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Disorganized Attachment Representations, Externalizing Behavior Problems, and Socio- Emotional Competences

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Abstract

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Disorganized attachment is a risk-factor for developmental maladaptation in the form of externalizing behavior problems, and for poor development of competences important for socio-emotional functioning. Concerns have however been raised regarding theoretical overextension, and there is consequently a need for multifactorial studies that examine which outcomes disorganized attachment is reliably important for. There is also a lack of research on the mechanisms that mediate the relation between disorganized attachment and externalizing problems. The present thesis therefore examined whether disorganized attachment is a specific risk-factor for symptoms of Oppositional Defiant Disorder (ODD) or Attention-Deficit/Hyperactivity Disorder (ADHD), or a non-specific risk factor for both types of problems. Several emotional and cognitive competences were investigated as mediators, with the question of whether disorganized attachment becomes associated with externalizing problems primarily through any specific mechanism, or through multiple mechanisms. Three studies were conducted. Children completed the separation anxiety test for attachment representations and laboratory tasks for distinct competences, and parents and teachers rated emotion regulation and ODD- and ADHD-symptoms. **Study I** was cross-sectional and found that disorganized attachment contributed specifically to conduct problems when accounting for ADHD-symptoms. However, disorganized attachment did not contribute to ADHD-symptoms when accounting for conduct problems. **Study II** found that children with disorganized attachment representations show deviations in identification of emotional expressions, in the form of a generally diminished ability to discriminate between expressions rather than in response biases. **Study III** was (short-term) longitudinal and replicated the results from Study I; disorganized attachment was primarily associated with ODD-symptoms, not ADHD-symptoms. Elevated emotional reactivity and poor regulation, particularly for anger and fear, mediated the relation between disorganized attachment and ODD-symptoms. Taken together, the present findings suggest that disorganized attachment may constitute a specific risk factor for externalizing problems pertaining to anger and aggression, such as oppositionality and misconduct, rather than ADHD-problems. Importantly, the findings caution against ideas of a pathway from disorganized attachment to ADHD-symptoms. The deviations in processing and regulation of anger and fear corroborate Bowlby's proposal that these emotions are closely connected, central to disorganization, and a potential mediating mechanism in relation to externalizing problems.

Keywords: Disorganized Attachment, Oppositional Defiant Disorder, Attention-Deficit/Hyperactivity Disorder, Emotion Regulation, Self-Regulation

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When You Walk Through a Storm

Hold Your Head Up High

And Don't Be Afraid Of The Dark

At The End of The Storm

There's A Golden Sky

And The Sweet Silver Song Of A Lark

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I **Forslund, T.**, Brocki, K. C., Bohlin, G., Granqvist, P., & Eninger, L. (2016). The heterogeneity of attention-deficit/hyperactivity disorder symptoms and conduct problems: Cognitive inhibition, emotion regulation, emotionality, and disorganized attachment. *British Journal of Developmental Psychology*, *34*(3), 371-387. doi:10.1111/bjdp.12136
- II **Forslund, T.**, Kenward, B., Granqvist, P., Gredebäck, G., & Brocki, K. C. (2017). Diminished ability to identify facial emotional expressions in children with disorganized attachment representations. *Developmental science*, *20*(6), e12465. doi:10.1111/desc.12465
- III **Forslund, T.**, Peltola, M., & Brocki, K. C. (2018). Disorganized attachment, externalizing behavior problems, and socio-emotional competences in Early School-Age. *Submitted for publication*

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The contribution of Tommie Forslund to the studies was as follows:

Study I: Co-planned and co-designed the study, collected $\frac{2}{3}$ of the data, coded the attachment interviews, analyzed the data, and wrote the manuscript with contributions from the main supervisor and co-authors.

Study II: Co-planned and co-designed the study, collected $\frac{1}{2}$ of the data, coded the attachment interviews, analyzed the data, and wrote the manuscript with contributions from the main supervisor and the co-authors.

Study III: Co-planned and co-designed the study, collected $\frac{1}{2}$ the data, analyzed the data, and wrote the manuscript with contributions from the main supervisor and the co-author.

Selected additional scientific work not included in the thesis

1. Granqvist, P., **Forslund, T.**, Fransson, M., Springer, L., & Lindberg, L. (2014). Mothers with intellectual disability, their experiences of maltreatment, and their children's attachment representations: A small-group matched comparison study. *Attachment & Human Development, 16*(5), 417. doi: 10.1080/14616734.2014.926946
2. **Forslund, T.**, & Duschinsky, R. (2018). Attachment Theory: A Reader. *Book Submitted for publication*
3. **Forslund, T.**, & Granqvist, P. (2016). Psychodynamic Foundations. In: T. K. Shackelford & V. A. Weekes-Shackelford (eds.), *Encyclopedia of Evolutionary Psychological Science* (pp. 1-5). Springer, Cham. doi:10.1007/978-3-319-16999-6_1972-1
4. **Forslund, T.**, & Granqvist, P. (2016). Evolutionary Foundations of the Attachment System and Its Functions (pp. 1-10). In T. K. Shackelford, V. A. Weekes-Shackelford (eds.), *Encyclopedia of Evolutionary Psychological Science*. doi:10.1007/978-3-319-16999-6_1960-1
5. **Forslund, T.**, Granqvist P. (2017). Effects of Attachment Quality and Organization. In: T. K. Shackelford & V. A. Weekes-Shackelford (eds.), *Encyclopedia of Evolutionary Psychological Science* (pp 1-11). Springer, Cham. Doi: 10.1007/978-3-319-16999-6_1964-1
6. Frick, M. A., **Forslund, T.**, Fransson, M., Johansson, M., Bohlin, G., & Brocki, K. C. (2018). The role of sustained attention, maternal sensitivity, and infant temperament in the development of early self-regulation. *British Journal of Psychology, 109*(2), 277-298. doi:10.1111/bjop.12266
7. Frick, M., **Forslund, T.**, & Brocki, K. (2018). Can reactivity and regulation in infancy predict inattentive and hyperactive/impulsive behavior in 3-year-olds? *Development and Psychopathology, 1-11*. doi:10.1017/S0954579418000160
8. Brocki, K. C., **Forslund, T.**, Frick, M., & Bohlin, G. (2017). Do individual differences in early affective and cognitive self-regulation predict developmental change in ADHD-symptoms from preschool to adolescence? *Journal of attention disorders*, doi:10.1177/1087054717693372

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Abbreviations

ADHD

EF

Fr/Fr

IWM

ODD

SAT

SSP

Attention-Deficit/Hyperactivity
Disorder

Executive Function

Frightening/Frightened

Internal Working Model

Oppositional Defiant Disorder

Separation Anxiety Test

Strange Situation Procedure

Introduction

Human infants develop strong and selective bonds – attachments – to their caregivers; maintaining proximity and protesting separations, retreating to the caregivers as safe havens when distressed, and using them as secure bases from which to explore the environment (Bowlby, 1988). John Bowlby, a British child psychiatrist and psychoanalyst, formulated attachment theory based on three convictions; that attachment is a primary motivation (the universality hypothesis), that attachment quality depends in part on caregiving quality (the sensitivity hypothesis), and that attachment quality is important for children’s psychological development (the competence hypothesis; Bowlby, 1969/1980; Mesman, van IJzendoorn, & Sagi-Schwartz, 2016).

Decades of careful research has corroborated each of these core notions. Caregiver sensitivity has been established as the main predictor of attachment quality (De Wolf & van IJzendoorn, 1997). A robust association, albeit of small to moderate magnitude, has also been demonstrated between variations in attachment quality and broad indices of developmental (mal) adaptation, such as externalizing behavior problems (e.g., Groh, Fearon, van IJzendoorn, Bakermans-Kranenburg, & Roisman, 2017). Additionally, links have been obtained with a variety of competences important for socio-emotional functioning, such as emotion regulation (Forsslund & Granqvist, 2017). Attachment theory has consequently become one of the most influential perspectives on child development (Reijman, Foster, & Duschinsky, 2018).

Notwithstanding the theory’s success, pertinent questions have come of age and need empirical inquiry. The work presented herein pertains to questions concerning the competence hypothesis. First, success tends to come at a cost, and concerns have been raised that the theory’s expansive breadth of scope may have resulted in theoretical overextension (Sroufe, 2016). Indeed, attachment quality has now been linked to most aspects of child development, and there is a proliferation of mini-theories on the consequences of variations in attachment quality (Thompson, 2016). In fact, insecure attachment in general, and disorganized attachment in particular, has been invoked to such an extent in explaining clinical phenomenon that leading scholars have seen it necessary to caution against misunderstandings of the theory and misuse (Granqvist et al., 2017; Main, Hesse, & Hesse, 2011). There is consequently a need for multifactorial research examining which outcomes attachment quality is reliably important for when taking the overlap between different outcomes into account (developmental integration). Second, there

is a lack of research on the mechanisms through which attachment quality may influence children's developmental adaptation (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010). Hence, there is an urgent need for theory driven research on distinct aspects of functioning that may constitute mediating mechanisms. Many competences have been proposed as mediators but multi-factorial research is scarce, rendering it unclear whether any competence should take precedence or if attachment influences adaptation broadly through multiple mechanisms (Groh et al., 2017).

Informed by these questions, the overall purpose of the present thesis was to examine disorganized attachment (Main & Solomon, 1986/1990), the type of insecurity most strongly associated with externalizing problems (Fearon et al., 2010), in relation to symptoms of Oppositional Defiant Disorder (ODD) and Attention-Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association [APA], 2013). Whereas disorganized attachment has long been linked to ODD-symptoms (Bowlby, 1944), theory and research on disorganization as a predictor of ADHD-symptoms represent a more recent extension (Thorell, Rydell, & Bohlin, 2012). Caregiving behavior has been linked to child ADHD-symptoms (Deault, 2010), and development of competences that in of themselves predict ADHD-symptoms (e.g., executive functioning; Bernier, Carlson, Deschene, & Matte-Gagné, 2012). A pathway to ADHD-symptoms through disorganized attachment would also open up new avenues for family based intervention programs, which is an attractive prospect given the hotly debated topic of neuro-stimulant medication in childhood (Kutcher et al., 2004; Nakao, Radua, Rubia, & Mataix-Cols, 2011). However, research on disorganization and ADHD-symptoms has yet to take into account important confounds, including comorbid ODD-symptoms (Nigg, 2006).

Distinct competences linked to externalizing problems and disorganized attachment, and which may constitute mediating mechanisms, were also examined, including social information processing (e.g., Dykas & Cassidy, 2011), emotional competences (Sroufe, Egeland, Carlson, & Collins, 2009) and cognitive competences (Bernier, Matte-Gagné, Bélanger, & Whipple, 2014). Variations in social information processing are close to Bowlby's (1973) account on internal working models (IWMs), and their proposed workings through attentional processes. Variations in emotional competences reflect an emphasis on safe haven aspects of caregiving such as dyadic regulation, thought to be integral to emotional development (e.g., Solomon & George, 2011). Finally, variations in cognitive abilities reflect a growing emphasis on secure base aspects of caregiving such as supporting children's exploration, which is thought to be integral to the development of cognitive control (e.g., Bernier et al., 2014).

Background

Paraphrasing Henry Wadsworth Longfellow (1872) and Martin Luther King Jr. (1963), we are “both anvils and hammers”, “both makers of history and made by history”. There is no reason to believe that attachment theory is any different. On the contrary, its emergence and development into the theory it is today should have been influenced by a variety of factors pertaining to both Bowlby’s and Ainsworth’s *context of discovery* and the field’s subsequent work in the *context of justification* (Proctor & Capaldi, 2006). Science entails building models of the world – theories – which we use to explain and predict real-world phenomenon. This endeavor necessitates developing core assumptions and operationalizing key constructs, a process that in turn entails deciding on what to include as relevant and what to disregard. Important seeds to the questions facing attachment theory today, and possibly to their resolution, may therefore be gained by attention to history and the assumptions that attachment scholars have developed. Lest not forget, past is prologue, and an awareness of how we have been made by history may be key to our making of history (Reis, 2010).

Attachment Theory

It is often emphasized that attachment theory is a *relational theory*, and it is sometimes highlighted that the theory was formulated as a psychodynamic objects relations theory that emphasizes a certain kind of *objects*; caregivers. These claims are certainly true, to an extent. However, Bowlby formulated attachment theory through an abductive effort in which he integrated theory and research from multiple scientific disciplines. This immense intellectual endeavor, which was supported empirically by Mary Ainsworth and her coworkers (Ainsworth & Bowlby, 1991), has resulted in a hugely generative theory that is still thriving half a century after its inception. Alas, encompassing formulations of attachment, and the caregiver’s role in attachment development, have arguably constituted double edged swords that have invited the current pluralism of theories on the consequences of attachment quality. Furthermore, the field’s subsequent emphasis on some aspects of Bowlby’s initial theorizing, and a comparable neglect of other aspects, has likely contributed to a reification of attachment quality as “relationally determined” and misunderstandings (Granqvist et al., 2017).

The present introduction will therefore begin by elaborating on some core tenets of attachment theory, as originally proposed by Bowlby, and how the theory has developed into the theory it is today. In doing so, and with an eye on the competence hypothesis, four key points will be elaborated. These four points will then be elaborated more thoroughly in the following, wherefore the knowledgeable reader may skip to “the competence hypothesis”.

- a. Attachment theory has its roots in psychoanalysis and has become an important empirical pillar for contemporary psychodynamic approaches. Psychodynamic theories tend to emphasize the importance of early caregiving, and there may consequently be a shared inclination within the field, for better or worse, to explain clinical phenomenon with reference to early child-caregiver relationship quality.
- b. Bowlby (1969) initially argued for a narrow conceptualization of the functional consequence of attachment; increasing infants’ chances of survival by maintaining proximity to caregivers. However, he then opened up to the possibility that attachment may also have facilitated learning important skills from interactions with caregivers (the attachment-teaching hypothesis; Bowlby, 1973). Later, he also adopted Ainsworth’s secure base concept and the notion that attachment quality may influence children’s development through affecting their exploration (the attachment-exploration hypothesis; Bowlby, 1988). The pluralism and breadth of functional considerations (Marr & Poggio, 1976) have arguably contributed to the current multitude of mini-theories regarding the consequences of attachment quality.
- c. Bowlby characterized the attachment system as a complex behavioral control system and argued that its goal-directed functioning depends on various support-systems that are recruited to guide behavior and affect. Thus, organization of attachment behavior should not be reducible to solely the effects of caregiving experiences, but also depend on the development of competences that support or hamper goal-directed behavior (cf. executive functioning; Diamond, 2013).
- d. Bowlby argued that attachment entails organization of expectations, attention, behavior and affect, which becomes grounded in cognitive-affective representations of self and others. These representations, he argued, should guide behavior and, in the case of insecurity, may manifest in defensive exclusion of threatening information. Consequently, attachment should also be readily examined after infancy using representational measures that target children’s expectancies on others availability and responsiveness.

Phenomenological Foundations

Bowlby, who had lost an important attachment figure himself (i.e., his nanny), had an early interest in the importance of continuity in caregiving and preventing prolonged child-caregiver separations, the latter of which he regarded as a possible trauma for personality development (Bowlby, 1969/1980; Forslund & Granqvist, 2016a). His research into the long-term effects of early child-caregiver separations also found that adolescents treated for antisocial behaviors had experienced markedly more losses and prolonged separations from their caregivers than clients who suffered from other types of problems (Bowlby, 1944). His research into the short-term effects of separations for overnight stays in hospitals also suggested untoward effects; the children's suffering was plain to see, related to the absence of the caregiver, and carried over to the reunions in which initial avoidance tended to give in to marked distress (Bowlby, Robertson, & Rosenbluth, 1952). Moreover, children evacuated to the countryside, so as to not have to suffer the bombing of London, often fared worse emotionally than children who stayed in London with their caregivers (Freud & Burlingham, 1943).

Notwithstanding the importance of such findings, Bowlby concluded in a WHO-report that there was a lack of knowledge about the processes whereby the ill effects of separations are brought into being (Bowlby, 1951). He therefore turned his attention toward understanding the nature of children's ties – attachments – to their caregivers (Bowlby, 1958). Nonetheless, his point of reference remained serious events such as bereavement and prolonged separations, and their potentially deleterious effects on development. Such experiences, he argued, could be “disorganizing” to the functioning of the attachment system since its functioning is thought to be organized around the continuous presence of certain objects (Solomon, Bakum, Duschinsky, & Schuengel, 2017). As such, Bowlby's interest in attachment quality was centered on what today has become known as disorganized attachment.

Psychoanalytical Foundations

Bowlby's theoretical point of departure was psychoanalysis, but the dominant psychoanalytical theories of his time shared none of his convictions regarding attachment (Forslund & Granqvist, 2016b). In brief, Bowlby (1969) contested the dynamic and economic principles of the meta-theory, which advocated a closed system of psychical energies that build up independently and need discharge for homeostasis (Rapaport & Gill, 1959). Along these lines attachment were considered secondary to children's channeling of psychical energies and being fed. Bowlby called these theories, which he deemed unscientific, for secondary drive theories and the cupboard theories of love.

Bowlby believed that a credible alternative explanation was needed for change to occur, and the quest that resulted in attachment theory was his way

of providing one, with the ultimate goal of modernizing psychoanalysis. Indeed, Bowlby retained central psychoanalytical concepts such as defense mechanisms and trauma, and argued at lengths that Freud would have welcomed his ideas. He was consequently saddened to be ostracized from the psychoanalytical association due to his presumably reductionist ideas in wanting to sacrifice psychoanalytic concepts for what was observable.

An Inclination toward Relational Explanation

Bowlby was part of a “third-wave” school of psychoanalysis, known as the British school of objects relations, whose scholars shared his conviction that the relationship with the first important “objects”, the caregivers, was important for development. Bowlby was for example particularly influenced by Donald Winnicott, who shared his view that children come into the world sensitive to social interactions and in need of healthy interactions to develop well. This school of thought has now become the mainstream of psychodynamic theory. Interestingly, attachment theory has also become an important part of many psychodynamic approaches, in part due to the empirical research it has generated, and is now often regarded as an empirical foundation for psychoanalysis (Fonagy, Gergely, & Target, 2008).

