



universität
wien

Dissertation

Titel der Dissertation

Assessing the Quality of Mother-Child-Interactions via
Behavioral Observation

Verfasserin

Mag. rer. nat. Nicole Hirschmann

angestrebter akademischer Grad

Doktorgrad der Naturwissenschaften

Wien, im Mai 2013

Studienkennzahl:
Dissertationsgebiet:
Betreuer:

A 091 298
Psychologie
Univ.-Prof. Mag. Dr. Klaus D. Kubinger

For my children, Steffi and Elias

Acknowledgments

First and foremost I want to thank my colleagues Ass.-Prof. Dr. Pia Deimann and Ass.-Prof. Dr. Ursula Kastner-Koller. They supported this thesis as co-authors to all papers and by contributing their expertise on child development, psychological assessment, and mother-child interactions in particular. Most importantly though, they encouraged me throughout my work on this thesis by providing great feedback and by consistently conveying confidence in my work.

Special thanks go to Univ.-Prof. Mag. Dr. Klaus D. Kubinger for supervising this thesis and for providing a great working atmosphere as Head of the Department of Developmental Psychology and Psychological Assessment, where I was conducting my work on this thesis. I furthermore want to thank Assoz. Prof. MMag. DDDr. Martin Voracek for sharing with us his immense knowledge on scientific writing and publishing in his PhD course on the topic. He and my fellow PhD students in his class read and reread many drafts of my papers, gave many helpful suggestions, and thereby substantially improved the quality of my work.

I convey special acknowledgement to my friend and colleague Mag. Nadine Aigner. She not only taught me much on and shared with me her enthusiasm for the method of behavioral observation. She also introduced me to INTAKT and observations of mother-child interactions in the first place. Without her contribution this work would not have been the same.

Many thanks go to Mag. Dr. Hanne Koch for our great cooperation on INTAKT and much more and especially for bringing joy into my office whenever she dropped in.

Many students have contributed to the development of INTAKT either as interns or as part of their diploma thesis. I thank Mag. Raphaela Celand, Karina Fallent, Sophie Gold, Pia Huber, Bettina Krätschmer, Sandra Pilz, Nina Reischer, Tina Schemmel, Mag. Tanja Svecz, and Jelena Vogler for their excellent work.

Analyzing mother-child interactions would not be possible without mothers and children who let us take a look at their interactions. I gratefully acknowledge the many families who participated in the INTAKT project and thus provided the foundation for our research.

Last but not least I want to thank my family, Philipp, Steffi, and Elias for their support, for their confidence in me, and for allowing me to spend so much time working on this thesis.

Table of Contents

Abstract – English	- 1 -
Abstract – Deutsch	- 3 -
1. General Introduction	- 5 -
1.1. Mother-Child Interaction	- 5 -
1.1.1. Maternal Sensitivity.....	- 6 -
1.1.2. Maternal Feedback.....	- 6 -
1.1.3. Maternal Interactive Style in Joint-Attention Episodes.....	- 7 -
1.2. Behavioral Observation	- 7 -
1.2.1. Rating Scales versus Nominal Codes	- 8 -
1.2.2. Time Sampling versus Event Sampling	- 8 -
1.2.3. Live Observation versus Video Recording	- 9 -
1.2.4. Psychometric Properties	- 10 -
1.2.5. Observational Errors.....	- 11 -
1.2.6. The Coding Manual.....	- 11 -
2. Contribution of the Current Doctoral Thesis.....	- 12 -
2.1. Initial Development of INTAKT	- 12 -
2.1.1. Paper 1.....	- 12 -
2.1.2. Discussion and Follow-up (Paper 1)	- 13 -
2.2. Validating INTAKT in the Educational-Counseling Context	- 14 -
2.2.1. Paper 2.....	- 14 -
2.2.2. Discussion and Follow-up (Paper 2)	- 14 -
2.3. Mother-Child Interaction and Child Development.....	- 15 -
2.3.1. Paper 3.....	- 16 -
2.3.2. Discussion and Follow-up (Paper 3)	- 16 -
3. General Discussion and Prospects.....	- 18 -
4. References.....	- 20 -
5. Original Papers of the Doctoral Thesis	- 25 -
5.1. Paper 1.....	- 27 -
5.2. Paper 2.....	- 47 -
5.3. Paper 3.....	- 69 -
6. Curriculum Vitae.....	- 91 -
7. Publications	- 92 -

Abstract – English

Mother-child interactions are important to a child's development. Their quality predicts a range of important developmental outcomes, as for example language development, socio-emotional development, or cognitive development. The best way to assess quality of mother-child interactions is via behavioral observation. Unfortunately, hardly any instruments for an objective, reliable, and valid assessment are available for this purpose. Therefore, this thesis aims at developing an instrument – INTAKT – that allows for such an assessment. INTAKT comprises scales for the evaluation of three aspects of maternal interactive style: Maternal sensitivity, maternal feedback, and maternal interactive style in joint-attention episodes. INTAKT's initial development, especially in the context of foster care, is detailed in Paper 1. Reliability estimates as well as evidence for validity of INTAKT are presented. In Paper 2, mothers who seek counseling due to concerns about their child are compared with control mothers on basis of INTAKT categories. It is shown that INTAKT is able to distinguish between the two groups and is helpful in the educational-counseling process. In Paper 3, relations between maternal interactive style and child development are investigated. Negative maternal feedback as well as inconsistent maternal sensitivity are identified as having an adverse impact on child development. Implications of those findings are discussed. Across all papers the progress in the development of the instrument is detailed. Especially, improvements concerning reliability and usability (e.g., coding via paper pencil versus computer) are discussed. In conclusion, the new instrument, INTAKT, constitutes an objective and reliable measure for the valid assessment of the quality of mother-child interactions.

Abstract – Deutsch

Mutter-Kind-Interaktionen stellen einen wichtigen Faktor in der kindlichen Entwicklung dar. Ihre Qualität steht in Zusammenhang mit einer Reihe von wichtigen kindlichen Entwicklungsbereichen, wie zum Beispiel der sprachlichen Entwicklung, der sozial-emotionalen Entwicklung oder der kognitiven Entwicklung. Am besten wird die Qualität von Mutter-Kind-Interaktionen über Verhaltensbeobachtung erhoben. Leider stehen jedoch kaum Instrumente für eine objektive, reliable und valide Erfassung in diesem Bereich zur Verfügung. Das Ziel dieser Dissertation ist daher die Entwicklung eines Instruments – INTAKT – welches eine solche Erhebung ermöglicht. INTAKT setzt sich aus drei Skalen zur Beurteilung des mütterlichen Interaktionsverhaltens zusammen: Mütterliche Feinfühligkeit, mütterliche Rückmeldung und der mütterliche Interaktionsstil in Joint-Attention-Episoden. Die ursprüngliche Entwicklung INTAKTs, speziell im Rahmen von Pflegschaftsverfahren, wird in Artikel 1 dargestellt. Ebenso werden Reliabilitätsabschätzungen sowie Hinweise auf die Validität von INTAKT präsentiert. In Artikel 2 werden Mütter, die Erziehungsberatung aufsuchen, mit einer Kontrollstichprobe hinsichtlich der INTAKT-Kategorien verglichen. Es zeigt sich, dass INTAKT zwischen den beiden Gruppen differenzieren kann und im Erziehungsberatungsprozess hilfreich angewandt werden kann. In Artikel 3 werden Zusammenhänge zwischen dem mütterlichen Interaktionsstil und der kindlichen Entwicklung untersucht. Dabei erwiesen sich negative mütterliche Rückmeldung wie auch inkonsistente mütterliche Feinfühligkeit als ungünstig für die Entwicklung des Kindes. Folgerungen aus diesen Ergebnissen werden diskutiert. Über alle Artikel hinweg wird der Fortschritt in der Entwicklung des Instruments beschrieben. Im Besonderen werden Verbesserungen der Reliabilität und der Usability (z.B. Paper-Pencil- versus Computer-Auswertung) diskutiert. Zusammenfassend lässt sich sagen, dass das neue Verfahren, INTAKT, ein objektives und reliables Instrument darstellt, mit dem sich die Qualität von Mutter-Kind-Interaktionen valide erfassen lässt.

1. General Introduction

Assessing the quality of mother-child relations can be accomplished in different ways. We can either use self-reports – given by the mother (e.g., Die Familienbögen; Cierpka & Frevert, 1994) or by the child (e.g., Familien- und Kindergarten-Interaktionstest, FIT-KIT; Sturzbecher & Freytag, 2000) – or assessment scales filled in by a clinician (e.g., Globale Einschätzungs-Skala der Eltern-Kind-Beziehung, GES-EKB; Zero To Three, 1999), or we can observe behavior directly. There are three main advantages to the method of behavioral observation. Firstly, young children, especially preverbal infants and preliterate children cannot always accurately tell us what they think let alone fill in questionnaires. But even with older participants it may be interesting to compare data gathered by observational methods with data collected via self-report. Secondly, spontaneous behavior often seems more natural than elicited behavior. And thirdly, observational methods have the ability to capture behavior unfolding in time. This makes it possible to investigate process in a way not possible when using more static measures (Bakeman & Quera, 2011).

Wanting to capitalize on these advantages, the aim of the current thesis was to develop an instrument for the assessment of the quality of mother-child interactions that should allow for an objective, reliable, and valid evaluation of maternal interactive style. *Paper 1* presents the initial steps of the development process of the new instrument, named INTAKT. The theoretical background of all three scales is detailed and first data on reliability and validity are presented. *Paper 2* presents a more in-depth study of the validity of INTAKT. Its applicability in educational counseling is demonstrated. Furthermore, connections between mother-child interaction and the child's developmental status are being looked at in a clinically referred sample. To assess this topic more thoroughly, *Paper 3* investigates the relation between quality of mother-child interactions and child development in a bigger and more representative sample.

1.1. Mother-Child Interaction

Interactions between mothers and their children play a major role in the development of a child. Traditionally, the importance of a warm and sensitive interactive style during infancy has been stressed as it is thought to provide a strong foundation for the child's later development. But research has shown that consistency in maternal responsiveness is even more important than early responsiveness (Landry, Smith, Swank, Assel, & Vellet, 2001). Also, children with sensitive mothers at age 3 but an insecure attachment history show more positive developmental outcomes than 3-year

olds with insensitive mothers but a secure attachment history (Belsky & Fearon, 2002). Thus, quality of mother-child interactions during the preschool and kindergarten years does also play a crucial role in the development of a child (e.g., Morrison, Rimm-Kauffman, & Pianta, 2003). When searching the literature, three main constructs emerge that have been studied repeatedly over the years: maternal sensitivity, maternal feedback, and maternal interactive style in joint-attention episodes. In terms of Bronfenbrenner's ecological systems theory all three are part of the microsystem, which he defines as the immediate situation directly affecting the developing person. This includes, amongst others, the people with whom a person interacts (Bronfenbrenner, 1979, p.7).

1.1.1. Maternal Sensitivity

Maternal sensitivity is rooted in attachment theory and known to be a main precursor of a secure attachment between mother and child (Ainsworth, Blehar, Waters, & Wall, 1978). Sensitive mothers are usually defined as aware of their children's signals, accurately in interpreting them, and appropriately and promptly in their response (Ainsworth, Bell, & Stayton, 1974). But over the time some researchers have modified the concept and, for example, included the mother's ability to engage with infants at their level and current focus and to structure interactions to allow infants to achieve levels of development beyond those they could achieve on their own (Bigelow et al., 2010).

A wealth of studies has shown that maternal sensitivity is linked to favorable child outcomes as, for example, social problem-solving skills (Raikes & Thompson, 2008), cognitive and language performance (NICHD Early Child Care Research Network, 2005), and even adjustment in adolescence (Feldman, 2010). Its predictive role concerning attachment security makes it a relevant factor for positive emotional development as, for example, self-reliance, emotional regulation, and social competence that are all associated with secure mother-child attachment (Sroufe, 2005).

1.1.2. Maternal Feedback

Maternal evaluative feedback is known to be a further important domain in mother-child interactions. Three main kinds of feedback can be distinguished: positive evaluative statements, negative evaluative statements, and corrective statements (Kelley, Brownell, & Campbell, 2000). Occasionally, this construct or parts of it have been subsumed under different names. For example, maternal affirmation, considered one type of maternal responsiveness by Tamis-LeMonda,

Bornstein, and Baumwell (2001), is equivalent to positive maternal feedback as defined by Kelley et al. (2000).

