exploratory variable observable signs of negative IWMs. Results show that children at risk, having experienced neglect and being taken out of their families show a less positive self-concept and more observed signs of negative IWMs towards both interaction partners. This was specifically the case when children at risk were interacting with their caregivers. When children at risk for RAD experience negative emotions they seem to distrust caregivers more often, present themselves in a more positive mood than they seem to feel, and more often derogate themselves during dyadic social interactions. This is in line with meta-analytic evidence that children who still live in orphanages have a less positive self-concept compared to children who changed to a stable caregiving environment by adoption (Juffer & Van IJzendoorn, 2007). Moreover, children with a high caregiver-rated RAD score and with many observed RAD signs have a more negative self-concept. This was especially the case during the caregiver–child interaction. Thus, not only insecure attachment is associated with a more negative self-concept (Booth–Laforce et al., 2006; Cassidy, 1988; Zimmermann & Grossmann, 1997) but also RAD.

The interpretation of distrust in others, false positive affect despite distress, and utterances of own incompetence when experiencing failure is an exploratory approach based on core ideas of attachment theory about the children's expectations regarding others and perceptions of themselves when experiencing failure (Bretherton, 1996; Lütkenhaus et al., 1985) and clearly needs replication and additional research. However, these observed signs of negative IWMs are significantly associated with children's negative self-concept and also with more observed signs of RAD. As the observed negative IWM also includes false positive affect when experiencing negative emotions, caregivers might not be aware of school-aged children's negative feelings and

their need for support. This also might influence caregiver's ratings as RAD children tend to signal their needs less open.

One aspect of the assessment of RAD are possible developmental changes in signs of RAD. Just as attachment behavior develops from proximity seeking to emotional communication when children get older and have additional abilities for self-regulation (Main & Cassidy, 1988; Zimmermann & Spangler, 2016) we also expect that signs of RAD change in phenotypic expression but remain their validity as signs of the disorder. The DAI is used at all assessments in the BEIP, suggesting that it can be validly used throughout childhood (Humphreys et al., 2017). Given the high association of observed attachment disorder behaviors and signs of negative IMWs in this study we would suggest including these negative IWM behaviors as additional observational criteria for RAD in older children and adolescents. However, this needs further discriminate validation in other observational contexts as both variables have been coded separately but in the same dyadic interaction which may increase their association.

An interesting finding of this study is the obvious trans-relational nature of RAD symptoms in school-aged children. When observed, RAD symptoms in older children are shown in interaction with familiar caregivers and unknown strangers when negative emotions are elicited. Indeed, not differentiating between adults is a sign of inhibited RAD in the DAI and a reduction in RAD symptoms is expected to be associated with a clearer differentiation between familiar caregivers and unfamiliar adults. Thus, the results of this study were expected and support the validity of empirical studies assessing inhibited RAD symptoms to new caregivers in foster care or institutions, who in the beginning of placement are all strangers to the children (e.g. Bovenschen et al., 2016). The observed signs of inhibited RAD towards the stranger assessed in this study should not be confused with signs of disinhibited attachment disorder (ICD-10) or DESD (DSM-5) only because they are expressed towards a stranger. Attachment research has shown that infants coming new into foster care show a variability of different attachment strategies to their new and unknown caregivers who in the beginning are strangers to them (Stovall & Dozier, 2000). The results of this study suggest that older children with RAD symptoms already have generalized negative IWMs of distrust towards others. As RAD is a disorder, we assume that this transfer to other relationships will be even stronger than in insecurely attached children (Bowlby, 1973) where empirical evidence already has shown that attachment patterns to caregiver predict social behavior in other contexts (Fearon & Belsky, 2011; Lütkenhaus et al., 1985; Sroufe et al., 1999).

Similar to results from the BIP (Humphreys et al., 2017) signs of RAD were associated with diverse mental health problems and low prosocial behavior independently of the RAD assessment approach. This either suggests that RAD symptoms in older children show a high comorbidity with a variety of disorders or that children with RAD have a very broad or intense deficit in self-regulation across domains. Moreover, as associations are moderate, we interpret the results also as showing that the assessed RAD symptoms are not identical to specific symptoms of any other single mental health problem but show the broad maladjustment of these children.

Although our study provided support for an observational approach of coding RAD symptoms the findings should not yet be generalized at the current stage of research. Additional analysis seems necessary to show whether the observed behaviors can also be observed in other negative emotion eliciting contexts. We have chosen four

additional dyadic contexts and are currently coding children's RAD behaviors with the CADBC to test trans-situational stability and the concordance with caregiver report which clearly is based on experiences with the child in many contexts over time. Future research needs to examine also at a physiological level whether the elicitation of negative emotions chosen here is intense enough to challenge the children's self-regulation and elicit their need for comfort and external regulation comparable to separations in infants and toddlers. In addition, the exploratory coding of observed signs of negative IWMs needs further validation. Despite these limitations, we suggest to include observation into the diagnostic process to improve the validity of RAD classifications in children. The coding approach using the CADBC for older children may be seen as a first step in this direction.

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