Practitioners who espouse attachment theory may therefore have a shared inclination to explain clinically relevant phenomenon by references to relational constructs such as trauma. As discussed in the following, this may not only have facilitated the huge interest in the disorganized attachment category (Main & Solomon, 1986/1990). It may also have contributed to a reification of the construct as etiologically relational, and a comparable downplaying of the possibility of biologically channeled pathways to disorganized behavior. Indeed, it is interesting to note that the rapprochement with psychoanalysis was facilitated by the move to the level of representation (Main, Kaplan, & Cassidy, 1985), and the development of linguistically and representational measures of attachment that are in part based on retrospection.

Evolutionary and Ethological Foundations

Bowlby’s search for a credible explanation of attachment found its point of impact when he realized the potential of explaining human attachment behavior using ethological concepts, through the pioneering control system’s ethologist Robert Hinde (e.g., 1959). Not only was ethology concerned with the development of close social bonds between animal offspring and their parents, it was also anchored in the usage of empirical methods such as naturalistic observations (Forslund & Granqvist, 2016c).

An Evolutionary Evolved Behavioral System

Ultimately, Bowlby’s starting point became evolutionary theory and Darwin’s (1859) theory of natural selection. He therefore came to draw heavily

from ethology, which he regarded as the best application of Darwin's theories to behavioral systems in animals. At heart, Bowlby argued that humans, like all species, are endowed with behavioral systems that have been retained through evolution since they happened to serve adaptive biological functions in our ancestral species-typical environments. More specifically, individuals who became endowed with certain behavior systems had increased rates of survival and reproduction and left more progeny. The genes of these individuals were therefore differentially passed on and the behavioral systems eventually became stable characteristics of the species. Attachment behavior should consequently be underpinned by a particular behavioral system.

Bowlby was particularly inspired by the phenomenon of imprinting seen in bird offspring (Lorenz, 1963; Tinbergen, 1951). Fledglings, although able to find food themselves, nonetheless develop bonds to their parents and follow them wherever they go. These bonds, Bowlby argued, must therefore have served some other evolutionary function than feeding. Harlow's (1958) studies on rhesus monkey infants and inanimate surrogate mothers then became important for bridging the gap between birds and humans. The rhesus infants clearly preferred a soft wool-clad surrogate mother that could provide "contact comfort" to a steel-clad one that could provide nourishment, suggesting that the need for a close and enduring relationship is a primary motivation (cf. instinct) and not a secondary result of feeding. Indeed, it has been argued that Bowlby tailored attachment theory to not only account for the behaviors shown by virtually all human infants, but also those shown by our closest evolutionary relatives (Suomi, 2008). The question still remained, however, what particular function attachment had served.

Proximity Maintenance as the System's Function

Bowlby (1969) believed that the biological function of a behavioral system cannot be any favorable outcome its performance may have, and therefore searched for a specific function that attachment may have fulfilled. Human infants are born vulnerable and dependent on their caregivers support for a proportional amount of time that is largely unparalleled in other species. Our ancestral environments were also fraught with danger, including a risk of falling prey to predators. Bowlby (1969) therefore hypothesized that the specific function of the attachment system is maintaining proximity to caregivers (the "predictable outcome" of activation), since proximity had increased chances of survival through protection (the functional consequence). Children's behavior when the attachment system is activated (e.g., signaling and approach behavior) also tends to result specifically in proximity to caregivers (Cassidy, 2016). Attesting to the centrality of maintaining proximity and preventing separations, Bowlby actually used the term following response at first, which is semantically close to imprinting, before he arrived at attachment (R. Duschinsky, personal communication, April 19, 2018).

Alternative Accounts of the System's Function

Bowlby's narrow account offers little guidance for the competence hypothesis; the attachment system could conceivably have been selected only due to facilitating infant's survival. Nonetheless, Bowlby emphasized that attachment is important for personality development, an assertion which is suggestive of an adaptive function beyond immediate survival. Indeed, Bowlby (1973) also speculated that child attachment may have facilitated learning important skills from caregivers. Later, he also came to adopt Ainsworth's secure base concept (Ainsworth, Blehar, Waters, & Wall, 1978), which emphasize that attachment figures are important vantage points for children's exploration of the environment (Bowlby, 1988).

It has also been argued that attachment may have served multiple functions (Main & Hesse, 1992), or facilitated children's learning about minds (Shai & Belsky, 2011). Differences in such computational considerations (e.g., Marr & Poggio, 1976) are important for subsequent levels of analysis, including how attachment is thought to be manifest in overt behavior and to be implemented in neurological substrates. Ultimately such considerations should have bearing for which competences attachment is hypothesized to be important for. For instance, a following response emphasizes maintenance of proximity to and movements *toward* the object. This definition of attachment is arguably most consonant with theories that emphasize the caregiver's role as a *safe haven* that provides protection and comforts children when distressed, with children thought to learn from close interactions with their caregivers (Solomon & George, 2011). It is semantically different from the concept of secure base, which references bidirectional movements, including movements *away* from the object. Of course, it may be argued that children may need contact with the base, a line of flight, to dare to venture away and explore (Duschinsky, Greco, & Solomon, 2015). Nonetheless, the secure base concept is arguably more consonant with theories that emphasize that attachment quality may influence children's development through affecting their autonomous exploration (Bernier et al., 2012). There is currently no consensus on the relative importance of secure base and safe haven functioning in children's attachment development. If anything, it is often emphasized that these roles are mutually dependent, that attachment figures must simultaneously provide a safe haven and a secure base (Marvin, Cooper, Hoffman, & Powell, 2002; Van IJzendoorn & Bakermans-Kranenburg, 2018). The inclusive operationalization of the function of child attachment, and the attachment figures role, has arguably invited the current pluralism of theories concerning the consequences of attachment for children's development.

Interactions with other Behavioral Systems

Bowlby (e.g., 1988) believed that it is important to keep the attachment system separate from other behavioral systems, most notably the exploratory

system. These systems, he argued, represent separate types of biologically rooted behaviors that have contributed to survival in distinct ways; by protection and through development of knowledge. Indeed, Bowlby felt that different behavioral systems had been unduly merged in psychoanalysis.

Bowlby (1969) maintained, however, that behavioral systems interact with one another. For instance, he proposed that the attachment system and the exploratory system are mutually inhibiting; that is, children will explore when there are no external or internal signals of threat. In contrast, exploration will decrease following activation of the attachment system, when children will be primarily motivated to seek proximity to their caregivers and protection. Consequently, attachment quality may influence children's exploration, which in turn may influence development of distinct competences and children's developmental adaptation. This position, which has become known as the "attachment-exploration hypothesis", is one of the most commonly invoked explanations for how attachment may influence children's development (van IJzendoorn, Dijkstra, & Bus, 1995). Whereas this position emphasizes the caregiver's role as a secure base, accounts that emphasize children's learning from close interactions with attachment figures, known as the "attachment-teaching hypothesis", places comparatively more weight on the caregivers role as a safe haven (van IJzendoorn et al., 1995).

Conflict between Behavior Systems

Bowlby (1969) also argued that the attachment system tends to be well aligned with the fear system, with children predisposed to withdraw to their caregivers when frightened. Alas, he also maintained that this response can become thwarted by "conflict", which is another central concept in his scheme. The concept of conflict was also adopted from ethology, and Bowlby used it to denote disruptions to the attachment system and its behavioral expression (Reisz, Duschinsky, & Sigel, 2017). Conflict is thought to arise when incompatible behavioral systems are activated simultaneously (Bowlby, 1969). Crucially, he argued that intense conflict, if not controllable by defense mechanisms, may lead to momentary loss of behavioral control and diminished environmental responsiveness. Essentially, and as elaborated in the following, this is an account of disorganization.

Drawing from Hinde (1966), Bowlby noted several kinds of conflict behavior, including alternations between contradictory behaviors, simultaneous contradictions between behaviors, redirection or misdirection of behaviors, and stereotypic behavior (Solomon et al., 2017). He reasoned that if a caregiver becomes associated with fear, the very haven of safety to which a child is impelled to return when distressed, this should lead to a situation of "threat-conflict" in which the fear systems simultaneously motivates the child to withdraw. Owing to a common debt to Robert Hinde, Bowlby's ideas regarding disorganized attachment are very similar to those that were subsequently outlined by Main and Solomon (1986/1990).

In understanding Bowlby's and Ainsworth's approach to attachment quality and personality development, it is interesting to note that the term *security* comes from the latin "sine cura", and means without anxiety (Ainsworth & Bowlby, 1991). Ultimately, a secure individual is one who is free from conflict. This assertion is mirrored in current accounts of attachment quality in which secure attachment is characterized by behavioral flexibility, and the insecure patterns are described as conditional and more rigid strategies (e.g., Cassidy, 1994). Secure attachment, which is the most common pattern of attachment, and which is regarded as normative, is often emphasized as a predictor of positive outcomes (Groh et al., 2017). A case could be made, however, that the effects of attachment quality on children's development may be best captured by insecure attachment, with conflict thwarting children's developmental trajectories. It has been argued that Bowlby was an ethologist at heart (Suomi, 1995), and Ainsworth and Bowlby (1991) actually called their approach to personality development *ethological*.

Systems Theoretical Foundations

Bowlby drew from early cybernetics (Miller, Galanter & Pilgram, 1960) and from Hinde (1959/1966), who applied control systems theory to ethology, to understand the structure and development of the attachment system.

A Control Systems Perspective

Bowlby (1969/1980) came to argue that the attachment system is a behavioral *control system*. In fact, the full term for the attachment system is the "attachment behavioral control system". He also argued that the system must have instructions, "set goals", regarding desired proximity to and availability of the caregiver, to be able to exercise control. These instructions are believed to be for an ongoing task rather than time limited events, since they pertain to continuous monitoring and maintenance of proximity.

Bowlby also argued that the attachment system, when fully developed, is a complex goal-corrected system that is organized to carry out plans. More specifically, the system is thought to be able to make use of different behaviors depending on situational constraints, and to adjust its behavioral expression depending on its performance, in order to achieve its predetermined outcome. This is in contrast to the proposed functioning of less complex systems that run their course in stereotyped chains when activated (cr. fixed action patterns). A prerequisite for complex goal-corrected systems is consequently that they are organized to take feedback into account. By feedback, Bowlby referred to processes whereby the effect of performance is continuously reported back to a regulating apparatus that compares it with its instruction to determine further action, in order to bring performance within the boundaries of the set goal. The degree of activation of the attachment system, and the momentary set-goal regarding proximity (the current set-

ting), is therefore thought to depend on activating and terminating feedback from internal and external sources that signal if there is cause for alarm.

Concerning the competence hypothesis, it may be argued that high activation of the attachment system results in reduced resources left for other activities, including ones devoted to learning. This is perhaps most readily seen in situations of immediate and intense activation of the attachment system, where children's attention and behavior becomes directed singlehandedly to increasing and maintaining proximity. However, it may also be argued that attachment activation can cause a drain of energy that influences subsequent behavior when the activation of the attachment system has decreased.

Environmental Programming

Bowlby (1969) advocated a developmental perspective and argued that the attachment system's emergence and development into a functional goal-corrected control system necessitates maturation and experience. Though having the disadvantage of taking time to become functional, Bowlby believed that the advantage of "labile" systems, which are open to learning, is that they permit modifications to suit the environment at hand. This is for example seen in the relation between caregiving and attachment quality; attachment development is regarded as a process in which children gradually learn to *organize* their expectations, attention, affect, and behavior in relation to the caregiver (e.g., Reisz, et al., 2017). Environmental programming through caregiver sensitivity is also the predictor par excellence of attachment quality (De Wolff & van Ijzendoorn, 1997).

In line with the organizational account of attachment, no single and de-contextualized behavior has been found to be enough as an index of attachment quality; environmental programming influences children's behavioral *organization*, it calibrates children's plans (Ainsworth et al., 1978; Sroufe & Waters, 1977). For instance, a secure child who wants to increase proximity may cry in one situation and approach the caregiver in another. The plan is the same, to increase proximity to the caregiver, but the means by which the child reaches its objective are different. The organizational aspect of the attachment system has remained a central feature of attachment theory. This is also salient in the conceptualization of disorganized attachment, which denotes an inability to maintain organization of attachment behavior due to conflict (Duschinsky & Solomon, 2017).

Regarding the competence hypothesis, and of relevance for the present thesis work, this characterization of the attachment system means that disorganized attachment behavior should overlap with phenomenon characterized by difficulties with behavioral organization, such as ADHD. Indeed, such overt similarities in behavior have likely contributed to an interest in disorganized attachment as a predictor of ADHD-symptoms. However, and as discussed in the following, neurologically channeled difficulties with behav-

ioral organization, as is common in ADHD, may also make it difficult for the attachment system to function in a complex goal-corrected manner.

Effector Equipment

Bowlby (1969) believed that the attachment system's functioning is mediated by the development and functioning of other systems. These systems, which he termed "effector equipment", can either support or hamper the emergence and organization of the attachment system. Since complex goal-corrected functioning is thought to include integration of attention, affect, and behavior, the attachment system's functioning should depend on the development of attentional networks, emotional circuits, and locomotor ability. This suggests, in turn, that deviations in dispositional factors such as temperamental reactivity (e.g., emotional reactivity) and regulation (i.e., effortful control; Rothbart et al., 2001) should influence the system's organization. Interestingly, Bowlby also took the term disorganization from the field of neurology, and discussions of intense emotional reactivity as a potentially overwhelming physiological experience (Reisz et al., 2017).

The meta-analyses on attachment quality and behavioral adaptation also suggested that resistant and disorganized attachment may be associated with temperamental negative reactivity (Groh et al., 2017). Though Bowlby emphasized the caregivers role as "psychic organizers" (Duschinsky et al., 2017), this suggests that the development and organization of attachment is far from reducible to experiences with caregivers. Insecure children's temperament may for instance influence the type of insecurity they develop, with the ability to maintain avoidant behavior likely facilitated by low reactivity and/or high regulatory ability (Belsky & Rovine, 1987). Moreover, children with intellectual disabilities, if insecure, have also been found to be disproportionately at risk for disorganized attachment classifications (Schuengel, Clasien, de Schipper, & Kef, 2013; Schuengel & Janssen, 2006).

Such findings are of great importance for the competence hypothesis. In the case of intellectual disability, few would argue that disorganized attachment is a risk factor for intellectual disability. Rather, a more plausible explanation is that neurological difficulties inherent to intellectual disability make it particularly difficult to maintain an organized-insecure behavioral strategy. Consequently, attachment theory and research should be careful not to infer effects of attachment quality on competences and indices of functioning that are highly heritable and characterized by neurodevelopment.

Cognitive Foundations

Bowlby (1973) argued that sensory input must be stored and organized into representations of the world in order for manipulation of new information and prediction. Here, Bowlby came to use the term "internal working models" (IWMs), adapted from early artificial intelligence theorizing by Young

(1964), to denote the development of cognitive-affective representations (Bretherton & Munholland, 2008). He argued that we necessarily construct complementary models of ourselves, including our ability to affect the environment, and of others, including what to expect in terms of availability and responsiveness. He also stressed that the IWMs, whence formed, will come to guide interpretations of external events and organization of attention behavior in future attachment-related situations. Children are therefore, for better or worse, thought to become co-creators of their subsequent experiences. Bowlby's account on IWMs have been integral to the move to the level of representation and the development of representationally based methods for examining attachment quality in both children and adults (Main et al., 1985).

The IWMs must be open to updating in order to function adaptively. At the same time, Bowlby argued that information that is incompatible with pre-existing models is unwelcome, since its integration requires reorganization of existing representations. This process, he argued, "must be preceded by initial disorganization" (Solomon et al., 2017, p. 17). Drawing from Piaget (1955), Bowlby (e.g., 1973) therefore argued that we typically make small corrections to our models (assimilation) and that stronger new input is needed for substantial change to occur (accommodation). Indeed, he argued that we protect ourselves against the potentially disorganizing effects of conflict and anxiety through psychological defenses based on information processing. For instance, instead of *repression* he argued that a normative process of selective attention becomes thwarted so that some types of information are defensively excluded (Reisz et al., 2017).

Expectations and attention are important parts of organization of attachment behavior. The representational measures of attachment make use of such theory and research, together with that on defense mechanisms (Main et al., 1985). In such measures, children are instructed to think about fictive children in situations where the attachment system tends to be activated, such as situations of distress and/or separation from caregivers. In doing so, children's own experiences with caregiver's, and the expectancies that these have given rise to, are thought to be activated and superimposed on the situations. That is, when answering questions regarding fictive children's feelings and actions, interviewed children are thought to draw from own experiences and expectations and thereby give the examiner an insight into their representations concerning attachment figure's availability and accessibility.

Systematization of Individual Differences

Attachment theory owes a lot to Bowlby's close collaborator Mary Ainsworth and her colleagues and students, most notably Mary Main and Judith Solomon, for the systematic mapping of individual differences in attachment quality and caregiving based predictor of attachment quality and organization (Ainsworth et al., 1978; Main & Solomon, 1986/1990).

The Strange Situation Procedure and the Emergence of Classifications

Ainsworth devised a semi-structured laboratory observation, the strange situation procedure (SSP), drawing on Bowlby's ideas about the interaction between the attachment system and the exploratory system (Ainsworth et al., 1978). The SSP enabled examination of how children organize their attachment behavior and their balance between attachment needs and those of exploration. Secure children, it is argued, shall be able to explore freely in the absence of threat signals, upon which they shall retreat to the caregiver (cf. the attachment exploration hypothesis).

The development of the SSP, and the discovery of the organized patterns of attachment (Ainsworth et al., 1978), has been a point of no return for attachment research and the competence hypothesis. Armed with a method for examining systematic differences in attachment quality, and the lure of categories, which were currency at the time, attachment research grew exponentially (Duschinsky, 2015). Alas, Ainsworth herself expressed dissatisfaction about how the SSP came to overshadow her longitudinal work on the association between caregiving and attachment, the very observations on which the validity of the SSP rest (Ainsworth & Bowlby, 1991). Indeed, she cautioned that the SSP has not always been used "wisely and well" (p. 7). In fact, it has been argued that she primarily saw the SSP as a way to validate her sensitivity observations (E. Waters, personal communication, March 20, 2015).