Positive and corrective maternal feedback are generally considered to be supportive of a child's development. They were found to relate to children's persistence in the face of difficulty (Kelley et al., 2000) and to less shame following task failure (Alessandri & Lewis, 1996). Negative maternal feedback, on the other hand, is considered to be adverse to child development. It is related to more shame following task failure and less pride following success (Alessandri & Lewis, 1996; Kelley et al., 2000). Coupled with low levels of positive feedback, negative feedback is associated with adolescents' negative self-perceptions, which place them at risk for depressive symptoms (Jacquez, Cole, & Searle, 2004).

1.1.3. Maternal Interactive Style in Joint-Attention Episodes

Joint attention describes children's ability to coordinate their attention with a social partner with respect to an object or event. Episodes of joint attention between a mother and her child facilitate the child's development. Most noticeably, language development is promoted during joint-attention episodes, through which the child learns to identify word-object mappings (Dominey & Dodane, 2004).

During episodes of joint attention mothers can either follow the attentional focus of their child or switch the attentional focus of the child. It was shown that for children older than six months it is more beneficial if a mother follows their attentional focus (Saxon, Colombo, Robinson, & Frick, 2000). For example, 9 to 15 months old children with mothers who use language that follows into their focus of attention, rather than leading their attention away, have better early skills of gestural and linguistic competence (Carpenter, Nagell, & Tomasello, 1998). Furthermore, children with mothers who follow rather than direct their play interest during joint-attention episodes, engage in more advanced play (Bigelow, MacLean, & Proctor, 2004).

1.2. Behavioral Observation

The method of behavioral observation is especially useful for the assessment of the quality of mother-child interactions as it allows us to gain a more objective impression than would be possible

from self-reports. This is in part due to the fact that parental interactions with young children are very subtle, very quick, and usually without conscious control, even in the adult involved (Gloger-Tippelt & Reichle, 2007). Behavioral observation, as used in this thesis, implies a quantitative approach. It provides measurement by use of an elaborate coding scheme. These coding schemes can be organized in various ways (cf. Bakeman & Quera, 2011).

1.2.1. Rating Scales versus Nominal Codes

Rating scales are ordinal scales, used by observers to quantify frequency or intensity of behavior (Greve & Wentura, 1997). They can comprise any number of points, but an odd number (e.g., 5, 7, or 9) is more common (Faßnacht, 1995). Each point of a rating scale can either be labeled by a number, a word, or a more lengthy description.

Codes, on the other hand, are nominal-scale categories, for which order is arbitrary. The main question, when developing a nominal coding scheme, is whether codes will be mutually exclusive and exhaustive (ME&E). This means that for every entity coded there is one code in the set that applies (exhaustive), but only one (mutually exclusive). ME&E sets present many advantages over open coding schemes, as they simplify recording and facilitate analysis of observed data. Easily, each set of codes can be converted into an ME&E set by using two strategies. Firstly, for two codes that are not mutually exclusive a third code can be added that is defined as a combination of the former two. Secondly, if a set of codes is not exhaustive, a new code can be added that is named *none-of-the-above*, or similar (Bakeman & Quera, 2011).

1.2.2. Time Sampling versus Event Sampling

No matter what kind of coding scheme we use, we have to make a decision on how to record the observational data. A broad distinction is made between the method of time sampling (also called interval recording) and event sampling (also called event recording, or more specifically untimed-event recording or timed-event recording; Bakeman & Quera, 2011).

Time sampling means that the stream of behavior is segmented into relatively brief, fixed time intervals and codes are assigned to each successive interval. Thereby, one of three sampling strategies can be applied. With partial-interval sampling (also called one-zero sampling) every interval is checked in which the behavior occurred at some point, once or more, during the interval.

Momentary sampling (also called instantaneous sampling or point sampling) means that the interval is checked if the behavior occurred at a defined moment (usually at the beginning or the end of an interval). With whole-interval sampling an interval is only checked if the behavior occurred for the whole duration of that interval. A variant of whole-interval sampling is predominant activity sampling, where the one behavior is checked that predominates during the interval. This is especially useful when working with an ME&E set of codes. Anyway though, the method of time sampling suffers from the disadvantage of being imprecise. Depending on which sampling method is chosen, frequencies might be underestimated, proportions might be overestimated, or other inaccuracies might occur. The reason for its popularity lies in its easy and inexpensive implementation (Bakeman & Quera, 2011; Faßnacht, 1995).

Event sampling on the other hand (specifically, timed-event recording) is a much more precise method. It usually involves noting the exact onset and offset times of events. Therefore, it works best when using computer technology. Currently, two of the most widely known commercial systems that support recording of observational data are Mangold International's INTERACT (www.mangold-international.com) and Noldus Information Technology's The Observer (www.noldus.com). Both can be used to either code live observations or video-recorded observations (Bakeman & Quera, 2011).

1.2.3. Live Observation versus Video Recording

There are many advantages to video-recording observations. Firstly, recorded material can be played and replayed, which allows for more reflection before codes are assigned. Secondly, because it can be replayed observers do not need to code everything all at once. They can focus on different aspects of behavior in different passes. Thirdly, with recorded behavior it is possible to compare an observer's coding with his own earlier coding of the same material, and thus check intraobserver reliability. And fourthly, coupling videos with computer systems for coding data offers unique opportunities for fine-grained analysis of behavior (Bakeman & Quera, 2011).

Nonetheless, sometimes live observation may be the method of choice. For example, in school classrooms video recording might be considered too intrusive. And in some circumstances trained human observers who are embedded in the situation may be able to detect behaviors that are unclear on recordings (Bakeman & Quera, 2011).

1.2.4. Psychometric Properties

Like other assessment tools (e.g., tests, questionnaires) behavioral-observation systems need to prove their psychometric properties. Those include objectivity, reliability, and validity of coded data.

Reliability of behavioral observations means that observations can be reproduced, if conditions that are theoretically relevant for the occurrence of the observed behavior are equivalent and differences only occur concerning theoretically irrelevant aspects (Feger, 1983, pp. 23-24). Usually, different points in time or different observers are considered irrelevant aspects, whereas different situations might be relevant. For example, if a child behaves differently during class and while on a soccer place that does not imply that observations are unreliable. The difference between the two situations is relevant. But if a child's behavior within the same class, with the same teacher teaching the same subject is being perceived very differently by two different observers a low reliability is at hand. If different observers are used as criterion for establishing reliability, definitions of reliability and objectivity overlap. Objectivity is oftentimes defined as the agreement between two coders. In this case, objectivity and reliability of behavioral observations are essentially the same (Greve & Wentura, 1997). Both can be assessed either by comparing two observers with each other or by comparing an observer's coding with a gold-standard protocol that is presumed to be accurate (Bakeman & Quera, 2011). The most common reliability measures for observational data are kappa (κ) for nominal-scaled data and weighted kappa (κ_w) and Intra-Class Correlation (*ICC*) for data from rating scales (Wirtz & Caspar, 2002).

Validity of behavioral observations concerns the question, if and to what extent the observation measures what is intended to be measured. There are three different approaches to determine the validity of an instrument. Firstly, content validity of a measure means that the measure itself is, by definition, the ideal criterion of the behavior in question. Secondly, construct validity means that a measure fulfills certain theory-based assumptions regarding some kind of construct. And thirdly, criterion validity concerns the question if and to what extent it is possible to link the results of the observation to a certain criterion (Greve & Wentura, 1997; Kubinger, 2009).

Reliability and validity of a measure are intertwined insofar as high reliability is a prerequisite for high validity. An unreliable measure cannot measure anything correctly, so it does not measure correctly what it intends to measure either. Inversely, it follows that high validity is a sufficient precondition for high reliability, whereas high reliability is a necessary but not a sufficient precondition for high validity (Greve & Wentura, 1997).

1.2.5. Observational Errors

Typical errors that frequently occur in behavioral observations are of three kinds. Firstly, observational errors can be caused by the observer. Observers can make mistakes either in the process of perceiving (e.g., expectation bias, observer drift), interpreting (e.g., central tendency bias), remembering, or reproducing observations. Secondly, observational errors can be caused by the observation itself. This can be either due to insufficiencies of the coding scheme or due to the fact that those who are observed are influenced by the fact of being observed. The latter phenomenon is called reactivity. Thirdly, observational errors can be caused by external conditions, for example, lighting conditions or noise (Greve & Wentura, 1997).

1.2.6. The Coding Manual

To avoid observational errors, especially those due to problems with the coding scheme, an extensive, well-organized, and carefully drafted coding manual is an essential instrument. It provides the names and definitions of all codes along with examples. It clarifies similarities and differences between codes that otherwise might be confused too easily. It also details the structure of the coding schemes, for example, whether they are rating scales or nominal scales or whether they are ME&E, and explains coding rules. Drafting a coding manual is an iterative process that should go along with the development of a coding scheme (Bakeman & Quera, 2011).

2. Contribution of the Current Doctoral Thesis

As detailed above, mother-child interactions play an important role for the development of children. To assess the quality of such interactions, behavioral observation seems to be the method of choice. Unfortunately though, currently hardly any instruments for the systematic observation of the quality of mother-child interactions are available. Instruments that are usually discussed in the context of assessment of mother-child interactions are either unpublished (e.g., CARE), mainly intended for research purposes (e.g., Mannheim Rating Scales), or both (c.f., Wiefel et al., 2007; Ziegenhain, Fegert, Ostler, & Buchheim, 2007). None of them offer norms to allow for the comparison of individual results with a standardized sample.

The aim of the current thesis was to develop a standardized instrument that allows for an objective, reliable, and valid assessment of the quality of mother-child interactions. Steps of the development process are detailed below.

2.1. Initial Development of INTAKT

Our effort to develop an instrument for the assessment of the quality of mother-child interactions started with a request from the Viennese Child Protective Services (CPS; MA 11 – Amt für Jugend und Familie). They had been videotaping mother-child interactions in the context of foster-care decisions for a long time, but had never used a standardized instrument for the evaluation of maternal interactive quality. Because decisions in this field are very sensitive, a reliable and valid instrument was in great demand.

2.1.1. Paper 1

As part of a cooperation with the CPS, they provided us with 20 videos of mothers and foster mothers interacting with their children. Based on an extensive literature research, three main concepts were identified that are relevant for the assessment of the quality of mother-child interactions (see 1.1.1. through 1.1.3. for details on the three concepts). Therefore, INTAKT is comprised of a rating scale for the assessment of maternal sensitivity, a coding scheme for the assessment of maternal feedback, and a coding scheme for the assessment of maternal interactive style in joint-attention episodes. The instrument was first used with the videos provided by the CPS.

Its psychometric properties were evaluated and it proved to be able to assess the quality of mother-child interactions quite reliably and validly.

In a follow-up study, mother-child interactions in CPS videos were compared to mother-child interactions in an inconspicuous sample. Extreme-group validity of INTAKT was demonstrated that way. For details of both studies see 5.1.

2.1.2. Discussion and Follow-up (Paper 1)

In two studies we were able to demonstrate that the newly developed instrument, INTAKT, is able to reliably and validly assess the quality of mother-child interactions. Reliability was modest in Study 1, but improved substantially in Study 2. This was achieved by reviewing and redefining behavioral definitions before starting data coding of Study 2. After Paper 1, we therefore prepared a comprehensive observer training, which all coders of subsequent studies had to successfully complete before starting coding.

Validity of INTAKT was, amongst others, examined by comparing decisions of experts to evaluations of interactive quality with INTAKT. Fifty percent of the decisions by CPS workers were positive for the observed mother (see Table 2 in Paper 1). Considering information from INTAKT, 85.7% of all decisions could be predicted by knowing if mothers were part of the positive or negative interactive cluster ($\Lambda = .71$). Furthermore, extreme-group validation was conducted to see if differences exist between different groups of mothers. Interestingly, mothers whose children had been placed in foster care by the CPS were rated as least sensitive and displaying the least favorable behavior concerning feedback and behavior during joint-attention episodes. This was true even though those mothers were the ones who had the most imminent reason for altering their own behavior while being videotaped. All of them knew that a decision about the foster status of their child depended in part on the analysis of their interactions. Nevertheless, reactivity (see 1.2.5.) obviously did not distort the results in such a way that those differences would not show up.

In the two initial studies reported in Paper 1 we had first taken a look at children 1 to 8 years of age, and then restricted the age range to 3- to 6-year olds. This allowed us to use a more structured situation, namely craft materials that are appropriate for play at this age. In all further studies we restricted child age to 3 to 5 years and used a combination of a structured and a less structured situation. Children and mothers could first use the craft materials to design a house. Then, they were provided with a box of play material which they could use for free play.