Organized Patterns of Attachment

Ainsworth and colleagues (1978) discovered three organized patterns of attachment. Following their landmark findings, "secure" children are typically characterized by a flexible balance between attachment behavior and exploratory behavior. In contrast, insecure-avoidant children show an organized but conditional pattern that is referred to as *minimizing*, due to their limited displays of attachment behaviors and affect following activation of the attachment system (Cassidy, 1994; Main, 1981). Furthermore, insecure-ambivalent/resistant children show a conditional pattern referred to as *maximizing*, due to their intense negative affect upon threats of separation and high levels of proximity seeking in combination with anger (Cassidy, 1994). Crucially, though these patterns are regarded as suboptimal and comparatively rigid, they are nonetheless considered to be organized patterns of behavior that ensures some degree of proximity and availability (Main, 1990).

Caregiver Sensitivity and the Organized Patterns of Caregiving

Ainsworth described the functions that caregivers need to fill for children to be securely attached using the two terms safe haven and secure base, discussed above. First, caregivers must function as "safe havens" to which the child can retreat when distressed; being warm and accepting of the child's bids for proximity, cooperating with the child, and responding sensitively to

the child's signals. Second, caregivers must also be "secure bases"; a reference point from which children can explore the environment. That is, caregivers must also convey that the environment is safe and that the caregiver is monitoring the child and is available should danger arise. In showing his appreciation of Ainsworth's contributions to attachment theory, Bowlby named his final book "a secure base" after her concept (Bowlby, 1988).

Following Ainsworth's and colleagues' work (1978) the three organized patterns of attachment shown in the SSP has been associated with three distinct patterns of caregiving. First, secure children tend to have caregivers who are "good enough" in perceiving their signals and responding to them timely and appropriately (Ainsworth, Bell & Stayton, 1974; Ainsworth et al., 1978). Whereas avoidant children tend to have caregivers who rebuff proximity seeking and show problems with high intensity signals, ambivalent children tend to have caregivers who are inconsistently sensitive and have problems with low-intensity signals (Cassidy & Berlin, 1994; Isabella & Belsky, 1991; Van IJzendoorn & Bakermans-Kranenburg, 2018).

In sum, research examining the predictors of attachment security has quite empathically corroborated Ainsworth's hypotheses. A meta-analytic association has for instance been obtained between caregiver's sensitivity and child attachment in the SSP (De Wolf & van IJzendoorn, 1997). Moreover, cross-cultural research has suggested that the three patterns of attachment and their antecedents are universal, with secure attachment unanimously perceived as the ideal (Mesman et al., 2016). Links to caregiver's own attachment representations have also supported a notion of intergenerational transmission of attachment (van IJzendoorn, 1995). Moreover, children who grow up in orphanages, who are bereaved of continuous responsiveness and opportunities to form selective attachments, often display disturbances long after adoption (Zeanah & Gleason, 2015). Consequently, few would question the validity of attachment as a phenomenon of importance in its own right, and some have argued that secure attachment should be regarded as the normative type of organization (the normativity hypothesis; Mesman et al., 2016).

The Transmission Gap

Notwithstanding the robust support for the sensitivity hypothesis, a "transmission gap" has been established between caregiver sensitivity and attachment quality, as reflected by an unsatisfyingly small meta-analytical association (van IJzendoorn, 1995). The consequent work in narrowing this gap has initiated reconciliation with the field of temperament (van IJzendoorn & Bakermans-Kranenburg 2012). For instance, it has resulted in an increased acknowledgement of the importance of biological dispositions, with children thought to exhibit differential susceptibility (cf. plasticity) to environmental influences (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007).

The work on bridging the transmission gap has also led to a variety of reformulations of the caregiving behaviors thought to be most crucial for at-

tachment quality. This has come to include such diverse aspects of caregiving as reflective functioning or mentalization (Fonagy & Target, 1997), mind-mindedness (Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002), parental embodied mentalization (Shai & Belsky, 2011), emotional dialogues (Oppenheim, Koren-Karie, & Sagi Schwartz, 2007), and autonomy support (Bernier et al., 2012). Yet, the transmission gap has only been narrowed (Verhage et al., 2016). It has therefore been suggested that the field should switch to a multifactorial perspective on caregiving (van IJzendoorn & Bakermans-Kranenburg, 2018).

Though seemingly disconnected from the competences hypothesis, theory and research on caregiving based predictors of attachment quality is of high relevance. For instance, a potential downside of the expansive inclusion of different caregiving behaviors is that it may simultaneously contribute to an increased hypothesis space concerning outcomes of attachment quality.

Disorganized/Disoriented Attachment

Some children were impossible to classify with Ainsworth's (1978) scheme, for instance showing avoidance in one reunion and ambivalence in the other, or inexplicable, bizarre, or fearful behaviors in the presence of the caregiver.

An Operationalization of Disorganization

Mary Main and Judith Solomon (1986/1990) concluded that many of the infants who were impossible to classify using Ainsworth's (1978) coding scheme had one thing in common; an inability to maintain an organized pattern of behavior in response to the caregiver upon attachment activation. Informed by Hinde's ethological ideas concerning conflict, disorganized behaviors were defined as "an observed contradiction in movement pattern, corresponding to an inferred contradiction in intention or plan" (p. 133). As elaborated by others, this definition actually includes two levels of analysis; confusion or conflict in visible behavior, and an inferred disruption of attachment behavior (Duschinsky & Solomon, 2017; Reijman et al., 2018).

Ultimately, disorganized behaviors should not be regarded as mere chaos, but behaviors suggestive of conflict between different behavioral systems, and which result in an interruption of the attachment response (Solomon et al., 2017). Disorganized children are thought to become stuck in an unsolvable conflict termed fear without solution (Main & Hesse, 1990). More specifically, disorganized children are thought to be impelled to approach the caregiver for protection, but simultaneously alarmed by the caregiver and hence motivated to withdraw. The attachment system therefore receives contradictory instructions and cannot settle on a set-goal for proximity, resulting in breakdown of behavioral organization (Forslund & Granqvist, 2016d).

It has been suggested that disorganized infants may, eventually, develop controlling strategies to deal with the conflict (Main & Cassidy, 1988). This

claim has been supported empirically, with approximately two thirds of disorganized infants developing either a controlling/caregiving or a controlling/punitive pattern during the preschool years (Moss, Cyr, & Dubois-Comtois, 2004). These findings suggest that it is important to disentangle various moderators that influence the patterns that children develop. Alas, there is still a comparable scarcity of research into these patterns, and few attachment instruments are validated to make these distinctions.

Pathways to Disorganized Attachment: Caregiving vs. Neurology.

Mary Main and Erik Hesse (1990) theorized that one pathway to disorganized attachment may stem from associating the caregiver with “alarm”, due to frightening/frightened and dissociative behaviors (Fr/Fr) on behalf of the caregiver. This pathway corresponds with Bowlby’s suggestion of a pathway from threat-conflict reviewed above (Reisz et al., 2017). Disorganized attachment is also common in abused and maltreated children, corroborating this notion (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010). A meta-analytic association has also been obtained between Fr/Fr behaviors and disorganization, suggesting that the caregiving behaviors predictive of disorganization are orthogonal to the ones that predict the organized patterns of attachment (Madigan et al., 2006).

However, not all children who are classified as disorganized have been maltreated. Indeed, this is a common misconception (e.g., Granqvist et al., 2017). For example, approximately 15% of children in normative samples are classified as disorganized (van IJzendoorn & Sagi, 1999). In explaining such findings, it is important to remember that Fr/Fr behaviors should not be equated with maltreatment. For instance, caregivers’ unresolved traumatic experiences have been linked with disorganized attachment in infants through momentary Fr/Fr behaviors in the absence of maltreatment (Schuengel, Bakermans-Kranenburg, & van IJzendoorn, 1999). Alternative pathways have also been suggested, including from hostile/helpless states of mind and atypical/disrupted emotional communication (Lyons-Ruth & Jacobvitz, 2016). Indeed, even prolonged separations have been suggested as potentially causative of disorganized attachment (Solomon & George, 2011).

Complicating matters further, temporary overstress, illness, and neurological vulnerability have also been linked to disorganized attachment classifications (Granqvist et al., 2016/2017; Padrón, Carlson, & Sroufe, 2014). For instance, emotional reactivity and difficulties with attention regulation in newborns have been linked to disorganized attachment classifications in the SSP (Spangler, Fremmer-Bombik & Grossman, 1996). Thus, it has been suggested that there may be different pathways to disorganized attachment classifications in different contexts. More specifically, dispositional risk factors may constitute a particularly salient pathway in low risk samples, with disorganized attachment developing if genetic risk interacts with insensitive caregiving (Spangler, 2013). Since children can show disorganized

behaviors without a disorganizing relational history, one cannot infer a disorganizing relationship merely from observing disorganized behaviors (Forsslund & Granqvist, 2016d; Granqvist et al., 2017).

Reification of Disorganized Attachment and Misapplication

Disorganized attachment has become subject to an enormous interest, including among clinicians and politicians. This has been facilitated by multiple factors; the initial framing of disorganization as a pattern, being common among maltreated children, being linked to frightening/frightened caregiver behavior, and being associated with maladaptation (e.g., Duschinsky, 2015). Indeed, disorganization has emerged as the type of insecurity most consistently linked with developmental (mal) adjustment, as captured by a meta-analytical association with externalizing problems (Fearon et al., 2010).

The optimism regarding disorganization as an indicator of maltreatment, and a risk-factor for psychological problems, have now grown to a point where national health institutes have undertaken feasibility assessments concerning screening all infants for disorganized attachment (The National Institute for Health and Care Excellence, 2015). Social workers have also been encouraged to look for disorganized behaviors in naturalistic settings as an indicator of maltreatment (Wilkins, 2012), and interest has grown in elevating disorganization to a diagnosis (Lyons-Ruth & Jacobvitz, 2016).

Concerns are being raised increasingly often, however, that attachment theory is commonly misinterpreted, and sometimes misapplied, in clinical practice (e.g., Main et al., 2011). A large number of the field's leading researchers even joined forces recently and released a consensus statement regarding the construct of disorganized attachment in order to counter common misunderstandings (Granqvist et al., 2017). Crucially, misunderstandings include both a tendency to infer caregiving based etiology to disorganized behavior and a deterministic belief that disorganized attachment, if not "treated", will almost inevitably result in maladaptive development. As aptly put by Reijman and colleagues (2018), disorganized attachment has had a high currency as a construct, and has been magnetized by a simplified image of a child fearful of or for his/her parents. Indeed, it is increasingly acknowledged that the construct has been reified, as exemplified by an undue belief that the various behaviors subsumed under the indices of disorganization are interchangeable in terms of etiology and consequences. However, few of the behaviors actually express fear and alarm directly (Duschinsky, 2015/2018; Duschinsky & Solomon, 2017). In line with this observation, neurological factors have been linked specifically to disorganized behaviors that do not show fear directly (Padrón et al., 2014).

Mary Main and Judith Solomon have also acknowledged that the construct was ambiguously introduced, for example through an overemphasis on fear without solution (Reijman et al., 2018; Solomon et al., 2017). Another reason for the reification may pertain to its clinical lure. Categorization is an

integral part of clinical work, where clinicians must decide whether a client meets criteria for a diagnosis. However, categories necessitate boundaries concerning what to include, and what not to include, and fuzzy sets are therefore at risk for being treated as crisp ones (Duschinsky, 2015).

Bowlby on Disorganized Attachment

As reviewed previously, Bowlby had a keen interest in disorganized attachment behavior. Indeed, the concept of disorganization likely reached Main indirectly from Bowlby via Ainsworth (Solomon et al., 2017). Science historians and theoreticians working with Bowlby's unpublished material have also noted that he addressed conflict and disorganization already from the 1950s (Reisz et al., 2017; Solomon et al., 2017). Indeed, he actually used the term in his published writings, and devoted an entire chapter to conflict in his seminal book "Attachment" (1969). Traversing the psychodynamic realm, it seems Bowlby sought to construct a theory of defense mechanisms to guard against *disorganization* (Reisz et al., 2017; Solomon et al., 2017). Unfortunately, he had retired at the time when disorganized attachment was eventually introduced, and ended up keeping his thoughts largely to himself.

Analyses of his unpublished material have suggested, however, that he preferred to treat disorganized behaviors as different from one another, rather than as reflecting a unitary entity (Duschinsky, 2018; Reisz et al., 2017; Solomon et al., 2017). He also cautioned against the term pattern, since he believed that readers may come to treat the construct similar to Ainsworth's (1978) patterns. He had also elaborated on at least three pathways to disorganization. The first pathway, *threat-conflict*, in which the source of safety becomes associated with threat, has been reviewed above. Additionally, he suggested one pathway from *safe haven ambiguity*, when the safe haven provides ambiguous signals concerning safety, and another from *activation without assuagement*, in which the attachment system is activated for too long, such as in prolonged separations and institutionalization (Reisz et al., 2017). In fact, he also discussed the possibility that neurological factors may interfere with the organization of the attachment system and its output.

Disorganized Attachment Moving Forward

As reviewed above, there is an enormous interest in disorganized attachment, including clinicians and politicians working in child welfare. This interest includes a strong positivity concerning the ability of disorganized attachment to predict children's psychological development. Alas, misunderstandings of the construct are common and it has been emphasized that attachment theory are sometimes misapplied in clinical work (Main et al., 2011). It is consequently of great importance to further the knowledge on the competence hypothesis; to disambiguate for what aspects of children's development that disorganized attachment is a reliably important predictor. This question will be the focus of the remainder of the introduction.

The Competence Hypothesis

The competence hypothesis, as initially introduced by Bowlby (1969), holds that attachment quality may influence children's development of important competences and their developmental adaptation. Indeed, effects of attachment quality and organization can be discussed on at least three non-exclusive levels (e.g., Forslund & Granqvist, 2017; van IJzendoorn et al., 1995). The first level concerns effects on the developmental adaptation; how children fare in important and broadly defined aspects of child development, such as peer relationships. The second level pertains to effects on the development of distinct competences important for socio-emotional functioning and developmental adaptation. That is, if attachment quality influences children's adaptation, through which distinct aspects of functioning do such effects come about. The third level addresses effects of attachment quality and organization on children's learning. The current work pertains to the first two levels, but references will be made to influences on learning when relevant to understand how attachment quality and organization may influence children's development of distinct competences and their adaptation.

Before reviewing empirical findings on the competence hypothesis, and in order to prevent deterministic beliefs about the consequences of attachment quality, it may be wise to remember Bowlby's (1969) emphasis on the importance of the fit between the organism and its environment. Indeed, Bowlby's position concerning attachment quality and child development is perhaps best described with the term "goodness of fit". More specifically, Bowlby argued that no system can be programmed to suit every environment equally well. Thus, if the attachment system becomes programmed to function adaptively within one particular environment, it may become comparatively inefficient in different environments.

Adaptiveness of any organization of the attachment system may therefore depend on the correspondence between the system's earlier programming and the environment in which it currently operates. Even secure attachment may therefore be disadvantageous in some environments (cf. naivety). Indeed, it would be difficult to explain why approximately forty percent of children and adults are insecure if it doesn't convey any benefits in some contexts (Mesman et al., 2016). Since secure attachment is characterized by behavioral flexibility, is the most frequent pattern, and the organized-insecure patterns have become described as conditional strategies, secure attachment has however taken on a role as a normative pattern.

The Level of Developmental Adaptation

An enormous corpus of research has examined associations between attachment quality and broad indices of developmental adaptation. That is, to what extent is attachment quality a predictor of how well children fare in salient

areas of development, such as in peer relationships. Since attachment theory emphasizes relationships, a particularly large body of research has examined socio-emotional aspects of development.

Meta-Analytical Support

The vast research has enabled a recent series of meta-analyses on the associations between attachment quality and three broad indices of developmental adaptation. First, one meta-analysis has been conducted on *social competence*, including indices such as peer acceptance or rejection, popularity, and pro-sociality (Groh et al., 2014). A second meta-analysis addressed the association with *internalizing behavior problems*, including indices such as anxiety, sadness, fearfulness, and withdrawal (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). A third meta-analysis examined the association with *externalizing behavior problems*, including indices such as aggression, oppositionality and conduct problems (Fearon et al., 2010).

The Meta-analyses demonstrated significant and robust links with all three indices of developmental adaptation, albeit of small to moderate magnitude, and with secure attachment linked to positive outcomes in general. Insecure-avoidant attachment emerged as most strongly associated with internalizing behavior problems, whereas disorganized attachment was most strongly associated with externalizing behavior problems (Groh et al., 2017). The meta-analytical association between disorganized attachment and externalizing behavior problems was small to moderate (Fearon et al., 2010). However, when evaluated as a single predictor and compared to the strength of other predictors, the association can be regarded as strong (Reijman & Duschinsky, 2018). For instance, it is comparable to the relation between caregiving and delinquency and relational aggression (Groh et al., 2017).

Theoretical Overextension

Success may often come at a cost, and concerns have been raised that attachment theory, with an expansive breadth of scope, may begin to suffer from overextension. For example, Sroufe (2016) recently pointed out that attachment quality has now been associated with almost all aspects of children's development; including but not limited to social and emotional functioning, cognitive functioning and intelligence, language development, nutritional status, and map-reading. Consequently, he warned that the theory may lose sight of its core and called for developmental integration. Similarly, Thompson (2016) concluded that there is now a proliferation of mini-theories of attachment which are grounded in different explanations of why attachment should be important for children's development. Though he emphasized that theoretical updates are inevitable, given the breadth of Bowlby's account and decades of scientific advances, he also argued that it is crucial to establish for which outcomes attachment is reliably important.

As outlined in the following, disorganized attachment status has been independently associated with different types of externalizing behavior problems, including ODD- and ADHD-symptoms. However, research examining disorganized attachment simultaneously in relation to both these problems, and accounting for their comorbidity, is notably scarce. Indeed, comorbidity rates between these problems often exceed fifty percent, and constitutes an important confound for research that only examine associations with one of these types of symptoms (Kutcher et al., 2004). Nonetheless, these problems are characterized by partially different etiology, have been linked to different correlates and outcomes (e.g., Dick, Viken, Kaprio, Pulkkinen, & Rose, 2005), and may respond differentially well to pharmacological and psychosocial interventions (Kutcher et al., 2004). Such findings attest to the utility of distinguishing between these symptoms, rather than treating them as the expression of a single underlying factor. The thesis work therefore took these problems as its starting point for addressing developmental integration.

Disorganized Attachment, ODD-symptoms and Conduct Problems

ODD is typically described as an age-inappropriate and persistent pattern of negativistic and oppositional behavior that causes significant impairment (APA, 2013). ODD-symptoms and conduct problems, which involve aggressive and antisocial behaviors that violate the rights of others and societal norms, are common childhood problems (Frick, Ray, Thornton, & Kahn, 2014; Rowe, Costello, Angold, Copeland, & Maughan, 2010). These problems, particularly if serious and debuting early (i.e., early-onset), are risk factors for a host of impairments and negative outcomes; including but not limited to educational and occupational problems, mental health problems, legal problems, social problems, and aggressive behavior and antisocial personality disorder (Frick et al., 2014; Loeber, Burke, & Pardini, 2009).

Early detection is crucial to preventive work and interventions, and that requires an understanding of etiology. There is consensus that there are multiple etiological predictors of ODD-symptoms and conduct problems, with multiple risk-factors on different levels (Burke, Loeber, & Birmaher, 2004; Smeekens, Riksen-Walraven, & Bakel, 2007). Such risk-factors include family factors (e.g., instability and conflict), caregiving factors (e.g., harsh, coercive and inconsistent discipline, low warmth), and child characteristics (e.g., impulsivity, poor emotion regulation, and low empathy (Lavigne, Dahl, Gouze, LeBailly, & Hopkins, 2015). Crucially, different subtypes of children with ODD-symptoms and conduct problems may, due to their differences in etiology and associated features, respond differentially well to different types of interventions (Frick et al., 2014). That is, different subgroups of children with conduct problems may display impairments in different competences that must be targeted, stemming from differences in underlying etiology. It is consequently important to detail different etiological subgroups, as well as the mechanisms by which these problems may emerge.

Disorganized attachment has been suggested as one risk-factor for ODD-symptoms and conduct problems (e.g., De Vito & Hopkins, 2001; Fearon et al., 2010). The link between disorganized attachment and aberrant caregiving also fits well with theory and research that emphasize caregiving based contributions to ODD-symptoms and conduct problems, such as from harsh and coercive parenting and low parental warmth (Crick & Dodge, 1994; Dodge & Pettit, 2003). In fact, Bowlby's own pioneering research on early child-caregiver separations suggested a link with anti-social outcomes (Bowlby, 1944). This theme has subsequently reverberated through the increasingly systematic research that was enabled by the organized patterns of attachment (Ainsworth et al., 1978), the "move to the level of representation" (Main et al., 1985), and the addition of the disorganized category (Main & Solomon, 1986/1990). For instance, Ainsworth and colleagues (1978) concluded that insecure children were less inclined to fall in with their caregiver's wishes (i.e., more disobedient). Lyons-Ruth also found that disorganized attachment status in infancy predicted hostility and aggression towards peers in preschool (Lyons-Ruth, Alpern & Repacholi, 1993), and markedly high levels of externalizing behavior in school-age children (Lyons-Ruth, Esterbrooks, & Davidson-Cibelli, 1997). Using representational measures, Bohlin and colleagues also found that disorganized attachment in late preschool predicted conduct problem and callous unemotional traits in early primary school (Bohlin, Eninger, Brocki, & Thorell, 2012).

The association between disorganized attachment and ODD-symptoms and conduct problems deserves increased attention through examination of mediating mechanisms (Fearon et al., 2010; Forslund & Granqvist, 2017; Groh et al., 2017). Indeed, the meta-analysis on externalizing problems concluded that there is a notable lack of research on the mechanisms whereby disorganized attachment may become associated with externalizing problems (Fearon et al., 2010). Consequently, there is an urgent need for theory driven research on mediating processes. Multiple competences have also been suggested; including cognitive ones such as poor executive functioning (Fearon et al., 2010; Low & Webster, 2015), deviations in social information processing such as attention to faces (Crick & Dodge, 2003; Peltola, Yrttiaho, & Leppänen, 2018), and emotional ones such as emotion dysregulation (Solomon & George, 2011; Sroufe et al., 2009). Integrative research including factors from different perspectives is however scarce (Groh et al., 2017).

Disorganized Attachment and ADHD-Symptoms

Attention-Deficit/Hyperactivity Disorder (ADHD) is typically defined as a neurodevelopmental disorder characterized by persistent and age-inappropriate symptoms of inattention and/or hyperactivity/impulsivity that causes functional impairment (DSM-V, 2013). ADHD is one of the most common childhood-onset disorders of self-regulation, with a prevalence of five to seven percent (Polanczyk, de Lima, Horta, Biederman, & Rohde,

2007; Willcutt, 2012). Yet, etiological knowledge is inconclusive, impeding precision in clinical assessment and treatment (Nigg, Willcutt, Doyle, & Sonuga-Barke, 2005; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005).

Etiological research was until recently conducted within a research tradition that searched for one single “core-deficit” that would explain all instances of ADHD (e.g., Willcutt et al., 2005). Consensus has grown, however, that this perspective, dominated by deficits in “top-down” regulation via executive functioning (Barkley, 1997), is insufficient and that there is likely additional pathways to the disorder. Consequently, the field has switched to a multiple pathways perspective and the suggestion of several endophenotypes with dissociable pathophysiology (e.g., Nigg, 2005). This shift has resulted in a surge of research on complementary pathways. Apart from theories suggesting breakdowns in motivationally laden “bottom-up” aspects of self-regulation (e.g., Sonuga-Barke, 2005) it has also triggered an interest in contributions from caregiving, for example through gene environment interactions (Frick, Forslund, & Brocki, 2018).

Research on caregiving and child ADHD-symptoms has documented a range of suboptimal caregiving behaviors, particularly among children with comorbid ODD and conduct problems; including but not limited to child-caregiver conflict, reduced caregiver warmth, less praise and reward, increased attention to overactive and impulsive behavior, and harsh, coercive and physical discipline (Deault, 2010; Modesto-Lowe, Danforth, & Brooks, 2008). Additionally, stress and psychiatric problems such as mood disorders, anxiety disorders, and antisocial personality disorder are prevalent among caregivers of children with ADHD-symptoms (Modesto-Lowe et al., 2008). Child ADHD-symptoms is in of itself a stressor that may influence caregiving negatively, and the direction of effect between caregiving and children’s ADHD-symptoms is therefore often unclear, with bidirectional and transactional effects conceivable. Notwithstanding influences of children’s ADHD-symptomatology on caregiving, suboptimal caregiving behavior may exacerbate children’s initial problems with self-regulation, and hence contribute to the severity of ADHD-symptoms and development of comorbid conditions. Indeed, ADHD-symptom severity is not necessarily predictive of functional impairment, suggesting that additional factors are important in determining whether children develop the disorder (Gordon et al., 2006). Additionally, the findings on caregiving and caregiver characteristics suggest that child-caregiver relationships may often become strained (Deault, 2010).

The increased interest in caregiving based contributions to ADHD-symptoms has paved the way for an interest in the potential role of insecure and disorganized attachment, the latter of which share behavioral features with ADHD (Thorell et al., 2012). Theoretically, disorganized attachment may cause ADHD-symptoms through negative effects on children’s development of self-regulatory competences, such as emotion regulation and/or executive functioning (Bohlin et al., 2012; Thorell et al., 2012). However,

views on a potential role for disorganized attachment differ greatly, in part due to historically different perspectives on etiology. Whilst there has been a strong emphasis on heritability and biologically channeled predictors in ADHD (Faraone, et al., 2005), attachment theory has hitherto prided itself with negligible genetic effects (Fearon & Belsky, 2016). Indeed, whereas Sroufe (2016) referenced ADHD-symptoms as a prime example of potential overextension of attachment theory, Thompson (2016) encouraged this extension.

Several studies have also documented associations between disorganized attachment status and ADHD-symptoms, typically using representational measures of attachment in short term longitudinal designs with late pre-school and early school age children (e.g., Bohlin et al., 2012; Thorell et al., 2012). However, a longitudinal follow-up of Thorell and colleagues (2012) study recently found that disorganized attachment in late preschool predicted ADHD-symptoms in adolescence (Salari, Bohlin, Rydell, & Thorell, 2016). Moreover, using the strange situation procedure Pinto and colleagues also found that disorganized attachment in infancy, among children next-born after still-berth, predicted ADHD-symptoms in early school age (Pinto, Turton, Hughes, White, & Gillberg). Spurred on by such findings, the optimism concerning the explanatory power of attachment classifications has grown to a point where scholars have invited considerations of attachment quality in the assessment and treatment of ADHD (Salari et al., 2016; Storebø, Rasmussen, & Simonsen, 2016).

Concerning potential mediators, there is an increased interest in the role of attachment quality in the development of executive functioning (EF; e.g., Bernier, Beauchamp, Carlson, & Lalonde, 2015), and poor EF should consequently be regarded as a potential mediator of the association between disorganized attachment and ADHD-symptoms. Alas, in one of the only attempts thus far to examine mediation, Thorell and colleagues (2012) failed to establish mediation by EF. There is also an increased interest in emotional liability and poor development of emotional competences in ADHD (Martel, 2009; Sobanski et al., 2010; Shaw, Stringaris, Nigg, & Liebenluft, 2014). Thus, poor emotional functioning constitutes another credible candidate.

Research on disorganized attachment and ADHD-symptoms is, however, comparatively scarce, and has yet to account for important confounds. For instance, markedly few studies have taken comorbid ODD-symptoms into account, and those that have done so have provided mixed results. For instance, whereas Thorell and colleagues (2012) found that the association between disorganized attachment and ADHD-symptoms remained with control for comorbid ODD-symptoms, Bohlin and colleagues (2012) found contrasting results. The link with ADHD-symptoms may therefore depend on comorbid ODD-symptoms, as previously cautioned by Nigg (2006). Consequently, additional research is needed. An alternative possibility, which to the best of my knowledge is yet to be examined, is that disorganized attach-

ment is a non-specific risk-factor for both types of symptoms. Examining specificity of associations with either type of symptom while controlling for the other would thus be a misplaced endeavor.

Research on attachment quality and ADHD-symptoms has also relied heavily on a few methods for assessing attachment representations, and it has been highlighted that the emphasis on narrative coherence in the coding of these measures may make them susceptible to the influences of ADHD-symptoms (Scholtens, Rydell, Bohlin, & Thorell, 2014). More specifically, children with ADHD often exhibit difficulties with narration and narrative coherence, and these difficulties are likely in part due to the biologically channeled vulnerabilities that result in ADHD-symptoms. Indeed, in the only study to date to address this problem, Scholtens and colleagues (2014) found that the association between disorganized attachment representations and ADHD-symptoms did not remain when controlling for problems with narrative coherence. Children who are high in ADHD-symptoms may therefore be at risk for being spuriously coded as disorganized due to difficulties inherent to ADHD-symptomatology, rather than due to a disorganizing relational history. Research is therefore needed using measures for attachment quality that may be less influenced by such factors. Finally, research on theoretically grounded mediating mechanisms is also urgently needed to move the level of discourse beyond predictive associations. As for the association with ODD-symptoms, through which aspects of functioning, through which distinct competences, may disorganized attachment result in ADHD-symptoms.

The Level of Distinct Competences

Bowlby (1973) emphasized that the link between (in) security and developmental (mal) adaptation may be mediated by suboptimal workings of the IWMs, through negative expectations on others availability and responsivity and thwarting of children's information processing. The integrative formulation of attachment theory, together with decades of subsequent theoretical developments and empirical research, has however resulted in a variety of alternative and/or complementary mediating mechanisms. Indeed, Bowlby himself came to argue that disorganized behaviors may be caused by overwhelming conflict, and that insecurity may lead to anger. Such assertions are for instance suggestive of emotion dysregulation as a potential mediator.

Disorganized Attachment and Social Information Processing

Bowlby accepted the psychoanalytical notion of defense mechanisms against overwhelming conflict. Nonetheless, he believed that the account on defense mechanisms needed updating. As an alternative to repression, Bowlby (1973) suggested that insecurity may manifest in defensive exclusion whereby attention is shifted away from threatening stimuli. In delineating this account, which emphasizes attention, Bowlby drew on theory on information

processing and memory (e.g., Norman, 1976). Social information processing is critical to social behavior. Deviations in basic aspects thereof, such as reduced or distorted attention to faces and emotional expressions, have been suggested as a mechanism that may mediate the association between attachment quality and externalizing problems (Dykas & Cassidy, 2011). For instance, attention to faces is thought to constitute an important foundation for the development of emotion identification, the ability to represent others' mental states, and empathic responding (Dadds, Cauchi, Wimalaweera, Hawes, & Brennan, 2012; Peltola et al., 2018). Consequently, reduced attention to faces may hamper children's development of emotion identification and empathic responsiveness, which in turn may result in externalizing problems (Dadds, Masry, Wimalaweera, Guastella, 2008).

Several studies have also found an association between reduced attention to facial emotional expressions and callous unemotional traits (Bedford, Pickles, Sharp, Wright, & Hill, 2015), which captures a lack of empathy and disregard of others' distress, and which is robustly associated with externalizing problems (Frick et al., 2014). For instance, Peltola and colleagues (2018) found that decreased attention to facial emotional expressions in 7-month olds predicted lowered levels of helping behavior at 24 months of age, and elevated levels of callous unemotional traits at 48 months of age. Reduced looking at the caregiver's face during the still-face procedure, a phenomenon also found in insecure children (Ekas, Haltigan, & Messinger, 2013), has been linked to callous unemotional traits (Wagner et al., 2016). Moreover, children with conduct problems and callous unemotional traits, who also showed a lowered ability to identify emotions, have been found to show reduced attention to their caregivers' eyes in child-caregiver interactions (Dadds, Jambrak, Pasalich, Hawes, & Brennan, 2011). Interestingly, eye-contact was reciprocated; the more the caregivers looked at their children the more the children looked back. The authors therefore argued that eye contact with attachment figures may be important for the development of systems for attention to and processing of social information (Dadds et al., 2011).

Face-to-face interactions are central to the development of the early child-caregiver relationships (Beebe & Steele, 2013). Empirically, secure and insecure infants have also been found to differ in attention to attachment-related situations (Johnson, Dweck, Chen, & Stern, 2010). Moreover, disorganized infants have been found to lack an age-typical attentional bias toward fearful faces (Peltola, Forssman, Puura, van IJzendoorn, & Leppänen, 2015). In fact, disorganized attachment has been conceptualized as a breakdown in attentional strategies (Hesse & Main, 2000). Deviations in attention to facial expressions have therefore been proposed as a mechanism that may mediate the link between disorganization and externalizing problems (Peltola et al., 2018). Suboptimal attachment-related experiences and memories have also been discussed by scholars outside of the attachment field as potentially exerting a negative influence on social information processing, for

example in the form of hostile-attributional biases (Crick & Dodge, 1994). Direct empirical research on disorganized attachment and attention to social stimuli as a mediating mechanism in relation to externalizing problems is scarce, however, and it has been argued that the operation of the IWMs have to often been taken for granted by ad hoc inferences based on the examination of attachment per se (Johnson et al., 2010).

Disorganized Attachment and Identification of Emotional Expressions

The ability to identify facial emotional expressions is another ability that may be influenced by attachment quality and which, in turn, may result in externalizing problems. It is increasingly recognized that the ability to identify emotional expressions is experience dependent, but further knowledge is needed on mechanisms that influence the development of individual differences (Leppanen & Nelson, 2009; Pollak, Messner, Kistler, & Cohn, 2009).

Facial emotional expressions are central to emotional communication, and the ability to identify expressions in others is therefore paramount for social behavior (Nelson, 1987). Indeed, deviations in the ability to identify emotions in others are associated features of many forms of psychopathology, and may play a central role in the development of psychopathy (Blair, 2008; Dadds et al., 2012). There is also meta-analytic support for an association between a reduced ability to identify emotional expressions and lowered empathy and elevated levels of callous unemotional traits (Dawel et al., 2012). Moreover, emotion identification training has been found to be particularly useful for children with conduct problems who are high in callous unemotional traits (Dadds et al., 2012).

Caregivers are responsible for a substantial part of the expressions that children are exposed to (Malatesta, 1985). Facial emotional interactions are moreover vital to the development of attachment (Koulomzin et al., 2002), and the IWMs are thought to include filters of the attachment figure's face as punishing or rewarding (Magai, 1999). It has therefore been suggested that attachment quality may influence the development of the ability to discriminate between facial expressions and/or response biases toward different expressions. Empirical research on the potential effects of attachment quality on emotion identification is however scarce. Secure attachment has been predictively associated with positive development of emotion identification (Steele, Steele & Croft, 2008; Steele, Steele, Croft & Fonagy, 1999), but research on disorganized attachment is very scarce. This is surprising since children exposed to aberrant caregiving, which is a key relational predictor of disorganized attachment, have been found to show deviations in identification of facial expressions (e.g., Pollak et al., 2009) as well as externalizing behavior problems (Schackman & Pollak, 2014).

Disorganized Attachment and Emotional Reactivity and Regulation

Emotional reactivity and emotion regulation have also been highlighted as emotional competences that may constitute mechanisms between attachment quality and externalizing problems (Colle & Del Giudice, 2011; Solomon & George, 2011). The organized patterns of attachment have for example been described as strategies for emotion regulation (Cassidy, 1994). Disorganized relationships have also been characterized as dysregulated (Solomon & George, 2011), and the development of disorganization has been cast within a framework of dysfunctional emotion socialization (DeOliveira, Neufeld Bailey, Moran, & Pederson, 2004). Bowlby's conceptualization of disorganization as stemming from overwhelming conflict and anxiety also suggests dysregulation of emotion.