2.2. Validating INTAKT in the Educational-Counseling Context

A further goal for the development of an instrument for the assessment of mother-child interactions was to make it accessible to practitioners. Therefore, our next step was to test INTAKT's usability in the context of educational counseling. In cooperation with two counseling units we were able to obtain videos of mothers who had consulted a psychologist because they sought advice concerning their child. INTAKT's applicability and usefulness in this context was assessed.

2.2.1. Paper 2

Twelve mothers who had consulted a psychologist with their 3- to 5-year old child took part in this study. Their interactions with their children were compared to a parallel sample of non-referred mothers and children. Furthermore, children whose mothers had consulted a psychologist were assessed with the Viennese Developmental Test (WET; Kastner-Koller & Deimann, 2012) and associations between quality of mother-child interaction and child development were evaluated. For all details of this study see 5.2.

2.2.2. Discussion and Follow-up (Paper 2)

In Paper 2 we were able to demonstrate another aspect of the validity of INTAKT. The instrument was able to distinguish between mothers who had consulted a psychologist because of concerns regarding their child and control dyads. The former displayed a less favorable interactive style.

Applying INTAKT in the educational-counseling context turned out to be highly successful. One of the psychologists who were to counsel participating mothers also took advantage of the videos during the counseling process. She used our analysis of the videos with INTAKT and our feedback on problematic and successful aspects of the interaction to integrate this information with other aspects of her assessment of the child. She then also used sequences of the video-taped interactions to point out to the mothers how they could successfully interact with their children and which problematic aspects they could avoid. This kind of video-supported counseling was regarded very positively by mothers as well as by the psychologist. As it has been shown that interventions concerning mother-

child interactions in preschool age can be very effective (Landry, Smith, Swank, & Guttentag, 2008) this gives promise that INTAKT can in the future be used successfully for educational-counseling purposes.

One aspect that turned out to be problematic for the implementation of INTAKT into practical use was its lack of economic efficiency. As most videos were about 50 minutes long, analysis via all three INTAKT categories took about eight hours per video. To reduce the time necessary for coding we are currently conducting research with the goal of identifying how much video footage must be coded to reliably and validly assess interactive quality.

As reliability is not a property of a scale itself but rather of a certain use of the scale (Wirtz & Caspar, 2002, p. 24) reliability estimates differ between studies. In Paper 2, *Maternal Sensitivity* displayed an inter-rater agreement of $ICC = .77$, which is comparable to results of Paper 1, Study 2 ($\kappa_w = .81$). For *Feedback* and *Joint Attention* we changed the way of calculating kappa. In Paper 1, Study 2 we had used an event-based algorithm that is provided by Mangold's INTERACT. It links each coded event with an event of the other coder. In Paper 2 we used a time unit-based algorithm that is provided by the freeware GSEQ (Generalized Sequential Querier, version 5.1). It divides the stream of events into equal time units (we used 1 second intervals) and for each time unit it is observed whether raters agreed on their choice of category. Based on this contingency table, kappa is calculated. In our judgment, this method provides a more accurate estimation of inter-rater reliability. Currently, we are conducting more research on the comparability of event-based and time unit-based algorithms for estimating inter-rater agreement of event-sampling data. For Paper 2 coefficients were $\kappa = .74/.73$ for *Feedback* and $\kappa = .71/.52$ for *Joint Attention*. This was mostly higher than in Paper 1, Study 2 ($\kappa = .58$ for *Feedback* and $\kappa = .57$ for *Joint Attention*) which we attribute to improved observer training (as mentioned in 2.1.2.).

2.3. Mother-Child Interaction and Child Development

In Paper 2 developmental status was only assessed of those children whose mothers had consulted a psychologist. Some interesting associations emerged but many aspects of mother-child interaction were almost uncorrelated to child development. We were therefore interested, if similar results would show up, when taking a look at associations between mother-child interaction and child development in a non-referred sample.

2.3.1. Paper 3

For this study, 40 mother-child dyads were videotaped and their interactions analyzed with INTAKT. Moreover, all of these children were assessed with the Viennese Developmental Test (WET; Kastner-Koller & Deimann, 2012). Regression analyses revealed inconsistent maternal sensitivity and negative maternal feedback as the main negative predictors of child development. More specifically, the former had an adverse impact on non-verbal child development, whereas the latter had an adverse impact on verbal child development. For all details of this study see 5.3.

2.3.2. Discussion and Follow-up (Paper 3)

Connecting the assessment of the quality of mother-child interactions to the assessment of child development in a community sample revealed interesting relations between the two. Especially, inconsistent maternal sensitivity and negative maternal feedback turned out to predict child development negatively. Furthermore, passive maintenance of the child's joint attention had a positive impact on non-verbal child development.

Inconsistent maternal sensitivity, quantified as the standard deviation of a mother's sensitivity over the time of the video, had already turned out relevant in Paper 2. It differentiated well between mothers who had consulted a psychologist because of concerns about their child and controls. Further following this kind of analysis might have promise for future research. It seems especially interesting that hardly any other studies have assessed stability in that way (as discussed in Paper 3). This might also be due to most studies using shorter video footage. We must also take this into consideration as a counterargument to our attempt to code less footage in the future.

Negative maternal feedback had already been an important factor in Paper 1. There, it was shown that mothers whose children had been placed in foster care by the CPS used much more negative feedback than inconspicuous mothers (23.48% compared to 1.67%). In Paper 3, negative maternal feedback was revealed as a main negative predictor of child development. Thus, high values in this category seem especially noticeable and might constitute a starting point for interventions.

Inter-rater agreement in Paper 3 was $ICC = .80$ for *Maternal Sensitivity*, $\kappa = .81/.76$ for *Feedback*, and $\kappa = .79/.86$ for *Joint Attention*. This constituted a further improvement compared to Paper 2 ($ICC = .77$ for *Maternal Sensitivity*, $\kappa = .74/.73$ for *Feedback* and $\kappa = .71/.52$ for *Joint Attention*). We once

more attributed this to improved observer training. After Paper 2 we had analyzed non-agreements between raters and redefined behavioral definitions to avoid similar misinterpretations in the future. We had further added more examples to better illustrate category definitions and delineations between categories. Currently, after having identified non-agreements in Paper 3 we are again working on redefinitions and we just recently drafted the latest version of the INTAKT manual.

3. General Discussion and Prospects

The aim of this thesis was to develop an instrument for the objective, reliable, and valid assessment of the quality of mother-child interactions. After a long development process, INTAKT does now allow for such an assessment. Its psychometric properties could be proven in different contexts and with different samples and coders. Constant revisions improved its quality substantially.

INTAKT is a theory-based instrument. It comprises scales and coding schemes for three concepts, namely maternal sensitivity, maternal feedback, and maternal interactive style in joint-attention episodes. Those three aspects of mother-child interactions have been proven to be important factors of the relation between a mother and child (see 1.1.1. through 1.1.3.). With INTAKT it was possible to assess them in mother-child pairs with children mainly between 3 and 5 years of age. Maternal sensitivity as well as maternal feedback have been assessed in this age range before, maternal interactive style in joint-attention episodes though is a concept more commonly assessed in mothers with younger children. Joint-attention abilities in children do usually show up and develop during the first two years of life and therefore this is a common time for the assessment of this factor. In INTAKT though, we defined categories to fit maternal interactive style with preschool-aged children. Those category definitions display similarities with other concepts that are usually assessed in preschool age. For example, maternal *maintaining* versus *directiveness*, as assessed in 2- to 4-year old children by Landry, Smith, Swank, and Miller-Loncar (2000), is defined in almost the same way as *attention following* and *attention switching* are in INTAKT.

Many steps of the development of INTAKT are detailed above, but there are more aspects that have been evaluated, but not yet discussed in detail. Amongst them are analyses concerning possible sex-related and age-related differences in interactions with children. It could be shown that mothers do not interact differently with their daughter or sons, as assessed with all three INTAKT scales (Celand, 2012). Furthermore, analyzing data from the sample used in Paper 3 revealed no relations between the age of the child and any INTAKT category (*Maternal Sensitivity*: $r = .12$, $p = .444$; *Feedback*: Pillai's trace = .11, $F(6, 72) = 0.70$, $p = .652$; *Joint Attention*: Pillai's trace = .39, $F(10, 68) = 1.63$, $p = .115$).

Currently, research focuses on a range of further interesting aspects. For example, all data presented here are cross-sectional data. Presently, longitudinal data are collected to assess stability of INTAKT data as well as the impact of mother-child interactions on child development at a later age.

As evident from the title on, this thesis has only focused on mothers as interactive partners of their children. Of course other people can play just as important roles in the life of a child. Therefore, one current step is to expand the focus of INTAKT to interactions between fathers and their children. Furthermore, non-parental caregivers play an important role in the life of most preschool children. Their sensitivity makes an independent contribution to later child outcomes (Hirsh-Pasek & Burchinal, 2006). Applying INTAKT to assess interactive style of caregivers seems well possible too.

A major goal for the future of INTAKT is to make it available to practitioners by publication of the manual. For this purpose, final definitions of all categories will have to be drafted. Moreover, it will probably be helpful to include video examples of interactions to better illustrate coding of certain interactive aspects and to better outline category definitions.

Three further steps will have to be accomplished before publication of INTAKT can be achieved. Firstly, providing a representative comparison sample will help practitioners to adequately judge how common or uncommon the present frequency of a certain maternal behavior is. This does not imply that INTAKT will constitute an exclusively norm-referenced assessment. It seems well possible that, for example by comparing data from referred and non-referred samples, certain criteria will emerge that point to especially problematic interactions. Exposing and describing those will likely form a basis for a criterion-referenced assessment that might well complement the norm-referenced method. Secondly, as mentioned before (see 2.2.2.), we need to enhance efficiency of INTAKT. Currently, coding takes too much time. Therefore, some of our research is focusing on how much footage needs to be coded in order to still assess interactive quality reliably and validly. Thirdly, as we cannot assume that all practitioners have coding software available, we will need to offer a paper-pencil method of coding.

We are confident that our work on INTAKT will soon provide practitioners as well as researchers with a valuable instrument for the assessment of mother-child interactions and thus can make a contribution to improvements in mother-child relationships.

4. References

- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant-mother attachment and social development: 'Socialisation' as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99-135). Cambridge, UK: Cambridge University Press.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.
- Alessandri, S. M., & Lewis, M. (1996). Differences in pride and shame in maltreated and nonmaltreated preschoolers. *Child Development, 67*, 1857-1869. doi:10.1111/j.1467-8624.1996.tb01832.x
- Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. Cambridge, UK: Cambridge University Press.
- Belsky, J., & Fearon, R. M. P. (2002). Early attachment security, subsequent maternal sensitivity, and later child development: Does continuity in development depend upon continuity of caregiving? *Attachment & Human Development, 4*, 361-387. doi:10.1080/14616730210167267
- Bigelow, A. E., MacLean, K., Proctor, J., Myatt, T., Gillis, R., & Power, M. (2010). Maternal sensitivity throughout infancy: Continuity and relation to attachment security. *Infant Behavior and Development, 33*, 50-60. doi:10.1016/j.infbeh.2009.10.009
- Bigelow, A. E., MacLean, K., & Proctor, J. (2004). The role of joint attention in the development of infants' play with objects. *Developmental Science, 7*, 518-526. doi:10.1111/j.1467-7687.2004.00375.x
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development, 63*, 1-174. doi:10.2307/1166214
- Celand, R. (2012). *Normierung des Beobachtungssystems „INTAKT“ zur Erfassung der Qualität von Mutter-Kind-Interaktionen mit besonderem Fokus auf die Unterschiede im mütterlichen Verhalten bezogen auf das Geschlecht des Kindes* [Standardization of the behavioral