Multiple studies have reported associations between disorganization and poor emotion regulation, variously implicating bottom-up emotional reactivity or poor top-down regulation, but with dysregulation of anger perhaps the most consistent theme (Solomon & George, 2011; Sroufe et al., 2009). For instance, Bowlby (1944) documented aggressive outcomes in his juvenile thieves, who had experienced potentially disorganizing separations. The children who had been separated from their caregivers for overnight stays in hospital also showed anger in response to their caregiver upon reunion (Robertson & Bowlby, 1952). Since overwhelming fear and alarm is considered pivotal in the etiology of disorganized attachment, it is interesting that some of the strongest findings to date concerning the consequences of disorganized attachment have implicated dysregulation of anger. This is also suggested by the robust association with externalizing behavior problems, in which dysregulation of anger is integral (e.g., Fearon et al., 2010). Research examining emotion dysregulation, and particularly dysregulation of anger, should consequently constitute a prime candidate as a mediating mechanism between disorganization and externalizing problems.

Disorganized attachment and cognitive competences

Attachment quality has also been linked to children's cognitive development. Early research reported that secure children were more task-persistent and effective in problem solving situations (Matas, Arend, & Sroufe, 1978). Similarly, secure attachment was found to predict curiosity and competence in tool-use (Arend, Gove, & Sroufe, 1979). More recently, interest has grown in a potential link between attachment quality and children's development of executive functioning (EF; Diamond, 2013). Executive functions refer to a cluster of partially interrelated cognitive competences (inhibitory control, working memory/updating, and set shifting (Miyake & Friedman, 2012). These abilities are generally considered to be paramount for goal-oriented behavior and self-regulation (Nigg, 2017). Executive functioning are accordingly robustly linked to a variety of aspects of developmental ad-

justment, including externalizing behavior problems. The protracted development of EF have been increasingly suggested to be experience dependent, with caregiver sensitivity, scaffolding and autonomy support considered crucial (Carlson, 2009; Bernier, Carlson, & Whipple, 2010).

Empirically, several studies have now found concurrent and predictive associations between attachment quality and EF development, among preschool children (Bernier et al., 2012) as well as school age children (e.g., Bernier et al., 2015; Bohlin et al., 2012). Impeded EF-development has also been found among children who experience prolonged separations from an attachment figure (Hewage, Bohlin, Wijewardena, & Lindmark, 2010). Furthermore, attachment security has been linked to higher school engagement via low attentional impulsivity and higher self-control (Drake, Belsky, & Fearon, 2014). Poor development of EF may thus also constitute a mediator between disorganization and externalizing problems, potentially stemming from hampered exploration that in turn takes a toll on EF-development.

Missing pieces

On the level of developmental (mal) adaptation, disorganized attachment has been robustly linked to broad indices of externalizing behavior problems such as ODD-symptoms and conduct problems (Fearon et al., 2010). However, despite the longstanding and robust link between disorganized attachment and these problems, there is a notable scarcity of research on mediating mechanisms (Groh et al., 2017). Paraphrasing Fearon and colleagues (2010), there is clearly little case for causality if there are no credible mechanisms. Research on theoretically grounded mechanisms, drawn from different theoretical perspectives, should consequently represent a prioritized question.

Disorganized attachment has also emerged as a viable candidate as a pathway to ADHD-symptoms (Thorell et al., 2012). However, it is unclear whether associations between disorganized attachment and ADHD-symptoms are independent of comorbid ODD-symptoms and misconduct (Nigg, 2006). Most research on disorganization and ADHD-symptoms has also relied on attachment measures that may be influenced by children's ADHD-symptoms. There is consequently a need for research on disorganized attachment and ADHD-symptoms that takes into account comorbid ODD-symptoms and use other attachment measures (Scholtens et al., 2014).

On the level of distinct competences, dysregulation of emotion should constitute a primary candidate as a mechanism that may mediate the relation between disorganized attachment and ODD-symptoms, given the overlap between emotion dysregulation and these problems. Multiple additional competences have however been suggested as potential mediators of the association, many of which are important for self-regulation and social behavior. Of these, attention to social stimuli, emotion identification, and inhibitory control all represent viable additional candidates for which there are indirect or tentative support, but which need additional empirical research.

There are also reasons to hypothesize that different mediators may be associated with one another. For instance, attachment quality has been associated with cognitive inhibition (e.g., Bernier et al., 2012; Bohlin et al., 2012), which in turn has been hypothesized to constitute an important basis for the development of emotion regulation (Barkley, 1997). On the other hand, bottom-up emotional reactivity can interfere with top-down regulation such as executive functioning (Nigg, 2017). Consequently, there is a need for research that examines several potential mediators simultaneously, in order to establish whether disorganized attachment may become associated with externalizing behavior problems primarily through some mechanisms or through broadly distributed effects on multiple distinct competences.

Aims

The overarching aim of the present thesis was to further the knowledge on the association between disorganized attachment representations and two types of externalizing problems; ODD-symptoms/conduct problems and ADHD-symptoms. The research was informed by a need for multifactorial research examining which aspects of adaptation that attachment quality is reliably important for (Sroufe et al., 2016), and a need to establish through which mediating mechanisms disorganized attachment becomes associated with externalizing problems (Fearon et al., 2010; Groh et al., 2017).

The research reported herein asked these specific research questions:

- I Are disorganized attachment representations specifically associated with either ODD- or ADHD-symptoms or a nonspecific risk-factor for both types of problems?
 - i It was hypothesized that disorganized attachment representations would be primarily linked with ODD-symptoms, and that associations with ADHD-symptoms would depend on ODD-symptoms.
- II Are disorganized attachment representations associated with competences important for socio-emotional functioning from the domain of social information processing, emotional functioning and/or cognitive functioning?
 - i It was hypothesized that disorganized attachment representations would be associated with all competences under study.
- III Is the association between disorganized attachment representations and externalizing problems mediated by any distinct competence from the domain of social information processing, emotional functioning, and/or executive functioning?
 - i It was hypothesized that dysregulation of emotion would mediate the association between disorganized attachment representations and ODD-symptoms. Due to a scarcity of previous research it was treated as an open question whether any other competence would emerge as a mediator.

Methods

Overview of the Projects

The three papers are based on two projects that had a shared aim of examining factors that convey risk for, or protect against, development of behavior problems. The two projects have important similarities, but also notable differences. Both projects included data collection at the Department of Psychology, Uppsala University, when the children were six to seven years old. Several instruments were also used in both projects. However, whereas project I (study I) oversampled children at risk for internalizing and externalizing problems, based on temperamental profiles, Project II (Study II & III) was based on typically developing children. Study I is moreover cross-sectional, whereas study III is based on a questionnaire based follow-up.

Participants

Demographic statistics for the three studies, together with data for predictor variables and outcome variables, are presented in Table 1. Study I included 184 children, aged 6-7 years old, who were part of a longitudinal project investigating temperamental profiles in relation to internalizing problems (e.g., shyness, depression) and externalizing problems (e.g., ADHD-symptoms, conduct problems). Factor- and cluster analysis of questionnaire data, obtained when the children were 3 to 4 years old ($n = 840$; response rate 56%), yielded three temperament factors and six temperament clusters. Study I included children recruited equally from these six clusters (50% boys per cluster), but was solely based on the data collected at the department visit. Study II included 105 children, aged 6-7 years, whose parents responded to a letter describing the study and asking about interest in participating (response rate 14.7%). Study three included the 80 children from study II whose parents and teachers responded to a questionnaire based follow up, approximately two years later. Parental educational was high in both samples and most children were born in Sweden and lived in nuclear families. Taking into account the low levels of externalizing behavior problems, with few children having scores suggestive of risk for ADHD or ODD, the samples are best described as normative.

Table 1 Demographic statistics and selected study data for project I and Project II.

	Project I		Project II	
	Study I	Study II	Study III	
			T1	T2
Demographic Statistics				
Participants NR	183-184	103-105	103-105	79-80
Child Age M(SD)	82.23 (1.77)	80.3 (1.79)	80.3 (1.79)	104.08 (2.73)
Child sex Male NR (%)	91 (49.5)	52 (49.5)	52 (49.5)	38 (47.5)
Parental education (1-5) M(SD)	4.55 (0.85)	3.78 (1.04)	3.78 (1.04)	
Attachment Classifications				
Secure NR (%)	87 (47.3)	57 (54.3)	57 (54.3)	48 (60) ^c
Avoidant NR (%)	47 (25.5)	27 (25.7)	27 (25.7)	19 (23.8) ^c
Ambivalent NR (%)	23 (12.5)	5 (4.8)	5 (4.8)	3 (3.8) ^c
Disorganized NR (%)	26 (14.1)	16 (15.2)	16 (15.2)	10 (12.5) ^c
Cognitive Inhibition M % (SD)	82.3 (11) ^a		77.7 (13) ^a	
Emotion Regulation M % (SD)	72.4 (13) ^b		75.2 (13) ^b	
Emotional Reactivity M % (SD)	49.5 (16) ^b	46.0 (16) ^b	46.0 (16) ^b	
Externalizing Problems				
ADHD-Symptoms M % (SD)	21.5 (15) ^d		22.3 (14) ^d	19.6 (15) ^d
ODD-Symptoms M % (SD)	16.4 (17) ^d		15.5 (15) ^d	11.3 (10) ^d

^aPresented as mean percentage of correct responses, and with the Go/No-Go task from Project I omitted, to facilitate comparisons between studies. ^bPresented as the mean percent for reactivity and regulation of negative emotion, to facilitate comparisons between studies. ^cDistribution of classifications among the children remaining in the study at T2. ^dPresented as mean percentage of symptoms for purposes of comparison between studies, since the conduct problems subscale of the SDQ was used in study I and DSM-IV criteria for ODD in study III.

Procedures

Project I (Study I), and Project II (Study II and Study III), each included a visit at the Department of Psychology that took approximately two hours including a break. The respective tasks were presented in a fixed order, with the attachment task before the break (project I), or at the end (project II), to give children time to recoup after the task. Children were tested individually in a quiet room decorated so as to be welcoming but not distracting. Accompanying parents were asked to fill in a questionnaire in an adjacent room.

All three studies were judged by the local ethics committee to be in accordance with the ethical standards of the Swedish research council and as declared in the declaration of Helsinki. Informed consent was obtained from all participating children and their parents. The children received a gift after the visits and their parents a gift certificate. Parents and teachers who participated in the follow up (study III) received a gift certificate.

Measures

The measures used in the respective studies are presented in the following order: attachment representations, cognitive competences, emotional competences, social-information-processing, and externalizing behavior problem.

Attachment Representations

The Separation Anxiety Test (Study I, II, and III)

Attachment representations were measured with the Swedish translation of Kaplan's (1987) adaptation of the Separation Anxiety test (SAT; Broberg, Viberg, & Karlsoon, 2000). Children were presented with six black and white drawings (fixed order) that depicted separation situation between an androgynously drawn child and its parents. A short vignette was given to each picture (e.g. "in this picture mom and dad are going away for the weekend, and the boy [girl] is to stay with his/her relatives"). Children were then asked (1) how the boy [girl] was feeling, (2) why the boy [girl] was feeling that way, and (3) what the boy [girl] would do. Standardized probes were used if children did not respond or responded that they didn't know (e.g. "take a guess"). The interviews were recorded, transcribed, and coded in line with Kaplan's manual.

Each transcript was coded categorically for the four attachment categories. Transcripts were coded as "secure - resourceful" if participants described vulnerable feelings and active and constructive solutions, "insecure/avoidant - inactive" if participants failed to describe constructive solutions (e.g. "do nothing"), and insecure/ambivalent-aggressive if participants described contradictory solutions (e.g., contact seeking in one situation, aggressiveness in others). Transcripts were coded "Insecure disorganized-fearful" if children imagined markedly frightening situations (e.g., parents or child died or got seriously ill), or reacted with disorganized thought (e.g., marked self-contradictions and lapses in reasoning), disorganized out of control behavior (e.g., hurting oneself), linguistic disorganization (e.g., "yes-no-yes-no-yes-no"), prolonged silences or whispering, or marked resistance against discussing feelings (e.g., insistence that the child feels nothing, refusal to finish the task).

All transcripts were coded by the author of the thesis, after training and passing a reliability test (>80 % across all four categories and 30 transcripts). Whereas a two group variable was used as the main variable in Study I and II (i.e., Disorganized vs. Organized), a three three-group variable was used in Study III (Disorganized vs. Organized-insecure vs. Secure). Inter-rater agreement with another SAT-coder was satisfactory in both projects.

The SAT was originally developed by Hansburg (1972) for use with adolescents, and was then adapted for use with six-year-olds by Klagsbrun and Bowlby (1976). Kaplan retained the stories, pictures, and the main questions posed to the children. However, Kaplan did not retain the original counting

of frequencies of pre-categorized answers. Instead, she drew from available theory and research on systematic variations in attachment quality and attachment representations and their workings, and developed a more complex coding system for coding children's pattern of responding to the interview. The validity of Kaplan's (1987) version of the separation anxiety test has been established in several samples through concurrent associations with 6th-year-reunion classifications and previously observed infant strange situation classifications (Main, Kaplan, & Cassidy, 1985; Grossmann et al., 2002). Indeed, disorganized attachment representations in the SAT has been predicted by disorganized attachment in the SSP, and predictive of unresolved states of mind in the adult attachment interview; the adulthood equivalent of disorganized attachment (Main, Hesse, & Kaplan, 2005).

Cognitive Inhibition

The Go/No-Go Task (Study I)

Inhibition of pre-potent responses was measured using a computerized go/no-go task (Berlin & Bohlin, 2002). Children were presented with 80 trials where they saw one of four stimuli (blue/red square/triangle), and were instructed to press a key ("go") in response to some "go" stimuli (e.g., blue) but not to "no-go" stimuli (e.g., red). Prepotency was provided by the majority being "go-trials" (70%). We used the total number of correct responses minus commission errors (i.e. pressing the key on "no-go" targets).

The Stroop-Like Task (Study I & III)

Interference control was measured with a Stroop-like task derived from the Day-Night Stroop task (Gerstadt, Hong, and Diamond, 1994). Children were presented with pictures on a screen, one at a time, from three (study I) or four (Study III) picture pairs (boy/girl, night/day, up/down, large/small), and were instructed to say the opposite of what they saw. Study I included 48 trials and Study III 62 trials, divided into two conditions with different presentation times (1200 vs. 800; Berlin & Bohlin, 2002). To account for silent responses, Study I used a coefficient of the (reversed) total mistakes divided by the number of pictures responded to. Study III used the total number of correct responses.

Identification of Facial Emotional Expressions (Study II & III)

The Karolinska Directed Emotional Faces

Children's ability to identify facial emotional expressions was examined with 40 color photographs of models (50% female) posing happy, angry, fearful, and sad expressions, taken from the Karolinska Directed Emotional Faces (KDEF; Lundqvist, Flykt & Öhman, 1998). Photographs were blurred with Photoshop CS5 Gaussian blur since peak expressions may be too easy and identification of suboptimal expressions may generalize better to real

life situations (Moulson et al., 2015). Photographs were shown one at a time without any time limit. Hit rates (HR; percentage of correctly identified) and false alarm rates (FAR; percentage of trials where expressions were incorrectly identified) were used to calculate indices of discrimination (D_p ; HR/FAR) and response-bias (B ; $FAR/(1-[HR-FAR])$).

The photographs were presented in two semi-randomized sequences with no effect on accuracy, $t(103) = .626$, $p = .533$. However, seven photographs had hit rates that given the sample size would not be considered different from chance responding ($< 35\%$). The final analyses are therefore based on the remaining thirty-three photographs. Study II analyzed the four indices for discrimination and the four indices for bias separately, and then used a composite score for discrimination of the four emotions. In contrast, Study III analyzed all eight variables together, in a discriminant functions analysis, and used the discriminant function scores in subsequent analyses.

Emotional Reactivity and Emotion Regulation

The Emotion Questionnaire (Study I, II, & III)

The accompanying parent(s) rated their child's emotional reactivity and regulatory ability for four emotions (happiness, anger, fear, and sadness), using the short form of the Emotion Questionnaire (Rydell, Berlin, & Bohlin, 2003). Emotional reactivity was examined with two questions per emotion, reflecting the frequency and intensity of the child's reactions. Emotion regulation was similarly measured with two questions per emotion, reflecting the child's capacity to regulate on its own and with the assistance of others. Each question was scored on a scale ranging from 1 (doesn't apply at all) to 5 (applies very well). Study I used separate scores for reactivity and regulation of happiness and negative emotionality (average of sadness, fear, and anger). Study II used the score for negative emotionality. Study III used all eight variables and subjected them to a discriminant functions analysis.

Social Information Processing

The Overlap Paradigm (Study III)

Children's attention to facial emotional expressions was examined with the overlap paradigm, which measures attentional dwell time to centrally presented face stimuli during simultaneous presentation of peripheral distractors (Peltola et al., 2018). Children were presented with 48 trials wherein one of four face stimuli was presented centrally, followed by a peripheral distractor (left or right) that remained in view with the face. The face stimuli were color images of female models posing fearful, neutral, and happy expressions, and a phase-scrambled control image (twelve times each). Distractors were patterns of black-and-white circles and a checkerboard. Stimulus presentation was automatic (E-Prime 2, Psychology Software Tools, Inc., www.pstnet.com). Data processing was done with gazeAnalysisLib, a library

of MATLAB routines (Leppänen, Forssman, Kaatiala, Yrttiaho, & Wass, 2015). Preprocessing of data included interpolation of missing data, and median filtering with a window of nine samples to remove abrupt spikes.

Dwell time indices for each stimulus were calculated as the last gaze point in the face area that preceded the first gaze point in the distractor area (Pelto et al., 2018). A maximum of 1000 ms was assigned if children did not disengage within 1000 ms after distractor onset. Trials with more than 150 ms of missing data, more than 25% of gaze points outside the face area preceding disengagement, or anticipatory saccades to the distractor (< 150 ms) were excluded. Normalized dwell time indices (0-1) were calculated with a formula accounting for dwell time and number of scorable trials.

Attention-Deficit/Hyperactivity (ADHD; Study I and III)

The ADHD-Rating Scale IV

Parents and teachers rated children's symptoms using the ADHD rating scale IV (DuPaul, Thomas, & Anastopolous, 1998), which contains the 18 DSM symptom criteria (APA, 2013). Each question was rated on a 4-point scale from zero ("never/rarely") to three ("very often"). The mean score of all 18 questions was used in both study I and III. Whereas Study I only included parental ratings, Study III included both parental and teacher ratings at T2 and therefore used a composite score. Internal consistency was satisfactory.

Oppositional Defiant Disorder (ODD; Study III).

The DSM-IV Symptom Criteria

Parents rated children's symptoms at T1, and parents and teachers at T2, on the eight DSM-IV symptom criteria for ODD (APA 2013). A slightly abbreviated version was used at T2, including six of the eight items (excluding "he [she] is often angry and resentful"; and "he [she] is often spiteful and vindictive"). We were concerned that the teachers would be ill at ease by these items since their anonymity cannot be fully guaranteed should parents request access to their child's data. Each item was rated on a 4-point scale ranging from 0 ("never-rarely") to 3 ("very often"). Internal consistency was high at both T1 and T2. The mean score for ODD symptoms was used at each time point. Parent's and teacher's ratings were significantly albeit weakly associated ($r = .24$, $p = .039$). Since the respective ratings showed the same pattern of association a composite ODD score was used.

Conduct Problems

The Strengths and Difficulties Questionnaire's Conduct Problems Subscale

Parent(s) rated children's conduct problems using the conduct problems subscale (5 questions) of the Swedish version of the Strengths and Difficulties Questionnaire (SDQ-Swe; Malmberg, Rydell, & Smedje, 2003). Each item was rated on a three point scale (0="not true", 1="somewhat true",

2="certainly true"). The mean score was used. Internal consistency was acceptable but not entirely satisfactory (Cronbach's alpha .69).

A Dimensional Perspective on Externalizing Behavior Problems

A dimensional perspective was adopted on externalizing problems, rather than categorizing children on the basis of fulfilling criteria for a disorder. First, externalizing problems is best understood from a dimensional perspective, with clinical features the extreme end of normally distributed traits (Marcus & Barry, 2011). In this vein, ADHD is best described by a dimensional latent structure (Frazier, Youngstrom, & Naugle, 2007). Quantitative rather than qualitative deviations should therefore be expected, and studies on normative samples should also be informative regarding factors that convey risk for functional impairment (Nigg, 2001). Second, a dimensional perspective has statistical advantages in comparison to a categorical approach in which subclinical levels are lost.

Summary of Studies Included in the Thesis

Study I

Background

ADHD is increasingly suggested to be etiologically heterogeneous (Nigg et al., 2005), and conduct problems have long been suggested to have a multifactorial etiology (e.g., Dodge & Pettit, 2003). A variety of distinct competences important for socio-emotional functioning have been implicated in the etiology of each type of symptoms. However, research examining multiple competences simultaneously in relation to these problems is scarce. It is consequently unclear whether various competences constitute specific risk-factors for either ADHD-symptoms and/or conduct problems when accounting for the comorbidity between these symptoms.

Disorganized attachment constitutes one such factor. Interest has grown rapidly in the possibility of a caregiving based pathway from disorganized attachment to ADHD-symptoms, and associations have been reported (e.g., Thorell et al., 2012). Establishing a pathway to ADHD-symptoms through disorganized attachment represents an attractive prospect given the hotly debated topic of neuro-stimulant medication in childhood, and since it would open up possibilities for family-based interventions targeting the attachment relationship. However, disorganized attachment has long been associated with conduct problems (Fearon et al., 2010). Yet, research on disorganized attachment and ADHD-symptoms has rarely controlled for comorbid conduct problems, and the research that has done so has presented inconsistent results (Bohlin et al., 2012; Thorell et al., 2012). It is therefore unclear whether disorganized attachment is specifically associated with ADHD-

symptoms or if the association depends on conduct problems. Moreover, research has relied on representational measures of attachment that may be compromised by difficulties in narrative coherence that children high in ADHD-symptoms often display (Scholtens et al., 2014). Research is therefore needed using other measures of attachment representations.

Informed by these questions study I examined disorganized attachment representations in relation to ADHD-symptoms and conduct problems, using a measure of attachment that places less emphasis on narrative coherence (SAT; Kaplan, 1987). The study also included measures of cognitive inhibition and emotional reactivity and regulation.

Methods

The study was cross-sectional and included 184 children of which a third were selected due to a temperamental profile that suggested risk for externalizing problems. The children completed the SAT and laboratory tasks for cognitive inhibition, and accompanying parents rated emotional reactivity and regulation, ADHD-symptoms, and conduct problems.

Results

There was a small but significant association between disorganized attachment and both ADHD-symptoms and conduct problems. A negative association was moreover obtained between disorganized attachment representations and cognitive inhibition. Importantly, the association between disorganized attachment and ADHD-symptoms did not withstand control for the other competences under study and comorbid conduct problems. The association between disorganized attachment and conduct problems did however remain significant, suggesting that there is a specific association between disorganized attachment representations and conduct problems.

Conclusions

The findings support the longstanding link between disorganized attachment and problems with aggression and oppositionality (e.g., Fearon et al., 2010), and caution against suggestions of a specific pathway to ADHD-symptoms (e.g., Thorell et al., 2012). More specifically, the findings suggest that associations between disorganized attachment and ADHD-symptoms may depend on comorbid conduct problems (Nigg, 2006).

Study II

Background

The development of the ability to identify facial emotional expressions has been suggested to be experience dependent (Gredebäck, Eriksson, Schmitow, Laeng & Stenberg, 2012). Thus far, experiential effects have

been most reliably demonstrated among children exposed to severe experiences such as abuse, neglect, and institutionalization (Pollak et al., 2009). In such circumstances, a diminished ability to discriminate between emotional expressions has been documented among children who have received insufficient experience, and response biases among children who have been subjected to an overexposure of particular expressions for which children must learn to respond quickly for adaptive behavior. However, there is still a relative lack of research on psychological factors that may influence the development of emotion identification (Leppänen & Nelson, 2009).

Facial emotional interactions are integral to the development of attachment (Koulomzin et al., 2002) and it has been suggested that the IWMs of attachment may include templates of the attachment figure's face as punishing or rewarding (Magai, 1999). Attachment quality may therefore influence the development of emotion identification. Disorganized attachment should be of particular interest due to its association with experiences of aberrant caregiving. However, there is a scarcity of research on attachment quality and emotion identification in general, and on disorganized attachment in particular. It is therefore unclear whether disorganized attachment representations are associated with deviations in emotion identification.

Study II therefore examined whether children with disorganized attachment representations show deviations in emotion identification and (b) if deviations take the form of a diminished ability to identify expressions or response biases. Moreover, we examined if deviations in emotion identification is associated with children's functioning in the form of emotional reactivity for negative emotions, and whether emotion identification may constitute a mediator between disorganized attachment and emotional reactivity.

Methods

One hundred and five typically developing children, aged 6–7 years old, completed the SAT and a task for emotion identification that was constructed for the present study and which included forty color photographs of models posing happy, sad, angry, and fearful facial expressions. The photographs were blurred to increase performance demands. Parents rated children's emotional reactivity. Indices for discriminative ability and response biases were calculated for each expression.

Results

The group with disorganized attachment representations showed a diminished ability in general to identify emotional expressions, but no response biases. Follow-up analyses using a three group variable with the avoidant and ambivalent children collapsed into an “organized-insecure” group, suggested that the effect was specific to disorganized status. Disorganized attachment representations, discrimination of emotional expressions, and emotional reactivity for negative emotions were all associated with one another.

The association between disorganized attachment and emotional reactivity was however not mediated by emotion identification.

Conclusions

The findings suggest that disorganized attachment may influence children's development of emotion identification. Possibly, disorganized children may come to avoid close interactions with their caregivers, reducing the amount of input for learning about expressions (George & Main, 1979). Alternatively, the emergence of disorganization may co-vary with processes that influence the development of emotion identification. The findings also suggest that deviations in emotion identification manifest in a generally diminished ability to identify expressions in children from low-risk samples.

Study III

Background

Disorganized attachment has been robustly linked with externalizing behavior problems (Fearon et al., 2012; Groh et al., 2017). Additionally, associations have been obtained with a multiplicity of competences important for socioemotional behavior and which may constitute mediating mechanisms in relation to externalizing problems (Forslund & Granqvist, 2017). Concerns have however been raised that attachment theory may suffer from overextension (Sroufe, 2016). There is consequently a need for multi-factorial research that examine for which aspects of development attachment quality is reliably important (Thompson, 2016).

Study III therefore examined disorganized attachment longitudinally in relation to symptoms of two different types of externalizing behavior problems; ADHD and ODD (DSM-V, 2013). Whereas disorganized attachment has long been linked to ODD-symptoms and misconduct (Fearon et al., 2010), theory and research suggesting a pathway to ADHD-symptoms reflect a more recent extension of the theory. Though attachment quality has been linked to the development of self-regulatory competences that are predictive of ADHD-symptoms (Bernier et al., 2015), suboptimal caregiving seems to be most common among caregivers of children with ADHD-symptoms who also exhibit comorbid ODD-symptoms (Deault, 2010). Mirroring such findings, it is unclear whether disorganized attachment contributes specifically to ADHD-symptoms or if the association depends on comorbid ODD-symptoms (Nigg, 2006). Alternatively, it has been suggested that ADHD- and ODD-symptoms may stem from a shared underlying disruptive factor (Lee, Burns, Beauchaine, & Becker, 2016). Consequently, disorganized attachment may constitute a general predictor of both types of symptoms rather than a specific predictor of either.

There is also a need for research examining through which mediating competences disorganized attachment may become associated with externalizing behavior problems (Fearon et al., 2010). A multitude of hypotheses have been proposed, but integrative research is scarce (Groh et al., 2017). First, negative IWMs (Bowlby, 1973) may result in reduced or distorted attention to facial expressions (Dykas & Cassidy, 2011), which in turn may hamper emotion identification and empathic responding (Dadds et al., 2011; Peltola et al., 2018). Second, impaired dyadic regulation via the attachment figure and the attachment relationship may result in emotion dysregulation (e.g., Solomon & George, 2011). Finally, impairments in the ability to explore the environment from the attachment figure may hamper the development of cognitive control (e.g., Bernier et al., 2014).

Informed by these knowledge gaps, the first aim of study III was to examine if disorganized attachment is specifically associated with either ODD- or ADHD-symptoms or a linear increase in both. A second aim was to examine if the hypothesized association between disorganized attachment and externalizing problems (particularly ODD-symptoms), was mediated by any or several of the following competences; attention to facial expressions, emotion identification, emotion regulation, and cognitive inhibition.

Methods

The study included 105 children, aged 6-7 years old, who completed the Separation Anxiety Test and tasks for attention toward facial expressions, identification of facial expressions, and cognitive inhibition. Parents rated emotional reactivity, emotion regulation and symptoms of ADHD and ODD. At T2 (approximately two years later), parents and teachers of 80 children completed a questionnaire based follow-up for ODD and ADHD-symptoms. Discriminant functions analysis was used to examine whether the disorganized group was discriminable from the other attachment groups in terms of either ODD- or ADHD-symptoms, or in terms of a linear combination of both types of symptoms. Similarly, discriminant functions analysis was used to enable analyses of whether the disorganized group differed from the other attachment groups on the respective competences under study that included several variables per competence. Using attention to facial expressions as an example, are children with disorganized attachment representations discriminable from the other attachment groups by means of a linear decrease in attention to all expressions under study, or primarily in terms of lowered attention to fearful expressions?

Results

The disorganized group was mainly characterized by elevated ODD-symptoms, not ADHD-symptoms. The disorganized group also exhibited reduced attention to facial emotional expressions (particularly fearful and neutral faces), a diminished ability to identify facial expressions (particularly

sad and happy faces), and elevated emotional reactivity and poor regulation (particularly for anger and fear). These distinct competences were, moreover, at least marginally associated with one another and with ODD-symptoms. Elevated emotional reactivity and reduced emotion regulation, particularly for anger and fear, mediated the link with between disorganized attachment status and ODD-symptoms.

Complementary Analyses not Included in the Manuscript

It is possible that the SAT may be hampered by some factor pertaining to oppositionality and misconduct. Since the SAT includes an index of disorganization termed “marked resistance against discussing feelings”, children who are high in oppositionality may be coded as disorganized due to these difficulties. We therefore examined if the results remained when excluding the children whose primary index of disorganization was marked resistance.

Two children were coded as disorganized primarily due to “prolonged silences and whispering”, six children due to “imagining fearful situations”, one child due to “disorganized thought”, five children due to “disorganized behavior”, and two children due to “marked resistance”. With these two children excluded, a bootstrapped ANOVA with Bonferroni correction found a significant difference in T2 ODD-symptoms, $F(2, 76) = 8.01, p = .001, n_2 = .17$, with ODD symptoms being higher in the disorganized group ($M = .83, SD = 1.13$), than in the organized-insecure ($M = .16, SD = .81$) and the secure group ($M = -.19, SD = .53$).

Conclusions

The findings corroborate Bowlby’s notion that anger and fear may go hand in hand (Bowlby, 1988) and support previous reports of a link between disorganization and oppositionality and misconduct (Fearon et al., 2010). The results also caution against suggestions of a caregiving based pathway from disorganization to ADHD-symptoms, lending credence to words of caution from both the field of ADHD (Nigg, 2006) and attachment (e.g., Sroufe, 2016). An intriguing pattern of associations emerged in which the disorganized group was particularly characterized by deviations in processing and regulation of anger and fear. This finding suggest that the association with externalizing problems may be mediated by broad effects on neural circuitry involving the amygdala, and which is important for both perception and regulation of threat-related stimuli (Callaghan & Tottenham, 2016). The complementary analyses also suggest that the association may be independent of displays of oppositionality and defiance in the SAT.

General Discussion

The overarching aim of the thesis was to further the scientific understanding of the association between disorganized attachment representations and externalizing behavior problems. The research was particularly informed by two issues. First, there is a need for research examining for which aspects of developmental adaptation that attachment quality is reliably important (Sroufe, 2016; Thompson, 2016). Second, there is a need for research establishing through which mediating mechanisms disorganized attachment may become associated with externalizing problems (Fearon et al., 2010; Forslund & Granqvist, 2017; Groh et al., 2017). Two of the studies examined disorganized attachment representations in relation to two different types of externalizing problems; ADHD-symptoms and ODD-symptoms/conduct problems. All three studies examined associations with competences that are important for socio-emotional functioning and which may constitute mediating mechanisms in relation to externalizing problems. Competences under study included social information processing (attention to facial expressions), emotional competence (emotion identification and emotion regulation), and cognitive competence (executive functioning).

The general discussion begins with a theoretical analysis of the associations between disorganized attachment status and the indices of developmental maladaptation under study; ADHD- and ODD-symptoms/conduct problems. The discussion then turns to the distinct competences which may be important for understanding how disorganization becomes associated with externalizing behavior problems. Finally, the discussion moves to how attachment quality may influence children's development of competences important for socio-emotional functioning and, in turn, developmental adaptation. This part of the discussion will address pertinent conceptual questions that may have a profound impact on the competence hypothesis, such as the attachment figure's role in attachment development.

Key Findings

Study I examined whether disorganized attachment representations are specifically associated with either ADHD-symptoms or conduct problems when accounting for symptom overlap and distinct competences under study. A specific association was found with conduct problems but, crucially, not

with ADHD-symptoms. Consequently, the findings caution against suggestions of a pathway from disorganized attachment to ADHD-symptoms. As argued by Nigg (2006), associations between disorganized attachment and ADHD-symptoms may depend on comorbid conduct problems.

Study II examined whether disorganized attachment representations are associated with deviations in a distinct competence important for socio-emotional functioning; the ability to identify facial emotional expressions. Disorganized children showed a generally diminished ability to discriminate between facial emotional expressions, but they did not show any response biases (i.e., tendencies to respond with particular emotions). Consequently, disorganized attachment may constitute a risk-factor for suboptimal emotion identification. Alternatively, the processes that result in disorganized attachment, whether relational and/or biological, may simultaneously convey risk for suboptimal emotion identification.

Study III examined whether disorganized attachment representations are specifically associated with either ADHD- or ODD-symptoms, or with a linear combination of both types of symptoms. Distinct competences that may mediate the association between disorganized attachment representations and externalizing problems were also examined. Using discriminant functions analysis, the disorganized group was characterized primarily by ODD-symptoms. The disorganized group was also characterized by deviations on several competences, including lowered attention to facial expressions (particularly to fearful and neutral ones), a decreased ability to identify emotional expressions (particularly happy and sad ones), and elevated emotional reactivity and a reduced ability to regulate emotions (particularly for anger and fear). Poor emotion regulation mediated the association between T1 disorganization and T2 ODD-symptoms. However, the pattern of associations suggests that disorganized attachment may convey risk for ODD-symptoms through broad effects on multiple competences.

The Level of Developmental Adaptation

Study I and III both corroborated the link between disorganized attachment and problems with misconduct and oppositionality. Both studies also cautioned against suggestions of disorganized attachment representations as a predictor of ADHD-symptoms. Suggestions of a pathway to ADHD-symptoms through disorganized attachment may thus constitute an example of over-extension of the competence hypothesis (Sroufe, 2016).

Disorganized Attachment Representations and ODD-Symptoms

The findings of study I and III converge in their support of the longstanding link between disorganized attachment and problems with misconduct and

oppositonality (Fearon et al., 2010). In fact, Bowlby's (1944) early research into the long-term effects of early child-caregiver separations, a potential pathogen for attachment organization (Solomon & George, 2011), emphasized antisocial outcomes among his "juvenile thieves". Interestingly, child-caregiver separations were particularly common among a subgroup of adolescents who were labeled affectionless, and who did not show normal affection to anyone. In contrast, a subgroup characterized by "constant over-activity", a description reminiscent of ADHD, seemed to have genuine attachments to their caregivers despite periods of being difficult.

The link between disorganized attachment and externalizing problems was also one of the standout conclusions of the series of meta-analyses on the competence hypothesis (Groh et al., 2017). The correlations with misconduct (study I), and oppositionality and defiance (Study III), do therefore not contribute with anything new in of itself. However, the studies contribute with new information through the joint examination of ODD- and ADHD-symptoms. Answering to calls for developmental integration (e.g., Sroufe, 2016), the present findings suggest that disorganized attachment representations may constitute a specific risk-factor for externalizing problems such as oppositionality and misconduct, rather than a general risk factor for all types of externalizing problems and including ADHD-symptoms.