- observation system "INTAKT" for the assessment of the quality of mother-child interactions with a special focus on differences in maternal behavior due to sex of the child]. Unpublished Diploma Thesis, University of Vienna, Austria.
- Cierpka, M., & Frevert, G. (1994). *Die Familienbögen: Ein Inventar zur Einschätzung von Familienfunktionen* [The Family Questionnaires: An inventory for the assessment of family functioning]. Göttingen, Germany: Hogrefe.
- Dominey, P. F., & Dodane, C. (2004). Indeterminacy in language acquisition: The role of child directed speech and joint attention. *Journal of Neurolinguistics*, *17*, 121-145. doi:10.1016/S0911-6044(03)00056-3
- Faßnacht, G. (1995). *Systematische Verhaltensbeobachtung* [Systematic behavioral observation]. Munich, Germany: Ernst Reinhardt Verlag.
- Feger, H. (1983). Planung und Bewertung von wissenschaftlichen Beobachtungen [Development and evaluation of scientific observations]. In H. Feger, & J. Bredenkamp (Eds.), *Datenerhebung* (Enzyklopädie der Psychologie, Forschungsmethoden der Psychologie, pp. 1-75). Göttingen, Germany: Verlag für Psychologie.
- Feldman, R. (2010). The relational basis of adolescent adjustment: Trajectories of mother-child interactive behaviors from infancy to adolescence shape adolescents' adaptation. *Attachment & Human Development*, *12*, 173-192. doi:10.1080/14616730903282472
- Gloger-Tippelt, G., & Reichle, B. (2007). Beziehungsorientierte Diagnostik und Intervention im Kindesalter – Einführung in das Themenheft [Assessment methods and preventive measures focussing on relationships]. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, *56*, 395-409.
- Greve W., & Wentura, D. (1997). *Wissenschaftliche Beobachtung* [Scientific observation]. Weinheim, Germany: Psychologie Verlags Union.
- Hirsh-Pasek, K., & Burchinal, M. (2006). Mother and caregiver sensitivity over time: Predicting language and academic outcomes with variable- and person-centered approaches. *Merrill-Palmer Quarterly*, *52*, 449-485. doi:10.1353/mpq.2006.0027
- Jacquez, F., Cole, D. A., & Searle, B. (2004). Self-perceived competence as a mediator between maternal feedback and depressive symptoms in adolescents. *Journal of Abnormal Child Psychology*, *32*, 355-367. doi:10.1023/B:JACP.0000030290.68929.ef

- Kastner-Koller, U., & Deimann, P. (2012). *WET – Wiener Entwicklungstest: Ein Verfahren zur Erfassung des allgemeinen Entwicklungsstandes bei Kindern von 3 bis 6 Jahren* [WET – Viennese Developmental Test: A test for assessing the developmental status of children 3 to 6 years of age] (3rd rev. & ext. ed.). Göttingen, Germany: Hogrefe.
- Kelley, S. A., Brownell, C. A., & Campbell, S. B. (2000). Mastery motivation and self-evaluative affect in toddlers: Longitudinal relations with maternal behavior. *Child Development, 71*, 1061-1071. doi:10.1111/1467-8624.00209
- Kubinger, K. D. (2009). *Psychologische Diagnostik: Theorie und Praxis psychologischen Diagnostizierens* [Psychological Assessment: Theory and practice of psychological assessment] (2nd rev. & ext. ed.). Göttingen, Germany: Hogrefe.
- Landry, S. H., Smith, K. E., Swank, P. R., Assel, M. A., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology, 37*, 387-403. doi:10.1037//0012-1649.37.3.387
- Landry, S. H., Smith, K. E., Swank, P. R., & Guttentag, C. (2008). A responsive parenting intervention: The optimal timing across early childhood for impacting maternal behaviors and child outcomes. *Developmental Psychology, 44*, 1335-1353. doi:10.1037/a0013030
- Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development, 71*, 358-375. doi:10.1111/1467-8624.00150
- Morrison, E. F., Rimm-Kauffman, S., & Pianta, R. C. (2003). A longitudinal study of mother-child interactions at school entry and social and academic outcomes in middle school. *Journal of School Psychology, 41*, 185-200. doi:10.1016/S0022-4405(03)00044-X
- NICHD Early Child Care Research Network. (2005). Duration and developmental timing of poverty and children's cognitive and social development from birth through third grade. *Child Development, 76*, 795-810. doi:10.1111/j.1467-8624.2005.00878.x
- Raikes, H. A., & Thompson, R. A. (2008). Attachment security and parenting quality predict children's problem-solving, attributions, and loneliness with peers. *Attachment & Human Development, 10*, 319-344. doi:10.1080/14616730802113620

- Saxon, T. F., Colombo, J., Robinson, E. L., & Frick, J. E. (2000). Dyadic interaction profiles in infancy and preschool intelligence. *Journal of School Psychology, 38*, 9-25. doi:10.1016/S0022-4405(99)00034-5
- Sturzbecher, D., & Freytag, R. (2000). *Familien- und Kindergarten-Interaktionstest (FIT-KIT)* [Family- and preschool-interaction-test]. Göttingen, Germany: Hogrefe.
- Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development, 72*, 748-767. doi:10.1111/1467-8624.00313
- Wiefel, A., Titze, K., Kuntze, L., Winter, M., Seither, C., Witte, B., ... Lehmkuhl, U. (2007). Diagnostik und Klassifikation von Verhaltensauffälligkeiten bei Säuglingen und Kleinkindern von 0-5 Jahren [Diagnostic classification of mental disorders in infants and toddlers age 0 to 5.] *Praxis der Kinderpsychologie und Kinderpsychiatrie, 56*, 59-81.
- Wirtz, M., & Caspar, F. (2002). *Beurteilerübereinstimmung und Beurteilerreliabilität* [Inter-rater agreement and inter-rater reliability]. Göttingen, Germany: Hogrefe.
- Zero To Three (1999). *Diagnostische Klassifikation: 0-3. Seelische Gesundheit und entwicklungsbedingte Störungen bei Säuglingen und Kleinkindern* [Diagnostic Classification: 0-3. Mental Health and Developmental Disorders of Infancy and Early Childhood]. Vienna, Austria: Springer.
- Ziegenhain, U., Fegert, J. M., Ostler, T., & Buchheim, A. (2007). Risikoeinschätzung bei Vernachlässigung und Kindeswohlgefährdung im Säuglings- und Kleinkindalter: Chancen früher beziehungsorientierter Diagnostik [Risk assessment of neglect and maltreatment in infants and toddlers: Chances of early preventive intervention]. *Praxis der Kinderpsychologie und Kinderpsychiatrie, 56*, 410-428.

5. Original Papers of the Doctoral Thesis

(Paper 1 -3)

5.1. Paper 1

Hirschmann, N., Kastner-Koller, U., Deimann, P., Aigner, N., & Svecz, T. (2011). INTAKT: A new instrument for assessing the quality of mother-child interactions. *Psychological Test and Assessment Modeling*, *53*, 295-311.

INTAKT: A new instrument for assessing the quality of mother-child interactions

*Nicole Hirschmann¹, Ursula Kastner-Koller², Pia Deimann²,
Nadine Aigner² & Tanja Svecz²*

Abstract

Despite abundant evidence for the influence of primary caregivers' interaction with young children, on their further development, there is a lack of standardized and published inventories for assessing the quality of such interactions. INTAKT, a newly developed instrument, which helps to rate maternal sensitivity, maternal feedback, and maternal interaction in joint attention episodes, is designed to close this gap. Two studies examined the psychometric properties of INTAKT, applying it to different kinds of mother-child dyads. Inter-rater reliabilities, as well as validation data using internal and external criteria, showed that the INTAKT scales allowed for an objective, reliable, and valid assessment of interaction quality between mothers and their children. Thus, the inventory is suitable as a diagnostic instrument for assessing the quality of mother-child interactions.

Key words: mother-child interaction; sensitivity; feedback; joint attention; assessment

¹ *Correspondence concerning this article should be addressed to:* Mag. Nicole Hirschmann, University of Vienna, Faculty of Psychology, Department of Developmental Psychology and Psychological Assessment, Liebiggasse 5, A-1010 Wien, Austria; email: nicole.hirschmann@univie.ac.at

² University of Vienna

Introduction

Interactions between children and their primary caregivers have been studied extensively during the past decades. Related research has shown that the quality of such interactions influences important and diverse areas such as the child's cognitive competences (Saltaris et al., 2004), inhibitory control (Lunkenheimer et al., 2008), ability to engage in symbolic play (Noll & Harding, 2003), language development (Lunkenheimer et al., 2008), receptive cooperation with parents (Kochanska, Aksan, & Carlson, 2005), the child's adjustment to school (Stright, Gallagher, & Kelley, 2008), social and cognitive development through middle childhood (Stams, Juffer, & van IJzendoorn, 2002) and math and reading achievement in elementary school (NICHD Early Child Care Research Network, 2008).

Therefore, much interest has focused on the question of which components of parent-child interactions exhibit such beneficial influences on the development of children. Attachment theory (e.g., Ainsworth, Blehar, Waters, & Wall, 1978) has traditionally focused on the construct of sensitivity as a main precursor of secure attachment. But even within that theory it is well recognized that sensitivity is an important, but not exclusive, factor, promoting adaption in young children (De Wolff & van IJzendoorn, 1997). Other areas of parental behavior that have been associated with differential outcomes for children, include parental feedback (e.g., Kelley, Brownell, & Campbell, 2000) as well as parental interactive style during joint attention episodes (e.g., Saxon, Colombo, Robinson, & Frick, 2000). All of these areas shall be discussed in further detail below.

Sensitivity

Following the classical definition of Ainsworth, Bell, and Stayton (1974, p. 127), sensitivity is "the mother's ability to perceive and to interpret accurately the signals and communications implicit in her infant's behaviour, and given this understanding, to respond to them appropriately and promptly". It was first assessed by Ainsworth and colleagues and was found to be highly correlated with children's later attachment security (Ainsworth et al., 1978). Further research (e.g., Susman-Stillman, Kalkoske, Egeland, & Waldman, 1996) affirmed this connection, and a meta-analysis on the topic showed sensitivity to be an important, though not the exclusive, precondition of attachment security (De Wolff & van IJzendoorn, 1997). More recent work found that greater maternal sensitivity to infants' distress and not to nondistress predicts attachment security (McElwain & Booth-LaForce, 2006), and that the association between maternal sensitivity and infant-mother attachment is partially mediated by the infant's ability to regulate affect (Braungart-Rieker, Garwood, Powers, & Wang, 2001). Effects of interventions attempting to enhance parental sensitivity and attachment security also support the idea of a causal role of sensitivity in shaping attachment (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003).

Secure attachment, in turn, is known to be related to a range of positive developmental outcomes, e.g. growth of self-reliance, bigger capacity for emotional regulation, and

better social competence (Sroufe, 2005). Furthermore, attachment security at an earlier age could be shown to be associated with enhanced social problem-solving skills in toddlers, less loneliness and social isolation in first grade (Raikes & Thompson, 2008), and a better ability to recognize emotions in faces when the child is 6 and 11 years old (Steel, Steel, & Croft, 2008).

In addition to accounting for a secure attachment relationship, maternal sensitivity towards infants has also been shown to have other influences on a child's development. It is positively associated with social problem-solving skills at preschool age and negatively associated with aggressive responses to hypothesized offenses at the end of first grade (Raikes & Thompson, 2008). It is predictive of higher self-control, more compliance, and fewer problem behaviors in toddlers (NICHD Early Child Care Research Network, 1998) and even positively influences adjustment in adolescence (Feldman, 2010). Higher maternal sensitivity further predicts better social and cognitive development in middle childhood (Stams et al., 2002) and has been shown to mediate negative effects of poverty on children's cognitive and language performance (NICHD Early Child Care Research Network, 2005). As well as being predictive of children's separation anxiety, it also seems to mediate the influence of a mother's separation anxiety on her child's separation anxiety (Dallaire & Weinraub, 2005).

Parental feedback

Parental evaluative feedback provides the child with information about the appropriateness of his/her actions and the resulting outcomes and whether or not the child's efforts and outcomes meet or fall short of parental expectations (Harter, 1978). This feedback can take several forms, including positive evaluative statements, negative evaluative statements, and corrective statements. The latter is to be understood as an attempt to correct children's actions with feedback which is negative or critical in content but neutral or positive in tone (Kelley et al., 2000).

The kind of feedback children receive from their parents has been shown to influence various domains of development. Positive and corrective maternal feedback were found to relate to children's persistence in the face of difficulty (Kelley et al., 2000) and to less shame following task failure (Alessandri & Lewis, 1996). Negative maternal feedback, in turn, was related to more shame following task failure and less pride following success (Alessandri & Lewis, 1996; Kelley et al., 2000). In general, more negative feedback was provided by mothers who had an officially recorded history of maltreating their children (Alessandri & Lewis, 1996). High levels of negative maternal feedback, coupled with low levels of positive feedback, are associated with adolescent negative self-perceptions, which, in turn, place adolescents at risk for depressive symptoms (Jacquez, Cole, & Searle, 2004). Negative maternal feedback regarding a child's failure, in interaction with a child's experienced negative events, tends to predict a more negative cognitive style, entailing greater cognitive vulnerability to depression (Mezulis, Hyde, & Abramson, 2006).

Joint attention

Joint attention refers to the ability of a child to coordinate his/her attention with a social partner with respect to an object or event. There are several ways in which dyadic joint attention can be attained. A broad distinction can be made between the categories of “attention switching” versus “attention following”. The former, characterized by caregivers who actively seek to switch the infant’s attentional focus during interaction, seems to be more beneficial for infants 6 months and younger, because they are generally more passive and less likely to initiate or lead interactions with their caregivers. The latter, a style in which the caregiver follows the lead of the infant’s attentional focus, proves to be more conducive to older infants (e.g., Saxon et al., 2000).

Infants whose mothers are able to follow that developmental trend (i.e., change from more attention switching at 6 months to more attention following at 8 months) score higher on language measures, adaptive behavior measures, and a general intelligence scale later on (Saxon et al., 2000). Moreover 9 to 15 month-old children with mothers who use language that follows into their infant’s focus of attention, rather than leading the infant’s attention away, have better early skills of gestural and linguistic competence (Carpenter, Nagell, & Tomasello, 1998). Furthermore, 12 month-old infants with mothers who have a high ability to follow, rather than direct their infant’s play interest and to scaffold their infant’s play interest during joint attention episodes, engage in more advanced play (Bigelow, MacLean, & Proctor, 2004). Moreover children’s independence in cognitive and social skills is supported by a mother’s maintenance of her child’s interest at 2 years of age (Landry, Smith, Swank, & Miller-Loncar, 2000).

Compared with dyads in which mothers are better able to follow their child’s attention, mother-child dyads which are still characterized by a high level of attention switching at 8 months, spend much less time within joint-attention episodes (Saxon et al., 2000). This, in turn, seems to be disadvantageous to the child, since time spent within joint attention with the caregiver is associated with a range of favorable developmental outcomes. During joint attention episodes, the child’s attention is focused on the relevant aspects of the referential world, thus facilitating language acquisition by more easily identifying word-object mappings (e.g., Dominey & Dodane, 2004). Indeed, the amount of time young infants spend in joint engagement with their mothers can predict infants’ early linguistic competence (Carpenter et al., 1998; Markus, Mundy, Morales, Delgado, & Yale, 2000). Likewise, there is a strong association between children’s ability to initiate and respond to joint attention and their later language and cognitive abilities (Markus et al., 2000; Morales et al., 2000; Mundy et al., 2007), even up to the age of 8 years (Smith & Ulvund, 2003).

Concerning a child’s social development, more frequent and consistent joint attention is longitudinally related to better social competence and less externalizing behavior (Vaughan Van Hecke et al., 2007), better theory of mind ability (Charman et al., 2000), a more active emotion regulation strategy use, less engagement in low-level play, and a tendency not to engage in self-soothing physical behaviors and to wait longer before attempting to retrieve a delay object (Morales, Mundy, Crowson, Neal, & Delgado, 2005).

Present research

From the findings reported above, it can be concluded that the quality of mother-child interactions, especially a mother's sensitivity towards the child's needs, her feedback regarding the child's activities, and her role in sustaining joint attention with the child, has a significant influence on the child's development. Therefore, a diagnostic instrument that allows for the assessment of the quality of mother-child interactions would be of great value to the domain of developmental psychology, especially since it could also serve as a source for subsequent interventions aiming at enhancing the quality of such interactions. To the best of our knowledge, no such instrument has been available to psychologists up until now. Wiefel et al. (2007, pp. 70-71) give an overview of the most widely used interaction scales. They refer to the Coding Interactive Behavior (CIB), the CARE-Index (CARE), and the Maternal Behavior Rating Scale (Mahoney), which are all unpublished instruments. They further list the Emotional Availability Scales (EAS), which are only available from the author after undergoing personal training. Also mentioned are the Mannheim Rating Scales for the Analysis of Mother-Child Interaction in Infants (Mannheimer) as well as the Bethlem Mother-Infant Interaction Scale (BMIS). However, these do not offer a standardized comparison sample, since the former is mainly intended for research purposes and the latter has only been developed and used in a psychiatric mother and baby unit. They finally list the FIT-K95 (a family- and kindergarten-interaction test), which does not allow for an evaluation of mother-child interactions by an independent observer, but only by the child itself. Thus, none of these instruments are readily useable for assessing the quality of observed mother-child interactions in a diagnostic context.

Hence, the aim of the following two studies was to develop an instrument that would allow for an objective, reliable, and valid assessment of the quality of mother-child interactions. In a Pilot Study, we tested the newly developed instrument and evaluated its psychometric properties. Subsequently, in an Extension Study we showed that inter-rater reliability can be raised through adjustment of behavioral category definitions and we further validated the instrument.

Study 1: Pilot Study

Method

Participants

We first developed the new instrument using video-sequences we had obtained from the Austrian Child Protective Services (CPS). Twenty videos were analyzed that had resulted from 14 cases of fosterage. Each video showed one mother (either a foster mother, $n = 8$ or a mother whose child had been placed in foster care, $n = 12$) interacting with her (foster) child. Five videos also included the (foster) father of the child; four included a sibling of the child. Children were between 1;4 and 8;4 years old ($M = 3;8$ years).

Measures

All interactions were coded with the new instrument, labeled INTAKT (an agglomeration of the German words *Interaktion* meaning interaction and *intakt* meaning intact, referring to an intact mother-child relationship). Details of coding are described in the Procedure section below.

As has become evident from theory, maternal sensitivity, maternal feedback, and maternal interactive style in joint attention episodes constitute relevant aspects of maternal interactive behavior, which should be evaluated when assessing the quality of mother-child interactions. Therefore, INTAKT comprises three scales: *Maternal Sensitivity*, *Feedback*, and *Joint Attention*.

Based on Ainsworth et al.'s (1974, 1978) theory, a 7-point scale for assessing *Maternal Sensitivity* was constructed, ranging from *very low sensitivity* (1) to *very high sensitivity* (7). Precise descriptions of maternal behaviors are given for points 1, 3, 5, and 7, respectively. They include information on whether the mother is able to attend to a common object with the child, whether she notices the child's signals and reacts promptly and appropriately to them, whether she can adopt the child's viewpoint, how she reacts to the child's accomplishments, and whether her language is appropriate for the child's developmental status.

According to theory (e.g., Kelley et al., 2000), maternal *Feedback* can either be positive, corrective (i.e., feedback negative or critical in content but positive or neutral in tone), or negative. Alternatively, mothers might give no feedback to their children at certain times. Therefore, INTAKT divides feedback into four categories (*positive*, *corrective*, *negative*, *no feedback*) and offers precise behavioral definitions for each of them.

Based on the theoretical (e.g., Saxon et al., 2000) distinction between mothers who tend to follow their child's attentional focus and mothers who tend to switch their child's attentional focus in joint attention episodes, INTAKT defines six categories for the assessment of *Joint Attention*. Thus, mothers can: actively contribute to their child's joint attention by assuming an active role in their common play while following the child's attentional focus (*active maintenance*), or by verbally commenting on their child's actions and/or outcomes (*verbal maintenance*), passively contribute to their child's joint attention by watching and following the child's actions (*passive maintenance*), manipulate the child's attention during an ongoing activity by directing the child's attention to certain aspects or away from other aspects of a game (*attention manipulation*), directly attempt to switch their child's attention away from the ongoing activity towards a new one (*attention switching*), or not attain any joint attention with their child (*no joint attention*). INTAKT offers precise descriptions of the corresponding maternal behaviors for each category.

All three scales included an additional category for uncodeable sequences which had to be coded if the quality of the video-tapes did not allow for an understanding of what the mother was saying or if mothers left the part of the room captured by the video camera. Every sequence that had been recorded as uncodeable was eliminated from further analysis.

Procedure

Interactions took place in a playroom of the CPS, and mothers were allowed to use all available toys while interacting with their child. The interaction lasted between 12:19 and 42:21 minutes ($M = 22:03$ min.). Mothers were informed that CPS workers were to use the videos as a basis for decisions regarding the foster status (e.g., changes of custody or visitation rights) of the child. All participants agreed to their videos being used for purpose of our study as well.

All sequences were coded according to the INTAKT categories by the fourth author. Each video was also coded by one of two additional trained coders to assess inter-rater reliability. All of them were blind as to whether mothers were foster mothers or mothers with children in foster care.

Coding the sequences involved three steps. Firstly, *Maternal Sensitivity* was assessed using a time-sampling procedure with 2 minute intervals. This was realized by watching the video for two minutes and then making a judgment about the interaction quality during that interval on the 7-point scale. Then the next two minutes of the video were watched and afterwards rated, and so on. A second step consisted of recording maternal *Feedback*, and lastly, *Joint Attention* was coded. The latter two were recorded in a time-sampling procedure with 15 second intervals. Videos were thereby watched for 15 seconds, and then it was decided which *Feedback* category applied to the respective situation. After making decisions for all 15 second intervals of the video, the video was watched again and *Joint Attention* categories were coded every 15 seconds.

Results and discussion

Inter-rater reliability

Ordinal scaled rater agreement (weighted kappa, κ_w) for *Maternal Sensitivity* and nominal scaled rater agreement (Cohen's kappa, κ) for *Feedback* and *Joint Attention* were calculated twice; at first for all videos ($n = 20$), and then only for videos that did not include a sibling of the child in question ($n = 16$). This was due to the fact that coding seemed to be more difficult for videos including more than one child. All κ values are presented in Table 1. As expected, κ values for one-child videos were higher than those for all videos.

Table 1:
Inter-rater agreement for all videos and one-child videos (Pilot Study)

Videos included	<i>Maternal Sensitivity</i>	<i>Feedback</i>	<i>Joint Attention</i>
All videos	$\kappa_w = .386$	$\kappa = .439$	$\kappa = .473$
One-child videos	$\kappa_w = .467$	$\kappa = .478$	$\kappa = .489$

Observed behavior and decisions of the experts

A hierarchical cluster analysis, using the algorithm of Ward (1963), was computed to detect subgroups of mothers within our sample who differed on the basis of their behavior towards their child. For each case, a mean value for *Maternal Sensitivity* was calculated. The categories for *Feedback* and *Joint Attention* were divided into positive (positive or corrective feedback; active, verbal, or passive maintenance) and negative (negative feedback; attention manipulation or switching, no joint attention) categories. The differences of the relative frequencies of positive and negative categories of *Feedback* and of *Joint Attention* were then calculated for each case. All three variables were then entered into the cluster analysis, which yielded a two-cluster solution with 10 mother-child dyads in each cluster.

Table 2 summarizes the differences between those clusters. No significant differences between the two clusters were observed concerning the sex of the child as well as the relationship towards the child (i.e. whether the observed person was a biological or a foster mother). Clusters differed regarding maternal behavior. Mothers in Cluster 1 ("positive interaction") had higher mean sensitivity ratings than mothers in Cluster 2 ("negative interaction"), gave more positive than negative feedback and sustained joint attention with their child mainly through active, verbal, or passive maintenance, while mothers in Cluster 2 provided slightly higher proportions of negative feedback and applied a higher rate of attention switching and attention manipulation.

For a first evaluation of the concurrent validity of INTAKT we were able to use the decisions of the CPS workers regarding the foster status of the child as an external criterion. CPS workers had made their decisions without any information regarding the

Table 2:
Demographic factors, INTAKT subscales, and decision of experts according to clusters
(Pilot Study)

Characteristic	Cluster 1 (<i>n</i> = 10)	Cluster 2 (<i>n</i> = 10)	<i>t</i> / χ^2	<i>p</i>
Sex of child				
Girls	7	7	$\chi^2(1, 20) = 0$	1
Boys	3	3		
Mother				
Biological	5	7	$\chi^2(1, 20) = 0.833$.650
Foster	5	3		
<i>Maternal Sensitivity</i>	<i>M</i> = 4.908	<i>M</i> = 3.098	<i>t</i> (18) = 5.746	<.001
<i>Feedback</i>	<i>M</i> = .20	<i>M</i> = -.03	<i>t</i> (18) = 4.334	<.001
<i>Joint Attention</i>	<i>M</i> = .66	<i>M</i> = .36	<i>t</i> (18) = 2.552	.020
Decision of experts				
Positive decision	6	1	$\chi^2(1, 14) = 7.143$.029
Negative decision	1	6		

INTAKT codings. They had gotten to know the families at the CPS and had evaluated the quality of interactions between (foster) mother and child as well as other family and life circumstances according to their own criteria. For 14 of the observed videos, the decisions constituted either a positive or negative consequence for the observed (foster) mother. For example, if the observed mother was a biological mother, a return of the child into her custody would have been a positive consequence; a continuance of the foster care would have been a negative consequence. In order to see if those decisions related to the evaluation of mother-child interaction quality with INTAKT, they were compared with the described clusters (see Table 2).