On the Effect Size and Generalizability of Findings

The effect size was small in study I, and small to moderate in study III. Parent and teacher reports have however been found to yield lower associations than observational measures (Fearon et al. 2010). This suggests that the effect could, if anything, have been more pronounced. Moreover, neither child sex nor socio-emotional status influenced the present results, and the findings should therefore generalize to both boys and girls. The samples were however distinctly low-risk and restriction of range may therefore have hampered the ability to document associations with socioeconomic status. Thus, it is unclear to what extent the findings generalize to samples of children at elevated risk. The present work can perhaps take heart from the finding that neither clinical status nor socioeconomic status moderated the meta-analytical association with externalizing problems (Fearon et al., 2010). Insecure attachment has been hypothesized to have a greater influence in high risk-samples, where the presence of protective or buffering factors may be lower (DeKlyen & Greenberg, 2008; Sroufe et al., 2009). There is consequently little reason to believe that the association with ODD-symptoms and misconduct is smaller in samples of higher risk. It is more unclear, however, to what extent the associations remain with control for ADHD-symptoms. Not only may ADHD-levels be expected to be higher, but the level of comorbidity with ODD-symptoms may also increase (Lee et al., 2016).

On the Replication of the Results between Study I and III

Study I and III included different but overlapping scales for symptoms of oppositionality, defiance, and misconduct. Whereas study I was cross sectional, and only used parental ratings, study III was longitudinal and included parent and teacher ratings. Study III may therefore be seen as a conceptual replication of study I. For instance, each scale includes items for disobedience and emotional liability (APA, 2013; Malmberg et al., 2003). The conduct problems subscale has also been used to screen for ODD with good effect (e.g., Stringaris & Goodman, 2009). Concerns have been raised regarding problems with replicability within psychological science (e.g., Pashler & Wagenmakers, 2012). The present replication should consequently be regarded as a strength that increases the confidence in the present findings.

On Potential Confounds in the SAT

It has been suggested that other methods for examining attachment representations may be hampered by the difficulties with narrative coherence that children high in ADHD-symptoms often show (Scholtens et al., 2014). Indeed, one of the main rationales for using the SAT (Kaplan, 1987) in the present work was that it places comparatively less emphasis on narrative coherence. However, given the above critique of other measures it is only prudent to ask whether the SAT may suffer from some other confounding factor. The pattern of results suggests that particular attention should be paid to factors related to oppositionality and misconduct. Inspection of the SAT's coding criteria for disorganized attachment suggests that the index termed "marked resistance against discussing feelings", which includes refusal to complete the SAT and acting out against the experimenter, may constitute one such factor. Conceivably, children high in ODD symptoms may be at risk for being spuriously coded as disorganized due to oppositionality. This is a plausible alternative explanation that warrants further research.

We conducted a post hoc analysis of whether the association with ODD-symptoms remained when excluding the children whose primary index of disorganization were "marked resistance", and we found that it did. This finding could be taken as an indication that the association may be robust. There are however several caveats to such a conclusion that render the present findings tentative. The sample was low-risk, and the number of disorganized children therefore low to begin with. Children classified as disorganized also showed higher attrition, and excluding the two children whose primary index of disorganization was "marked resistance" resulted in an unsatisfactorily small sample. Several of the children who were classified as disorganized due to other indices also showed signs of "marked resistance". A continuous scale for resistance, applied on the entire study sample, could perhaps have gone a bit further towards answering this question. It could still be argued, however, that any conclusion would have been limited by the

low-risk status of the sample, since a higher proportion of children at elevated risk for ODD may receive a disorganized coding due to “marked resistance”. Research similar to Scholtens and colleagues (2014) on narrative coherence and ADHD, but with marked resistance and ODD, would consequently be a fruitful avenue for further research on the SAT.

Disorganized Attachment Representations and ADHD-Symptoms

Neither study I nor study III yielded any support for a specific association between disorganized attachment representations and ADHD-symptoms. On the contrary; the significant but small association in study I did not withstand pertinent controls, and the constructs were unrelated in study III. The findings therefore add to those of Scholtens and colleagues (2014), and suggest that associations with ADHD-symptoms may depend on difficulties in adhering to the administration of some attachment instruments for children high in ADHD-symptoms. The findings also lend credence to words of caution by Nigg (2006), who has suggested that associations between attachment quality and ADHD-symptoms may depend on comorbid problems with oppositionality and misconduct. It should also be noted that the findings mirror those on caregiving and ADHD-symptoms, in which suboptimal caregiving has been found primarily among caregivers to children with comorbid ODD-symptoms (Deault, 2010; Modesto-Lowe et al., 2008).

On the Importance of the Present Null-Findings

A case could be made that the present “null-findings” regarding ADHD-symptoms are more important than the positive ones concerning ODD-symptoms. The reason for this is that they lend credence to words of caution from both the field of ADHD (Nigg, 2006) and attachment (Sroufe, 2016) in applying an attachment perspective on the emergence on ADHD-symptoms. The huge and sometimes exaggerated optimism regarding the ability of insecure and disorganized attachment to explain clinical phenomenon (Reijman et al., 2017) has clearly reached the field of ADHD as well, as manifested by calls to invite considerations of attachment quality in assessment and treatment of ADHD (e.g., Salari et al., 2016; Storebø et al., 2016).

Concerns are being raised increasingly often, however, that attachment theory is commonly misinterpreted and sometimes misapplied in clinical practice (e.g., Main et al., 2011). A large number of the field’s leading researchers even joined forces recently and released a consensus statement regarding the construct, in order to counter common misunderstandings (Granqvist et al., 2017). Crucially, serious misunderstandings include logical errors of assuming relational antecedents to disorganized behaviors, such as Fr/Fr caregiver behavior, and a deterministic belief that disorganization will

almost inevitably result in developmental problems (Granqvist et al., 2017). For instance, aberrant caregiving are sometimes inferred on the mere basis of observations of disorganized behaviors (See Granqvist et al., 2016, for a discussion). It is important to note, however, that disorganized behavior do not necessarily imply disorganized attachment. Disorganized behavior has a heterogeneous etiology that includes neurological vulnerability (Padrón et al., 2014; Spangler, 2013; Granqvist et al., 2017). Moreover, associations have been found with temporary overstress due to illness or problems with the administration of the attachment task (Granqvist et al., 2016). It is also increasingly acknowledged that disorganized attachment has multiple relational antecedents, several of which do not involve inherently frightening caregiver behavior (Duschinsky, 2015/2018; Reijman et al., 2017, Solomon et al., 2017).

Far from splitting hairs, there is a risk that the profoundly unfortunate incidence with the refrigerator mother theory of autism (Bettelheim, 1959) could see a repeat in the form of frightening caregivers causing ADHD. Undue inferences of caregiving based etiology to children's ADHD-symptoms may result in unfounded suspicion and blaming of caregivers, many of whom are high in ADHD-symptoms themselves. As an illuminating example, pharmacological treatment for ADHD was recently linked to a remarkable reduction in disorganized attachment classifications among adolescents (Storebø et al., 2014). This intriguing finding can be interpreted in multiple ways. First, the short gap between T1 and T2 (6 months) may have influenced the second administration of the attachment interview. Second, the pharmacological treatment may have led to a reduction in self-regulatory problems stemming from relationally determined disorganized attachment representations. Third, and perhaps most parsimonious, the adolescents, who were not on medication at T1, may have been classified as disorganized due to biologically channeled difficulties in adhering to the administration of the attachment interview.

These and other possibilities are all open to empirical inquiry. However, a recent article discussing the findings of Storebø and colleagues (2014) serves as a useful example in highlighting the strong inclination among scholars working within attachment theory to explain phenomenon with reference to relational antecedents. Having first characterized the development of effector equipment as depending on caregivers "... nurturing of the child's developing neural integration" (p. 10), the authors goes on to question "...whether the system had truly organized or whether the expression of attachment through representation had somehow been masked" (Reisz et al., 2017, p.20). Discussion of any alternative explanation is conspicuously absent.

It should not be forgotten that ADHD is one of the most heritable of the psychiatric disorders, with behavioral genetic research suggesting heritability estimates as high as 70 - 80 percent, and molecular genetic research linking particular polymorphisms to ADHD (e.g., Faraone et al., 2005). Moreo-

ver, whereas genetic effects on attachment quality and organization have been found to be negligible in early childhood (Fearon & Belsky, 2016), research in older children and adolescents has suggested a more substantial genetic contribution (Fearon, Shmueli-Goetz, Viding, Fonagy, & Plomin, 2014). It has been speculated that this may reflect a developmental shift wherein attachment quality becomes more of a quality of the individual, or a methodological artifact that is due to representational measures being more influenced by biological dispositions (Fearon & Belsky, 2016). Though it would be premature to disqualify the possibility of a role for disorganized attachment in the emergence of ADHD-symptoms, there are multiple reasons why the current enthusiasm should be tempered.

The Level of Distinct Competences

The association with oppositionality and misconduct gives rise to many questions, one of which concerns the putative mechanism(s) behind it. Indeed, the meta-analysis on externalizing problems highlighted a notable lack of research on mechanisms and called for theory driven research on mediating processes from different domains of functioning (Fearon et al., 2010). To paraphrase Fearon and colleagues (2010); “there is clearly little case for causality if there are no mechanisms” (p. 437). As discussed in the following, the present research suggests that disorganization may become associated with externalizing problems through broad effects on multiple competences that are important for social information processing.

Emotion Identification

The disorganized group showed a generally diminished ability to identify facial emotional expressions but no response biases. Taking stock of the extant literature on experience and emotion identification we discerned two different patterns of deviations. First, a generally diminished ability to discriminate expressions has generally been found in impoverished but non-abusive contexts, in which children have received *insufficient exposure* to facial expressions (Moulson et al., 2015). Second, response biases to particular expressions have typically been found in children who have received an *overexposure* to particular expressions, such as anger, which they must learn to identify rapidly for adaptive responding (Shackman & Pollak, 2014).

The generally diminished ability is therefore in line with research that has suggested insufficient exposure, for example through poor modelling of expressions on behalf of caregivers and underexposure due to caregiver withdrawal and unresponsiveness (DeOliveira et al., 2004; Lyons-Ruth & Jacobvitz, 2016; Main & Hesse, 1990). It is also in line with suggestions that dis-

organized children may come to withdraw from close interactions with caregivers, thereby reducing learning opportunities (Main & George, 1985).

Study III analyzed the data differently, by subjecting all eight variables for discrimination and bias to a discriminant functions analysis. Though this analysis replicated the main effect observed in Study II, it also highlighted that a diminished ability to discriminate happy and sad expressions made the descriptively strongest contribution to the differentiations of the groups. Stated differently, discrimination of angry and fearful expressions was comparatively intact. This finding is intriguing since overexposure to these expressions is hypothesized to be part of the emergence of disorganization even in non-maltreating samples (Schuengel et al., 1999). Alternatively, the link between disorganized attachment status and emotion identification may also be due to biologically based differences influencing both variables. Callous unemotional traits, which have been linked to disorganized attachment (Bohlin et al., 2012) and reduced attention to faces, including those of caregivers, may represent one such variable (Dadds et al., 2011; Frick et al., 2014). At a minimum, the findings suggest that diminished emotion identification can constitute an associated feature of disorganized attachment representations, whether relationally or biologically determined.

Attention to Facial Emotional Expressions

The disorganized group exhibited lower attention to facial emotional expressions, particularly to fearful and neutral ones. This finding corroborates Bowlby's (1973) account on defensive exclusion, which suggests that shifting of attention away from threatening stimuli constitutes a primary defense mechanism against potentially disorganizing conflict and anxiety. Despite its centrality to Bowlby's account, little research has examined attentional processes in relation to attachment quality (Dykas & Cassidy, 2011; Hesse & Main, 2000). The study therefore addressed a knowledge gap, and adds to research on infants that has, for instance, found a lack of a normative bias to fearful expressions in disorganized children (Peltola et al., 2015).

Vision is one of the most important means by which we gather information about the world, and selection of information through attention is crucial to social behavior and learning (Findlay & Gilchrist, 2003). Lowered attention to facial expressions could thus be a risk-factor for diminished learning about faces, emotional expressions, and suboptimal social behavior (Dadds et al., 2012). Indeed, we hypothesized in Study II that the disorganized group's diminished ability to identify expressions could stem from withdrawal from social interactions. The association in study III between attention to expressions and emotion identification supports this hypothesis.

Emotional Reactivity and Regulation

Disorganized children showed elevated emotional reactivity and decreased emotion regulation, particularly for anger and fear. Emotion regulation also mediated the association between disorganization and ODD-symptoms, a result that remained when using only teacher ratings of ODD-symptoms. These findings lend support to theory and research that have characterized disorganized relationships as dysregulated, with caregivers thought to be unable to help their child regulate and achieve homeostasis (Solomon & George, 2011). The findings also support Bowlby's claim that anxiety (cf. fear) and anger may "go hand in hand" (1988, p. 79), with anger perhaps a natural reaction to threats of separation (i.e., as in separation anxiety) and losses of caregivers (i.e., as in mourning). In this vein, he argued that problems with anger can develop following fear of abandonment, and that anger at attachment figures may become redirected toward third parties.

The present anger-fear complex is intriguing given the proposed centrality of fear and alarm in the emergence of disorganized attachment (Duschinsky, 2018; Main & Hesse, 1990), and the robust links to externalizing problems such as aggression (Fearon et al., 2010). Emotional reactivity is also one of the core features of ODD (Loeber, Burke, & Pardini, 2009). The present findings are consequently in line with the possibility that disorganized attachment may give rise to emotional reactivity and poor emotion regulation, particularly for fear and anger, which in turn may result in oppositionality and misconduct. It is important to note, however, that difficulties with emotional reactivity and regulation in newborns have been found to predict disorganized status in the SSP (Padrón et al., 2014; Spangler, 2013). An alternative explanation for the present findings is therefore that biologically based difficulties with emotional reactivity and regulation may give rise to both ODD-symptoms and disorganized status in the SAT.

Cognitive Inhibition

Study I found a small but significant association between disorganization and cognitive inhibition. This is in line with previous research on ADHD-symptoms (Bohlin et al., 2012; Thorell et al., 2012), and ODD-symptoms (LaVigne et al., 2015). The constructs were however completely unrelated in Study III. A potential reason for the differences between studies will be discussed further below. It is important to point out, however, that it is comparatively hard to interpret the nature and direction of associations between disorganized attachment and cognitive inhibition. Bowlby (1969/1980) argued that the complex and goal-corrected functioning of the attachment system hinges on the development of effector equipment, abilities that support or hamper complex goal-directed functioning. Executive functions correspond very well with the notion of effector equipment, and it is not difficult

to see how neurologically channeled impairments in EF could hamper the organization of attachment behavior. Cognitive inhibition is also denoted by strong heritability, and has been suggested to be a particularly difficult target for intervention (Thorell, Lindqvist, Bergman Nutley, & Klingberg, 2009). It should be noted, however, that cognitive inhibition was moderately associated with ADHD-symptoms, which suggest that the task worked well. The present samples were low-risk, particularly that of study III, and it may be that children's biologically channeled development of cognitive inhibition was good-enough to support organized attachment behavior in the majority of cases. Consequently, associations between disorganized attachment and cognitive inhibition may, when found, represent neurological vulnerability.

The Pattern of Associations with Multiple Competences

Theories on social information processing have emphasized that problems may be situated at different levels, such as in encoding of stimuli, in representation and interpretation of stimuli, in response generation, and/or in enactment of responses (Crick & Dodge, 1994). Indeed, it is typically argued that information processing includes multiple processes in distributed brain regions and networks (e.g., Rogers & McClelland, 2014). The pattern of deviations in Study III is in line with such proposals. For instance, the lowered attention to facial expressions is suggestive of problems with encoding of social stimuli. The diminished ability to identify expressions suggests difficulties with interpretation or representation. The emotional reactivity and decreased regulatory ability suggest difficulties with response generation, a conclusion buttressed by these children's externalizing problems. The associations between several of the distinct competences are also in line with the proposed bidirectional and interactive functioning of different levels of processing. For example, representational and interpretative factors may influence encoding (Crick & Dodge, 1994). This is firmly in line with Bowlby's (1973) ideas on defensive exclusion in which interpretation of stimuli as threatening is thought to influence further encoding so that threatening stimuli is excluded from further processing.

The Flight or Fight Response as an Integrative Mechanism

The emergence of disorganized attachment is thought to involve fear and alarm, emotional reactions that are associated with withdrawal. It is therefore intriguing that research on the consequences of disorganization for children's competences and developmental adaptation has highlighted problems with anger and aggression. The present research suggested that processing of anger and fear may go hand in hand, findings which beg the question of how initial problems with unassuaged alarm may translate into anger.

Bowlby discussed fleeing and freezing as behavioral outputs of the fear system, and argued that these behaviors may be elicited by different conditions (Duschinsky, 2018; Solomon et al., 2017). However, he also argued that conflict and disruption of the attachment system's ability to carry out its function may result in anger (Bowlby, 1973). His notion that anxiety and anger may go hand in hand also implicates conflict between the attachment system and that for anger. Indeed, Bowlby argued that aggressive behaviors can become predisposed in conflict situations (Solomon et al., 2017). Consequently, perhaps the "fight or flight" response to acute stress (Cannon, 1929) can be used as an overarching and integrative framework for understanding how the fear-circuitry presumed to be involved in disorganization comes to be associated with anger and externalizing problems. The fight or flight response also indexes both avoidance (flight) and approach (fight), which is reminiscent of the paradoxical injunction of both wanting to approach and avoid the caregiver (Main & Hesse, 1990).

The fight or flight response has received considerable support, though ethologists have argued for updates to the account. For instance, it has been pointed out that the axiom omits initial freeze reactions as well as final fright reactions (tonic immobility; Bracha, 2004). It has also been argued that the axiom mischaracterizes the typical order of the two classic responses, since flight is typically elicited before fight (Bracha, Roulston, Matsukawa, Williams, & Bracha, 2004). Moreover, it has also been emphasized that the classic fight or flight response is most commonly seen in adult male mammals, that responses to acute stress are much more heterogeneous, and that young children in particular may be less likely to exhibit the classic fight or flight response (Perry et al., 1995). In line with the core tenets of attachment theory, it has for example been argued that "young children more commonly utilize a combination of adaptive responses which are designed to, in the early stages of threat, bring caretakers to defend them" (Perry et al., p. 279). There may also be gender differences; females may more often show a behavioral pattern of "tend and befriend" rather than fight or flight, being nurturing and trying to maintain social relationships (Taylor et al., 2000).