There was a significant connection between the observed maternal behavior and the decisions of the experts, $\chi^2(1, 14) = 7.143, p = .029$. Mothers with more positive interactions were confronted with more positive decisions by CPS workers, while mothers with more negative interactions faced more negative decisions regarding the foster status of their child. Thus, measuring *Maternal Sensitivity*, *Feedback*, and *Joint Attention* with INTAKT seems to allow for a valid assessment of the quality of mother-child interactions.

Study 2: Extension Study

After having successfully developed an instrument for assessment of the quality of mother-child interactions with videos obtained from local CPS, we intended to extend the approach to a broader sample. Thus, mother-child dyads with a middle-class family background were used as a sample for our Extension Study. Moreover, we aimed at improving inter-rater reliability through adjusting the definitions of the categories of maternal behavior. Furthermore, in the Extension Study we were able to code all interactions using the Mangold Software INTERACT instead of the paper-pencil method applied in our Pilot Study. Therefore, an event-sampling procedure could be used to code maternal *Feedback* and *Joint Attention*.

Method

Participants

19 mother-child dyads from Austrian families with medium to high socioeconomic status were videotaped. They included 8 boys and 11 girls between 3 and 6 years old. Additionally, we recoded 14 videos from our Pilot Study using the INTERACT software and our more precise category definitions. Videos with more than one child were excluded because they had proven to be too difficult to code reliably. Two videos had to be omitted due to technical reasons, leaving six videos with foster mothers and eight with mothers whose children had been placed in foster care. Children in those videos were between 1;4 and 4;4 years old ($M = 3;0$ years).

Measures

All interactions were coded with the INTAKT categories as described above (see “measures” section of Pilot Study). Some adjustments were made regarding the precise definitions of the behavioral categories.

Procedure

The interactions took place at home. Mothers and children were seated at a table with liquid as well as solid glue, colored felt-pens, scissors for adults as well as for children, and colored fancy papers with triangular roofs, round roof-lights, walls, square windows, and rectangular doors on them. They were told, “Look, I’ve got some craft materials here. Could you (*child*) change that boring house into a beautiful, colored house? Your mom can assist you with it and you (*both*) can use everything that’s on the table.” So the children were free to produce the house either by using the papers or by drawing, or by using a combination of both. The interactions lasted between 11:01 and 35:17 minutes ($M = 16:58$ min.), depending on how long it took the mother and child to complete the task.

The videotaped sequences were coded according to the INTAKT categories, using the Mangold Software INTERACT, by the fifth author who was blind as to whether mothers in the CPS-videos were foster mothers or mothers with children in foster care. Ten (27 % of the total sample) randomly selected sequences were additionally coded by the first author to assess inter-rater reliability.

Coding the sequences involved four steps. Firstly, the video was viewed without coding, in order to gain an overview of the interaction. In a second step, *Maternal Sensitivity* was assessed using a time-sampling procedure with 2 minute intervals (see Study 1). A third step consisted of recording maternal *Feedback*, using an event-sampling procedure. Thereby the video was watched and for every moment of the video it was decided which category of *Feedback* applied to the situation. Lastly, *Joint Attention* was coded in an event-sampling procedure. The video was therefore watched again and a decision about the applicable *Joint Attention* category was made for every moment of the interaction.

Results and discussion

All analyses were conducted after omitting the first two minutes of the videos to allow mothers and children to adjust to the situation and to being videotaped.

Inter-rater reliability

A weighted κ with squared weights was calculated for *Maternal Sensitivity*, reaching a value of .81. Cohen’s κ were calculated for *Feedback* and *Joint Attention* with help of the Mangold Software INTERACT. To allow for differences in reaction time between the two coders, codings were considered equal if they overlapped for at least 80 % or if they

did not overlap but coding started within a time limit of two seconds. Kappa reached a value of .58 for *Feedback* and .57 for *Joint Attention*.

Differences between mothers

For further validation of INTAKT, we compared maternal behavior in our normal sample with maternal behavior in CPS videos. If the INTAKT scales provide a valid measure of interaction quality, one should expect mothers from our second sample to achieve better values, especially when compared with mothers whose children had been placed in foster care.

Mean *Maternal Sensitivity* values for each of the three groups were as follows, inconspicuous mothers $M = 6.17$, foster mothers $M = 5.14$, and mothers with children in foster care $M = 4.01$. A one-way ANOVA showed significant differences of these means, $F(2, 33) = 13.881, p < .001$. A post-hoc analysis (Scheffé) revealed this to be due to a significant difference between inconspicuous mothers and mothers with children in foster care ($p < .001$). The latter were judged to be less sensitive when interacting with their children.

Mothers provided feedback to their children for about the same amount of time (6.19, 4.60, and 7.07 % of the time; $\chi^2(2, 33) = 5.146, p = .076$). Table 3 shows how the different kinds of feedback were distributed amongst the three groups of mothers. Mothers differed in the amount of positive, $\chi^2(2, 33) = 14.464, p = .001$, and negative, $\chi^2(2, 33) = 6.538, p = .038$, feedback they gave to their children. Specifically, inconspicuous mothers provided more positive feedback than foster mothers, $z = -2.736, p = .006$, and mothers with children in foster care, $z = -3.186, p = .001$. Negative feedback, in turn, was used more often by mothers with children in foster care than by inconspicuous mothers, $z = -2.480, p = .013$.

Table 3:

Percentage of time in which mothers gave different kinds of feedback and spent within each category of joint attention (Extension Study)

INTAKT category	Inconspicuous mothers	Foster mothers	Mothers with children in foster care
<i>Feedback</i>			
Positive feedback	67.36 %	41.82 %	17.25 %
Corrective feedback	30.97 %	56.44 %	59.27 %
Negative feedback	1.67 %	1.74 %	23.48 %
<i>Joint Attention</i>			
Active maintenance	39.79 %	38.64 %	43.03 %
Verbal maintenance	33.08 %	25.34 %	20.13 %
Passive maintenance	24.29 %	19.62 %	11.32 %
Attention manipulation	1.91 %	6.18 %	13.01 %
Attention switching	0.37 %	3.22 %	6.47 %
No joint attention	0.57 %	7.00 %	6.04 %

Mothers also differed according to the way they sustained joint attention with their children while playing with them. Table 3 shows the percentage of time they spent within each category. While no differences between mothers could be observed regarding their active, $\chi^2(2, 33) = 0.310, p = .856$, and verbal, $\chi^2(2, 33) = 2.231, p = .328$, maintenance of the child's joint attention, time spent passively maintaining the child's joint attention differed between groups of mothers, $\chi^2(2, 33) = 8.772, p = .012$, with inconspicuous mothers spending more time within that category than mothers with children in foster care, $z = -2.920, p = .003$. Regarding the differences in attention manipulation, $\chi^2(2, 33) = 9.649, p = .008$, and attention switching, $\chi^2(2, 33) = 13.111, p = .001$, the results show that mothers with children in foster care spent more time within those categories than inconspicuous mothers, $z = -2.829, p = .005$ and $z = -3.446, p = .001$ respectively.

In summary, the comparison between the three groups of mothers showed that the differences appeared as predicted. In particular, maternal behavior in normal mother-child dyads was evaluated in a more positive way than that of mothers whose children had been placed in foster care. Thus, the comparison of those extreme groups of mothers provided further evidence for the validity of the instrument.

Cluster solutions depending on maternal behavior

Similar to the Pilot Study, a hierarchical cluster analysis, using the algorithm of Ward (1963), was computed to detect subgroups of mothers, within our sample, who differ on the basis of their behavior towards their child. For each case, a mean value for *Maternal Sensitivity* was calculated. Categories for *Feedback* and *Joint Attention* were divided into positive (positive or corrective feedback; active, verbal, or passive maintenance) and negative (negative feedback; attention manipulation or switching, no joint attention) categories. Differences regarding the relative duration of positive and negative categories of *Feedback* and of *Joint Attention* were then calculated for each case. All three variables were then entered into the cluster analysis, which yielded a two-cluster solution with 25 mother-child dyads in Cluster 1 and eight dyads in Cluster 2.

Table 4 summarizes differences between those clusters. Contingency analysis revealed no differences between the two clusters concerning sex of the child. Cluster 1 ("positive interaction") was characterized by highly sensitive mothers who gave positive feedback to their children and sustained joint attention with them in a positive way. Cluster 2 ("negative interaction") was characterized by less sensitive mothers who provided a higher proportion of negative feedback and manipulated or switched the attentional focus of the child more often. All mothers from our second sample were in the "positive interaction" Cluster, while most mothers whose children had been placed in foster care were part of the "negative interaction" Cluster. These results were in line with our expectation that mothers whose children had been taken into custody by the CPS should achieve lower values than mothers from a normal sample, and thus provided further evidence for the validity of our instrument.

Table 4:
Demographic factors and INTAKT subscales according to clusters (Extension Study)

Characteristic	Cluster 1 (<i>n</i> = 25)	Cluster 2 (<i>n</i> = 8)	<i>t</i> / χ^2	<i>p</i>
Sex of child				
Girls	16	6	$\chi^2(1, 33) = 0.330$.687
Boys	9	2		
Mother				
Biological	2	6	$\chi^2(2, 33) = 17.573$	<.001
Foster	4	2		
Normal	19	0		
<i>Maternal Sensitivity</i>	<i>M</i> = 6.07	<i>M</i> = 3.56	<i>t</i> (31) = 8.072	<.001
<i>Feedback</i>	<i>M</i> = .06	<i>M</i> = .03	<i>t</i> (31) = 2.927	.006
<i>Joint Attention</i>	<i>M</i> = .91	<i>M</i> = .40	<i>t</i> (31) = 8.041	<.001

General discussion

In summary, our results showed that the defined behavioral categories can be objectively and reliably assessed with INTAKT and that they offer valid information on the quality of mother-child interactions. By redefining maternal behavior descriptions, it was possible to raise inter-rater reliability considerably. Validity of the instrument was proven on the basis of internal as well as external criteria.

Thus, observation of maternal sensitivity, maternal feedback, and maternal behavior in joint attention episodes provides a solid basis for the assessment of the quality of mother-child interactions. As can be seen from the extensive research reported above, interactional quality in those areas has a great impact on the further development of the child (e.g., Mezulis et al., 2006; Raikes & Thompson, 2008; Vaughan Van Hecke et al., 2007). Therefore, assessment via INTAKT is likely to provide additional information when assessing the developmental status of a child. Research linking INTAKT measures with developmental measures is currently under way.

In a next step, norms should be created for the newly developed instrument, so that it can then be used in the context of routine mother-child assessments. The assessment of maternal behavior could then also be used as a starting point for maternal counseling and interventions regarding the interactions with her child.

So far, INTAKT has only been used with (foster) mothers and their children. However, there does not seem to be any reason why it should not be possible to use the same categories to evaluate interactions between fathers or other caregivers (e.g., day care providers) and their children. Further research should focus on this topic.

There are some mentionable limitations to our studies: Firstly, we used a rather small sample size, which was due to the fact that all videos had to be taped in the homes of the families or were provided by the CPS. On the other hand, this assured a high ecological

validity and meant that all participants were highly motivated to interact with their child in the most positive way they could. In particular, mothers whose children had been placed in foster care knew that a decision about the foster status of their child was at hand. Under those circumstances, a positive interaction would have been expected. Nonetheless, significant differences in behavior, compared with inconspicuous mothers, could be observed using the INTAKT categories.

Another limitation concerns the differences between videos obtained from CPS and those recorded at home. On average, the former included younger children than the latter. As it seems possible that the age of the child might influence a mother's interactive style, more research about age-related effects seems necessary. Analysis of age-related differences for INTAKT categories is currently underway. Another difference between the videos concerns the play situation itself. While CPS videos included a less structured play situation, standardized materials and instructions were used in the videos recorded at home. This represents an important step in the development of INTAKT, and more research using the more standardized procedure is imminent. Furthermore, it can also be seen as a positive fact that INTAKT scales proved their worth in such different settings.

Another difference between the two studies concerns the time-sampling (paper-pencil) vs. event-sampling (PC-software) method for coding maternal *Feedback* and *Joint Attention*. Both alternatives proved to be useful, with the event-sampling method providing even more detailed data.