It is interesting to note that whilst the "tend and befriend pattern", if taken to an extreme, bears similarities with the controlling-caregiving pattern, the "fight response" translates more readily into a controlling-punitive pattern. Problems with oppositionality, misconduct and aggression are also more common in males. Empirical research has implicated the flight or fight response in the emergence of conduct problems, with both responses associated with a near complete vagal withdrawal (Beauchaine, Gatzke-Kopp, & Mead, 2006). Deviations in children's physiological stress systems, in the form of elevated (hyper-active) or suppressed (hypo-active) basal cortisol levels, has also been associated with externalizing behavior problems (Alink et al. 2008). Interestingly, attachment based interventions have been found to attenuate cortisol hyper-activity among young children with externalizing

behavior problems (Bakermans-Kranenburg, Van Ijzendoorn, Mesman, Alink, & Juffer, 2008). Since fear and alarm are closely connected to the stress response system, developmental deviations in cortisol activity may consequently constitute one physiological mechanism behind the association between disorganized attachment and externalizing problems.

On the Differences in Associations between Study I and III

Particular weight has been given to the associations with distinct competences that were obtained in Study III. However, whereas the pattern of associations with the broad indices of developmental maladaptation was largely consonant between the projects, the pattern of associations with distinct competences was almost the opposite. Study I found an association with cognitive inhibition, but not with emotion regulation. In contrast, study III found associations with emotional competences, but not with cognitive inhibition. These differences present a challenge for the interpretation of the findings, particularly since the demographics statistics are highly similar.

Although speculative, the differences could be grounded in the differences in recruitment between the projects. Whereas Study III was based on a sample of children whose caregivers simply responded with an interest in participating, Study I was based on children who were recruited equally from six different temperament clusters. These clusters included two clusters each of children whose temperament suggested risk for internalizing or externalizing problems. Temperament is typically defined as constitutionally based individual differences in reactivity and regulation (e.g., Rothbart et al., 2001). The attempt to oversample children at risk for externalizing problems using temperament profiles should therefore have resulted in an increased number of children with biologically channeled difficulties with reactivity and/or regulation. It is therefore possible that the association between disorganized attachment status, cognitive inhibition, and ADHD-symptoms in Study I may stem from biologically determined problems with effector equipment. Such an interpretation would mean that the SAT should also, to an extent, be regarded as sensitive to the influences of ADHD-symptoms.

The Level of Learning Conditions

Any reliable conclusion concerning potential effects of attachment quality on children's psychological development, whether on a broad level of developmental adaptation or on a level of distinct competences, requires an understanding of how attachment may influence children's learning (van IJzendoorn et al., 1995). Unfortunately, and as discussed in the following, notable obstacles to precision may be found in the field's fairly encompassing definitions of (a) attachment and (b) the caregiver's role in attachment development. Similar to most research on the competence hypothesis, the present

work did not examine children's learning directly, and the present discussion is therefore theoretical. The discussion is however important in highlighting conceptual issues that make it harder to establish causality.

Attachment-Teaching vs. Attachment-Exploration

On the one hand, it could be argued that the present findings favor the attachment-teaching hypothesis; that children learn skills from close interactions with their caregivers. Facial emotional interactions are for example a salient feature of the early child-caregiver relationship with caregivers exposing children to expressions, modelling expressions, and mirroring children's own expressions (Beebe & Steele, 2013). It is consequently easier to envision potential effects of attachment on children's attention to faces and emotion identification as stemming from "teaching" in close interactions, perhaps particularly in situations when the attachment figure acts as a safe haven in comforting children when distressed. In such instances, the attachment figure may be likely to both mirror the child's emotional state and verbalize it, thereby also providing children with a concept. Likewise, the development of emotion regulation is often argued to go from initially externally driven by the caregiver, via dyadic/intersubjective regulation within the attachment relationship, to internal and independent regulation by the child him-/herself (Solomon & George, 2011). The caregiver who acts as a safe haven when a child is distressed is also likely to model strategies for regulating emotions. Consequently, it may be most parsimonious to characterize the development of emotion regulation as something that is "taught" by caregivers rather than learned from exploration of the environment.

On the other hand, one could argue that other individuals (cf. objects), social interactions, and social relationships are salient parts of the environment that children explore. Thus, the above effects could perhaps also be explained by disorganization interfering with children's natural instinct to explore. Rhetorically speaking, does avoidance of close interactions with caregivers decrease chances to learn from caregivers or does it limit exploration? It is hard to draw definite demarcation lines.

Safe Haven vs. Secure Base

Increased attention to the caregiver's specific role in attachment development may be of crucial importance to the competence hypothesis. Pertinent questions remain regarding the caregiving behavior most crucial for children's attachment quality (i.e., the transmission gap; Verhage et al., 2016), and the developmental outcomes most reliably influenced by attachment quality (i.e., the competence hypothesis). Whilst early theory on caregiving behavior and attachment quality focused more on safe haven behavior (e.g., intersubjective regulation, Bernier & Meins, 2008), subsequent research has

seen an increased emphasis on secure base aspects of caregiving such as autonomy support (e.g., van IJzendoorn & Bakermans-Kranenburg, 2018). In parallel, an early emphasis on attachment quality in children's development of emotional competences, grounded in learning from close interactions with their attachment figures (e.g., Cassidy, 1994; Sroufe et al., 2009), has seen an increased interest in children's development of cognitive abilities grounded in support of exploration (e.g., Bernier et al., 2012).

The competence hypothesis may have a problem with overextension, with attachment quality possibly being linked to too many aspects of child development (i.e., explaining too much variance). On the face of it, this problem may seem diametrically opposite to the one facing the sensitivity hypothesis, where the link between caregiving and child attachment has been too modest (i.e., explaining too little variance). However, as detailed in the above, the theoretical developments on the respective hypotheses have arguably mirrored one another, with the theoretical models expanding.

These issues may, ultimately, boil down to the operationalization of child attachment and the attachment figure's role in attachment development. In brief, the respective definitions are perhaps equally ingenious and fairly all-encompassing. The caregiver shall function as both a safe haven that provides comfort and protection *and* as a secure base from which children can explore. Similarly, attachment quality is denoted by both the ability to approach the caregiver for comfort *and* the ability to explore from the caregiver. Naturally, these conceptualizations invite a diverse pluralism of caregiving behaviors to be theorized as important for attachment, and a myriad of different aspects of development to be linked to attachment quality.

The Difficulty of Measuring Attachment Quality

As reviewed in the above, Bowlby argued for the importance of keeping the attachment system separate from other behavioral systems. In this vein, he also focused his attention on children's expressions of attachment behavior and conflict in separations from caregivers and in reunions.

With this in mind, it is interesting to note that attachment quality is typically measured through the joint output of the manifestations of the attachment system, the exploratory system, and their interaction. Using the SSP (Ainsworth et al., 1978) as an example, children do not need to show signs of increased activation of the attachment system to be classified as securely attached, for example through aversive signaling behavior or approach behavior. It is enough that children explore the play-material elaborately, that they show relationship specificity through some level of positive signaling behavior toward the caregiver, and that they do not show marked levels of conflict behavior (i.e., avoidance, resistance, disorganization). In the SAT (Kaplan, 1987), children are coded as secure if the fictive child exhibits attachment behavior and tries to stop the separation, or if the child shows an

ability to provide its own happiness through constructive activities during the separation. Constructive exploration, it is thought, denotes an internalized sense of felt security.

These choices, which are grounded in the attachment-exploration hypothesis, may be well informed. For instance, it has been suggested both theoretically and empirically that attachment quality cannot be indexed by any single and decontextualized behavior, but that it must be assessed through organization of goal-corrected behavior (Ainsworth et al. 1978; Sroufe & Waters, 1977). However, it should also be noted that such a broad and inclusive way of assessing attachment quality risks carrying with it a merging of the attachment system and the exploratory system. This is no problem if attachment is construed as including both children's ability to seek comfort from their caregivers and their ability to explore from the caregiver. However, measurement precision should be hampered if attachment is conceptualized as being more specifically about children's ability to use their attachment figures as sources of comfort and protection when distressed.

These considerations are of immediate relevance to the competence hypothesis. A broad assessment of attachment quality should arguably potentiate associations with a more diverse variety of constructs. Ultimately, the broad assessments of attachment quality may therefore contribute to the current proliferation of mini-theories regarding the potential outcomes of attachment quality. It would be interesting with research that uses instruments focused exclusively on children's attachment behavior and conflict following activation of the attachment system. For example, Main and Weston (1981) used an adult actor with a clown mask.

Clinical Implications

The studies were based on low-risk samples, particularly study III, and any suggestions of clinical implications should therefore be tempered. Though not without its caveats, the results do however suggest an association with problems with misconduct and oppositionality. Attachment based interventions may therefore benefit children with these problems. Attachment based interventions have also been found to reduce externalizing problems (Moretti & Obsuth, 2009), and attachment based prevention programs to attenuate the development of externalizing behavior problems (Giannotta, Ortega, & Statin, 2013). Research examining the therapeutic mechanism behind such effects has also suggested that increasing caregiver sensitivity (e.g., availability, perspective taking, empathic responding) may reduce children's problems with emotion regulation, which in turn may result in reductions in externalizing problems (Moretti, Obsuth, Craig, & Bartolo, 2015). Such findings are in line with the present finding on poor emotion regulation as a mediator of the association with ODD-symptoms.

As discussed previously, the present findings suggest that caution is warranted in applying an attachment perspective on the emergence on ADHD-symptoms. I am personally not aware of a single study that has found that disorganized attachment status has contributed specifically to prediction of clinical ADHD-status. On the contrary, research reporting significant associations has typically done so in the form of concurrent or predictive associations of small to moderate magnitude, and have lacked examination of whether disorganized status is associated with significant impairment.

While caution is warranted in applying an attachment perspective on the emergence of ADHD-symptoms per se, current research nonetheless suggests that an attachment perspective could be useful in relation to the development of comorbid conditions, such as ODD-symptoms, among children with ADHD-symptoms. First, research on disorganized attachment and ADHD-symptoms, including that of the present thesis (Study I), suggests that disorganized attachment representations may be more prevalent among children with ADHD-symptoms who also show comorbid ODD-symptoms (Bohlin et al., 2012). Second, suboptimal caregiving among caregivers of children with ADHD has been most commonly found when children have comorbid ODD-symptoms (Deault, 2010). In part, neurologically channeled ADHD-symptoms may in of itself constitute a stressor for caregiving and child-caregiver relationship quality. To the extent that this stress contributes to deviations in caregiving and development of disorganized attachment representations, this may be a risk-factor for comorbid ODD-symptoms. This is a possibility that warrants further research.

Limitations

The present work has several limitations that present opportunities for further research.

No Direct Measures of Caregiving Quality

First and foremost, neither of the studies included any direct measure of caregiving quality, and it is consequently not possible to delineate to what extent the associations that were obtained reflect children's biologically channeled vulnerabilities and/or caregiving based etiology. This is a limitation that, unfortunately, is shared with a big part of the research on attachment representations and children's psychological development.

Low-risk Samples

Second, the present research was solely based on children from low-risk samples, and it is therefore questionable to what extent the findings regarding behavioral maladaptation extend to high-risk and/or clinical samples. The dimensional perspective suggests that low-risk samples should be in-

formative regarding functioning in high risk and clinical samples (e.g., Nigg, 2001). Nonetheless, comorbidity between symptoms of ADHD and ODD may be more pronounced in samples with higher levels of clinical impairment, and it is possible that disorganized attachment could be related to a linear increase in both ODD- and ADHD-symptoms in such samples. For instance, it has been suggested that a bi-factor latent structure grounded in impulsivity may capture ADHD and ODD best (Lee et al., 2016).

Few Children with Disorganized Attachment Classifications

The sample size of disorganized children, though corresponding to meta-analytical prevalence estimates, was relatively small. This was especially notable in T2 of Study III, since children with disorganized attachment representations showed higher attrition than children from the organized-insecure and secure groups. This limitation has particular consequences for the analyses of mediation, which should be treated as exploratory.

Future directions

Simultaneous Examination of Caregiving Behavior Predictive of ODD

Future research on disorganized attachment representations and ODD-symptoms should not only be conducted on samples including a higher proportion of children at risk for ODD, it should also include caregiving behavior that in of itself predicts ODD-symptoms. Importantly, there is an overlap between behaviors that predict the emergence of disorganized attachment and the ones that predict ODD-symptoms, such as frightening and coercive behaviors (Loeber et al., 2009). Associations between disorganized attachment and ODD-symptoms could therefore reflect processes that contribute to the emergence of both disorganized attachment and ODD. For instance, one study found that attachment quality predicted both parents and teachers ratings of preschoolers ODD-symptoms. However, attachment quality did not contribute independently to ODD-symptoms when controlling for caregiving behaviors such as hostility (Lavigne et al., 2015).

Differentiation of ODD-Dimensions and Disorganized Subgroups

Research that move beyond broad measures of disorganized attachment status and ODD-symptoms in general would also be welcome. Disorganized attachment may for example develop into different controlling patterns from preschool and onward (Main & Cassidy, 1988), and disorganized children who exhibit a controlling-punitive pattern may be at highest risk for externalizing behavior problems (Moss et al., 2004). In line with this suggestion, molecular genetic research has suggested gene environment interactions in which disorganized children who carry certain risk alleles, presumably the

children who tend to develop a controlling-punitive pattern, rather than the ones who develop a controlling-caregiving pattern, are more likely to develop problems with aggression (Hygen, Guzey, Belsky, & Berg-Nielsen, & Wichström, 2014). It has also been suggested that ODD, like ADHD, may consist of at least two and possibly three partially independent dimensions (Leadbeater & Homel, 2015; Stringaris & Goodman, 2009), and disorganized attachment may be more strongly associated with some ODD-dimensions than others (Aebi et al., 2016).

Examination of Moderators of the Association with ODD-Symptoms

Beyond examining whether some subgroups of disorganized children show a more pronounced association with ODD-symptoms, research on subgroups of disorganized children would be useful for illuminating the potential influences of various moderators on the associations with ODD-symptoms. For example, associations may be differentially influenced by factors pertaining to children's gender and biological dispositions (e.g., high levels of emotional reactivity and/or low effortful control), caregiving factors (e.g., coercive parenting practices; Patterson, 1992), family factors (e.g., inter-parental conflict), and contextual factors associated with socio-economic status.

Attachment Interventions and Reductions in ADHD-Symptoms

Attachment based interventions would arguably constitute a fruitful avenue for examination of a potential role of disorganized attachment in ADHD-symptoms. Taking pharmacological treatment and ODD-symptoms into account, if changes from disorganized to organized attachment status are associated with significant decreases in ADHD-symptoms, this would suggest a role for attachment quality.

Differential Susceptibility, Disorganized Attachment, and ADHD

It has been increasingly recognized that the development of the frontal lobes, which are strongly implicated in the development of EF and ADHD, are dependent on "appropriate input and sensitive interaction with the primary caregivers" (e.g., Glaser, 2000, p.101). Nonetheless, ADHD is a neurodevelopmental disorder with high heritability. It has also been argued that similarities in brain organization may be due to the fact that our environments tend to be more similar than dissimilar (Mareschal et al., 2007). Thus, one may wonder just how aberrant caregiving would have to be in order to cause perturbations of such a magnitude that it triggers neurological impairment that manifest in an ADHD-diagnosis.

Nonetheless, it is becoming increasingly recognized that some children, due to their biological predispositions, and for better or worse, are more susceptible to environmental influences (Belsky et al., 2007). Children with the DRD4 7-repeat allele, which is linked to ADHD, have for instance been found to be more susceptible to an attachment based interventions for exter-

nalizing behavior problems (Bakermans-Kranenburg, van Ijzendoorn, Pijlman, Mesman, & Juffer, 2008). Molecular genetic research has also linked disorganized attachment to the DRD4 7-repeat allele, though attempts at replicating a main effect have failed (Bakermans-Kranenburg & van Ijzendoorn, 2007). It is possible however that some children may have a genetic susceptibility to developing both disorganized attachment and ADHD-symptoms, should they be exposed to certain environments.

Conclusions

This thesis supports the link between disorganized attachment and oppositionality, defiance, and misconduct, while cautioning against suggestions of a pathway from disorganized attachment to ADHD-symptoms. Though additional research is warranted, particularly in at-risk samples, clinicians should be careful in inferring a relationally disorganized attachment system in the etiology of ADHD. Answering to calls for developmental integration, the present research suggests that prediction of ADHD-symptoms may represent an overextension of the competence hypothesis (Sroufe, 2016).

The findings also suggest that disorganized attachment representations may be associated with deviations in several associated competences that are situated at different levels of processing of and responding to social information, including competences relevant to encoding, interpretation, and response generation (e.g., Crick & Dodge, 1994). It has also been suggested that the “flight or fight” response may constitute a bridge for understanding how the alarm and unsolvable fear that is thought to be integral to the emergence of disorganization may transfer into externalizing problems.

Finally, the operationalization and measurement of attachment has been disseminated. It has been argued that the fairly encompassing operationalization of attachment and the attachment figure’s role as both a safe haven and a secure base may constitute double edged swords that have invited a vast pluralism of mini-theories to be subsumed under the rubric of attachment.

Kurt Lewin (1951) famously said that there is nothing as practical as a good theory. Attesting to its practicality, attachment theory has been, and keeps being, immensely valuable. However, judging by the theory’s development, and the sheer breadth of situations in which it is currently being invoked, one may perhaps be forgiven for rhetorically wondering in what way an attachment perspective is different from a caregiving perspective. To the extent that the two becomes isomorph, one should eventually be rendered obsolete. Though I do not want to ascribe to theoretical orthodoxy and fundamentalism, I therefore believe that attachment theory may do well to conduct some theoretical soul-searching. Perhaps it is time that we renew our vows to proximity maintenance, prevention of child-caregiver separations, and protection of offspring as the heart of attachment!

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