In conclusion, INTAKT appears to have potential as a useful instrument for the assessment of the quality of mother-child interactions, for researchers as well as practitioners.

Author note

We wish to thank Belinda Mikosz, Christine Piribauer, and Judith Illetschek from the Psychologische Beratungsstelle für Adoptiv- und Pflegefamilien der MAG ELF for their assistance in obtaining videos.

References

- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant-mother attachment and social development: 'Socialisation' as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99-135). Cambridge: Cambridge University Press.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.
- Alessandri, S. M., & Lewis, M. (1996). Differences in pride and shame in maltreated and nonmaltreated preschoolers. *Child Development*, 67, 1857-1869.

- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin, 129*, 195-215.
- Bigelow, A. E., MacLean, K., & Proctor, J. (2004). The role of joint attention in the development of infants' play with objects. *Developmental Science, 7*, 518-526.
- Braungart-Rieker, J. M., Garwood, M. M., Powers, B. P., & Wang, X. (2001). Parental sensitivity, infant affect, and affect regulation: Predictors of later attachment. *Child Development, 72*, 252-270.
- Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development, 63*, 1-174.
- Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Cox, A., & Drew, A. (2000). Testing joint attention, imitation, and play as infancy precursors to language and theory of mind. *Cognitive Development, 15*, 481-498.
- Dallaire, D. H., & Weinraub, M. (2005). Predicting children's separation anxiety at age 6: The contributions of infant-mother attachment security, maternal sensitivity, and maternal separation anxiety. *Attachment & Human Development, 7*, 393-408.
- De Wolff, M. S., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development, 68*, 571-591.
- Dominey, P. F., & Dodane, C. (2004). Indeterminacy in language acquisition: the role of child directed speech and joint attention. *Journal of Neurolinguistics, 17*, 121-145.
- Feldman, R. (2010). The relational basis of adolescent adjustment: Trajectories of mother-child interactive behaviors from infancy to adolescence shape adolescents' adaptation. *Attachment & Human Development, 12*, 173-192.
- Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development, 21*, 34-64.
- Jacquez, F., Cole, D. A., & Searle, B. (2004). Self-perceived competence as a mediator between maternal feedback and depressive symptoms in adolescents. *Journal of Abnormal Child Psychology, 32*, 355-367.
- Kelley, S. A., Brownell, C. A., & Campbell, S. B. (2000). Mastery motivation and self-evaluative affect in toddlers: Longitudinal relations with maternal behavior. *Child Development, 71*, 1061-1071.
- Kochanska, G., Aksan, N., & Carlson, J. J. (2005). Temperament, relationships, and young children's receptive cooperation with their parents. *Developmental Psychology, 41*, 648-660.
- Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development, 71*, 358-375.
- Lunkenheimer, E. S., Dishion, T. J., Shaw, D. S., Connell, A. M., Gardner, F., Wilson, M. N., & Skuban, E. M. (2008). Collateral benefits of the Family Check-Up on early childhood school readiness: Indirect effects of parents' positive behavior support. *Developmental Psychology, 44*, 1737-1752.

- Markus, J., Mundy, P., Morales, M., Delgado, C. E. F., & Yale, M. (2000). Individual differences in infant skills as predictors of child-caregiver joint attention and language. *Social Development, 9*, 302-315.
- McElwain, N. L., & Booth-LaForce, C. (2006). Maternal sensitivity to infant distress and nondistress as predictors of infant-mother attachment security. *Journal of Family Psychology, 20*, 247-255.
- Mezulis, A. H., Hyde, J. S., & Abramson, L. Y. (2006). The developmental origins of cognitive vulnerability to depression: Temperament, parenting, and negative life events in childhood as contributors to negative cognitive style. *Developmental Psychology, 42*, 1012-1025.
- Morales, M., Mundy, P., Crowson, M. M., Neal, A. R., & Delgado, C. E. F. (2005). Individual differences in infant attention skills, joint attention, and emotion regulation behaviour. *International Journal of Behavioral Development, 29*, 259-263.
- Morales, M., Mundy, P., Delgado, C. E. F., Yale, M., Messinger, D., Neal, R., & Schwartz, H. K. (2000). Responding to joint attention across the 6- through 24-month age period and early language acquisition. *Journal of Applied Developmental Psychology, 21*, 283-298.
- Mundy, P., Block, J., Delgado, C., Pomares, Y., Vaughan Van Hecke, A., & Parlade, M. V. (2007). Individual differences and the development of joint attention in infancy. *Child Development, 78*, 938-954.
- NICHD Early Child Care Research Network. (1998). Early child care and self-control, compliance, and problem behavior at twenty-four and thirty-six months. *Child Development, 69*, 1145-1170.
- NICHD Early Child Care Research Network. (2005). Duration and developmental timing of poverty and children's cognitive and social development from birth through third grade. *Child Development, 76*, 795-810.
- NICHD Early Child Care Research Network. (2008). Mothers' and fathers' support for child autonomy and early school achievement. *Developmental Psychology, 44*, 895-907.
- Noll, L. M., & Harding, C. G. (2003). The relationship of mother-child interaction and the child's development of symbolic play. *Infant Mental Health Journal, 24*, 557-570.
- Raikes, H. A., & Thompson, R. A. (2008). Attachment security and parenting quality predict children's problem-solving, attributions, and loneliness with peers. *Attachment & Human Development, 10*, 319-344.
- Saltaris, C., Serbin, L. A., Stack, D. M., Karp, J. A., Schwartzman, A. E., & Ledingham, J. E. (2004). Nurturing cognitive competence in preschoolers: A longitudinal study of intergenerational continuity and risk. *International Journal of Behavioral Development, 28*, 105-115.
- Saxon, T. F., Colombo, J., Robinson, E. L., & Frick, J. E. (2000). Dyadic interaction profiles in infancy and preschool intelligence. *Journal of School Psychology, 38*, 9-25.
- Smith, L., & Ulvund, S. E. (2003). The role of joint attention in later development among preterm children: Linkages between early and middle childhood. *Social Development, 12*, 222-234.

- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development, 7*, 349-367.
- Stams, G.-J. J. M., Juffer, F., & van IJzendoorn, M. H. (2002). Maternal sensitivity, infant attachment, and temperament in early childhood predict adjustment in middle childhood: The case of adopted children and their biologically unrelated parents. *Developmental Psychology, 38*, 806-821.
- Steel, H., Steel, M., & Croft, C. (2008). Early attachment predicts emotion recognition at 6 and 11 years old. *Attachment & Human Development, 10*, 379-393.
- Stright, A. D., Gallagher, K. C., & Kelley, K. (2008). Infant temperament moderates relations between maternal parenting in early childhood and children's adjustment in first grade. *Child Development, 79*, 186-200.
- Susman-Stillman, A., Kalkoske, M., Egeland, B., & Waldman, I. (1996). Infant temperament and maternal sensitivity as predictors of attachment security. *Infant Behavior and Development, 19*, 33-47.
- Vaughan Van Hecke, A., Mundy, P. C., Acra, C. F., Block, J. J., Delgado, C. E. F., Parlade, M. V., ... Pomares, Y. B. (2007). Infant joint attention, temperament, and social competence in preschool children. *Child Development, 78*, 53-69.
- Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association, 58*, 236-244.
- Wiefel, A., Titze, K., Kuntze, L., Winter, M., Seither, C., Witte, B., ... Lehmkuhl, U. (2007). Diagnostik und Klassifikation von Verhaltensauffälligkeiten bei Säuglingen und Kleinkindern von 0-5 Jahren. [Diagnostic classification of mental disorders in infants and toddlers age 0 to 5.] *Praxis der Kinderpsychologie und Kinderpsychiatrie, 56*, 59-81.

5.2. Paper 2

Hirschmann, N., Deimann, P., & Kastner-Koller, U. (submitted). Observing mother-child interactions to assist educational counseling. A behavioral observation case-control study. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*.

Title

Observing mother-child interactions to assist educational counseling: A behavioral observation case-control study.

Abstract

There are diverse reasons as to why mothers of preschool-aged children might seek educational counseling, but many of them are traceable to problems in mother-child interactions. The present study examines differences in interaction quality between mothers who seek educational counseling ($n = 12$) due to concerns about their child and control mothers ($n = 12$). Relations between maternal interactive behavior and child development are also explored. Maternal interactive style is assessed using the behavioral observation system INTAKT. It could be shown that mothers who seek counseling – especially those whom psychologists had referred to long-term counseling or intervention – differ from controls, concerning their sensitivity towards children's needs, feedback towards the child, and interactive style during joint attention episodes. Results indicate that an assessment of mother-child interaction quality is helpful in identifying relevant problem areas and can be integrated in a practical manner in educational counseling

Keywords: mother-child interaction, educational counseling, sensitivity, feedback, joint attention

Introduction

There are many reasons as to why mothers of preschool-aged children might seek educational counseling. Amongst the most common causes are socio-emotional problems of the child. Specifically, externalizing behavior problems, including aggressive behavior of the child, hyperactive or impulsive behavior, or prolonged tantrum phases can constitute an enormous challenge to mothers of young children (Roskam, Meunier & Stievenart, 2011). On the other hand, internalizing problems such as shyness and anxiousness of the child are also causes of concern for mothers (Egger & Angold, 2006). Closely connected to both are social problems which a child might experience, especially in group settings. Children may, for example, face difficulties due to disruptive behavior or with making friends in a social group (McKown, Gumbiner, Russo, & Lipton, 2009). A further reason for mothers of preschool-aged children to seek counseling is due to concerns about the developmental status of the child, for example because of delayed language development (Glascoe, 2000).

Considering the wide range of problems, many reasons for their etiology and development have been discussed. One factor that has been found to be of importance in all of those problem areas is the effect of the quality of mother-child interactions.

With regard to externalizing behavior problems it has been shown that children with mothers who use a more sensitive parenting style are less prone to aggressive responses to a hypothesized offense (Raikes & Thompson, 2008), show more compliant behavior with their mothers, and fewer problem behaviors as reported by their mothers (NICHD Early Child Care Research Network, 1998). Also, a decrease in maternal sensitivity over time was shown to be related to an increase in externalizing behavior (Wang, Christ, Mills-Koonce, Garrett-Peters, & Cox, 2013). Furthermore, secure attachment – usually a consequence of a more sensitive parenting style – relates to a larger capacity for emotional regulation (Sroufe, 2005). Moreover, children who experience more frequent

and more consistent episodes of joint attention with their mothers, exhibit less externalizing behavior problems (Vaughan Van Hecke et al., 2007).

Internalizing behavior problems are also influenced by mother-child interactions. Higher maternal sensitivity, for example, is predictive of fewer symptoms of separation anxiety in children (Dallaire & Weinraub, 2005) and secure attachment of a child is associated with less loneliness and social isolation (Raikes & Thompson, 2008). Furthermore, the quality of maternal evaluative feedback relates to a child's self-perception. Specifically, positive feedback predicts less shame while negative feedback predicts more shame after task failure (Alessandri & Lewis, 1996). Accordingly, high levels of negative maternal feedback, coupled with low levels of positive feedback, are associated with a higher risk for depressive symptoms later on (Jacquez, Cole, & Searle, 2004).

Social problem-solving skills (e.g., wanting to make friends with another child) are also positively associated with a more sensitive parenting style (Raikes & Thompson, 2008). Consequently, secure attachment relates to better social competences from early on (Sroufe, 2005). Moreover, children's independence in social skills is higher, if their mothers maintain the child's interests. At the same time, mothers should decrease their directiveness, while their children's competences increase (Landry, Smith, Swank, & Miller-Loncar, 2000). Additionally, more frequent and consistent joint attention episodes between a mother and her child are related to better social competences in the child (e.g., empathy, prosocial peer interactions; Vaughan Van Hecke et al., 2007) as well as a better theory of mind ability (Charman et al., 2000).

The quality of mother-child interactions influences various further developmental domains. Maternal sensitivity is able to mediate negative effects of poverty on children's cognitive and language performance (NICHD Early Child Care Research Network, 2005), and in conjunction with maternal praise and other measures of maternal stimulation it can predict the cognitive functioning of preschool children (Saltaris et al., 2004). Furthermore, children with mothers who use language that follows their child's focus of attention, rather than leading the child's attention away, have

better early skills of gestural and linguistic competence (Carpenter, Nagell, & Tomasello, 1998). Moreover, the amount of time young children spend in joint engagement with their mothers can predict children's early linguistic competence (Markus, Mundy, Morales, Delgado, & Yale, 2000). Recently, it has been shown that maternal attention maintaining is positively associated with preschoolers' executive functions (Conway & Stifter, 2012).

In accordance with the findings of associations between the quality of mother-child interactions and problem behaviors of the child, intervention studies have found that improving interaction quality can alleviate problem behavior. For example, family intervention programs can help to improve positive behavior support and thereby promote children's inhibitory control and language development (Lunkenheimer et al., 2008). Consequently, educational counseling should always include counseling to enhance the quality of mother-child interactions.

A prerequisite for a helpful intervention is of course a sound individual assessment of the current mother-child interaction quality. Therefore, it is of interest as to whether differences can be identified between mothers who seek educational counseling and other mothers, in interaction with their respective child as well as how those differences relate to the respective developmental problems of the child. The present study therefore initially aims at identifying specific relevant problems in mother-child interactions in dyads in which mothers seek counseling. In line with the reviewed literature we hypothesized that mothers with children who exhibited socio-emotional and/or other developmental problems and were therefore consulting a psychologist would display a less favorable interactive behavior when playing with their child. In a further step, it seemed interesting to uncover whether the interaction quality between mother and child was related to the child's developmental status.

Method

Sample

Our calculations are based on 8,357 observations from 21 hours and 20 minutes of videos, originating from interactions in 24 mother-child dyads. Twelve of these mothers were seeking educational counseling from a psychologist regarding their children (case dyads). Those children were between 3;3 and 5;10 years old ($M = 4;9$ years; $SD = 10$ months). Mother's age ranged from 29 to 42 years ($M = 35$ years; $SD = 5$ years). Mothers had consulted a psychologist for different reasons, including aggressive behavior of the child, anxious behavior of the child or concerns about the developmental status of the child. Twelve unscreened mother-child dyads served as control dyads. Each of those dyads was matched to a case dyad, regarding sex and age of the child (within a 1-year range). Consequently, control children were also between 3;3 and 5;10 years old ($M = 4;5$ years; $SD = 10$ months). Mothers were between 25 and 42 years of age ($M = 32$ years; $SD = 5$ years). Each group (cases and controls) comprised 8 boys and 4 girls. In both groups, the highest maternal educational level ranged from having completed apprenticeship to having finished university.

Measures

To assess maternal interactive style, the coding system INTAKT was applied. It uses a videotaped play situation between mother and child and allows to rate the quality of this interaction on three dimensions (*Maternal Sensitivity, Feedback, and Joint Attention*, as detailed below). Each of them is based on theoretical background and with reference to theory, certain behaviors of the mother are considered more or less beneficial for the child (Hirschmann, Kastner-Koller, Deimann, Aigner & Svecz, 2011).

Maternal Sensitivity is a 7-point rating scale, based on Ainsworth's (1974) sensitivity concept. It ranges from *very low sensitivity* (1) to *very high sensitivity* (7) and every other step of the rating scale is precisely verbally anchored, thus describing corresponding maternal behavior. Descriptions, for example, focus on whether the mother notices the child's signals and reacts promptly and appropriately to them, whether she can adopt the child's viewpoint, and whether her language is appropriate for the child's developmental status. For coding, the video is stopped every two minutes,

watched again if necessary, and then maternal behavior during this interval is rated according to the scale.

Feedback is a classification system comprising four categories. The categories *positive feedback* (e.g., mother praises the child for having a good idea) and *corrective feedback* (e.g., mother uses a friendly voice to tell the child how to better hold the scissors) are considered beneficial for the child, while the category *negative feedback* (e.g., mother tells the child that he did not draw neatly enough) is regarded as unbeneficial. *No feedback* (mother gives no feedback to the child) is coded the rest of the time and is considered a neutral category. Precise behavioral definitions are offered for each category and the system is applied in an event-sampling procedure.

Joint Attention is a classification system comprising six categories. It allows one to judge whether mothers follow their child's attentional focus (either through *active maintenance* or through *verbal maintenance* or through *passive maintenance*) or switch their child's attentional focus (*attention manipulation* or *attention switching*) in joint attention episodes. Furthermore there can be episodes of no joint attention between mother and child (*no joint attention*). Considering studies which show that following the child's attentional focus is more beneficial than manipulating it (e.g., Conway & Stifter, 2012), the first three categories are considered beneficial while the latter three are considered unbeneficial for the child. Precise descriptions of the corresponding maternal behaviors are provided for each category. An event-sampling procedure is used for assessment.

For *Maternal Sensitivity* it is possible to calculate the mean and standard deviation for each mother over the duration of the video in order to assess the level of maternal sensitivity as well as its stability over time. *Feedback* and *Joint Attention* scores can be calculated by adding up the relative durations of positive behavioral aspects.

Children whose mothers had consulted a psychologist had also been assessed with the Viennese Developmental Test (WET; Kastner-Koller & Deimann, 2012). The WET is a developmental test for 3;0 to 5;11 year olds, which measures children's development in relevant areas of functioning

(motor, perceptual, memory, cognitive, language, and socio-emotional skills). It produces an overall developmental score as well as scores for each subscale. If the consulted psychologist deemed it necessary, other tests were administered (e.g., projective measures, parents' questionnaires). In every case, a final conclusion was drawn by the psychologist, which might include a clinical or subclinical diagnosis. Those conclusions, as well as recommendations about possible consequences (e.g., if a therapy for the child or counseling for the parents seemed necessary) were communicated to the child's parents in an in-depth consultation.

Procedure

Case mothers and children were recruited by two psychologists, one working in a private practice in Vienna specializing in child psychology, the other working at a center for counseling at the University of Vienna. Participating families were thus living in Vienna and its surrounding areas. During or after the psychological assessment of the child, which the mothers had sought due to concerns or questions regarding their child, mothers were asked whether they wanted to take part in our study. Control mothers were also approached on a voluntary basis and were informed about our interest in mother-child interactions. Control families were living in Vienna and other Austrian states. All mothers gave written consent for the videos to be included in our study.

All interactions took place at home or in a psychologist's practice, depending on the mother's preference. Mothers and children were seated at a table with liquid as well as solid glue, colored felt-pens, scissors for adults as well as for children, and colored fancy papers with parts of a house on them. A little apart, a box was placed that contained various play materials (e.g., puppets, cars, small furniture). They were told, "Look, I've got some craft materials here. Could you (*child*) change that boring house into a beautiful, colored house? Your mom can assist you with it and you (*both*) can use everything that's on the table. Once you are done, there is a box of play materials for you over here." So the children were free to produce the house either by using the papers or by drawing, or by using a combination of both. Whenever they felt the house was completed they could go on with playing

with the materials in the box. Overall, the interactions lasted between 31:55 and 92:27 minutes ($M = 53:21$ min). Crafting the house lasted between 10:17 and 45:00 minutes ($M = 23:23$ min), whereas the free play situation lasted between 11:55 and 78:23 minutes ($M = 29:03$ min).

The interactions were videotaped and videos were subsequently analyzed and coded by two trained coders according to the INTAKT categories, using the Mangold Software INTERACT. It took approximately five months to code all videos. Both coders were blind to the aims and hypotheses of the study and did not know whether dyads were cases or controls. Six (25% of the total sample) randomly selected videos were coded by both coders to obtain inter-rater reliability estimates.

Results

Preliminary Analyses

Inter-rater agreement for *Maternal Sensitivity* was examined using intra-class correlation (ICC; two-way random effect model, absolute agreement definition). One video had to be excluded from analysis because it produced entirely different rater codings, the reason for which remained elusive even after close inspection. Inter-rater agreement reached an $ICC = .77$.

Time-unit kappa with tolerance was used as an agreement measure for event-sampling data. Thereby, the stream of events is divided into equal units (1 s intervals in our case). For each time unit it is observed whether the other coder decided for the same category, at least within a specified tolerance window (plus/minus 3 s in our case). Calculations were accomplished with the Generalized Sequential Quierier (GSEQ, Version 5.1), which always reports two kappa values for each calculation, one with each observer as the first (Bakeman & Quera, 2011, p. 78). Inter-rater agreement for *Feedback* reached $\kappa = .74/.73$ and for *Joint Attention* $\kappa = .71/.52$.

Mother-Child Interactions in Counseling versus Non-Counseling Dyads

To examine our hypothesis that mothers who had consulted a psychologist exhibit a less favorable interactive behavior than control mothers, a MANOVA with group (cases versus controls)

as the independent variable and INTAKT scores (mean and SD for *Maternal Sensitivity*, relative durations of positive behavioral aspects for *Feedback* and *Joint Attention*, see Table 1) as dependent variables was conducted (all p values are one-tailed). It revealed that differences between those two groups existed, concerning maternal interactive behavior, Pillai's trace = .40, $F(4, 19) = 3.19$, $p = .018$, $f_r^2 = .67$. Mothers who had consulted a psychologist exhibited a higher level of variability in their sensitivity rating, $F(1, 22) = 4.13$, $p = .027$, $\eta^2 = .16$. They spent less time maintaining their child's joint attention in a positive way, $F(1, 22) = 5.96$, $p = .012$, $\eta^2 = .21$, and showed a tendency to use less positive kinds of feedback, $F(1, 22) = 2.07$, $p = .082$, $\eta^2 = .09$.

Taking a closer look at mother-child dyads who had consulted a psychologist revealed that reasons for doing so were diverse. Some mothers had concerns about a delayed development of their child and many complained about behavioral problems, while others suspected that the development of their child might be accelerated. As diverse were the conclusions that the consulted psychologists arrived at. They included cases where no problematic behavior or development was identified, cases where few and cases where severe developmental problems were present, cases where therapy for the child and cases where long-term educational counseling for the parents was advised. Moreover, in one case, long-term educational counseling for the mother had already commenced some months prior to the testing.

Therefore, we took a closer look at those cases where the psychologist had advised professional treatment for the child (because of behavioral and/or developmental problems), long-term educational counseling of the mother or a combination of both, and where counseling had not yet started, when the interaction was videotaped. Including only those "intervention cases" and comparing them with our control dyads showed that those two groups differed as well, Pillai's trace = .47, $F(4, 15) = 3.31$, $p = .020$, $f_r^2 = .88$. Mothers who had been referred to intervention tended to be less sensitive towards their child, $F(1, 18) = 2.94$, $p = .052$, $\eta^2 = .14$. They exhibited a higher level of variability in their sensitivity rating, $F(1, 18) = 4.46$, $p = .024$, $\eta^2 = .20$, used less positive kinds of

feedback, $F(1, 18) = 3.51, p = .039, \eta^2 = .16$, and spent less time actively or passively maintaining their child's joint attention, $F(1, 18) = 7.24, p = .007, \eta^2 = .29$.

Mother-Child Interaction and Development of the Child

Table 2 provides an overview of correlations between maternal interactive behavior and developmental data of the child. As can be seen, *Maternal Sensitivity* did not significantly correlate with most of the developmental domains as assessed with the Viennese Developmental Test (WET). The only exception was the domain of socio-emotional development, which comprises the ability of children to interpret emotional expressions and their autonomy as evaluated by their mother. By trend, higher levels of maternal sensitivity were related to higher scores in this domain, $r = .59, p = .056$. The relation between high variability in maternal sensitivity and lower scores in this domain turned out to be non-significant, $r = -.46, p = .153$.

Concerning maternal feedback, no correlation reached statistical significance, even though, for example, the negative connection between verbal cognitive abilities and negative maternal feedback was rather high, $r = -.52, p = .123$.

Regarding the mother's ability to attain joint attention with her child, two noticeable connections to the child's developmental status could be observed. Mothers who used a lot of attention manipulation when playing with their child had children who had lower verbal cognitive abilities, $r = -.68, p = .031$, while mothers who often solely verbally commented on their child's actions tended to have children with lower scores in socio-emotional development, $r = -.59, p = .054$.

Discussion

The current study showed that it is possible to identify typical and relevant problems in mother-child interactions in dyads in which mothers seek educational counseling. A rather simple play situation can be used for this kind of assessment, which allows one to identify differences in behavior when compared with unscreened mother-child dyads. Especially for a subgroup of mother-

child dyads whose problems were so severe that psychologists had advised for professional treatment of the child and/or long-term educational counseling of the mother, it could be shown that maternal sensitivity, maternal feedback, as well as maternal interactive style in joint attention episodes were able to differentiate between this group and control dyads. This kind of assessment can therefore be a helpful starting point for interventions designed to alleviate educational problems.

Our findings are mostly in line with previous research. Higher levels of maternal sensitivity have been found to influence a child's behavior positively (e.g., Raikes & Thompson, 2008). We expanded the scope by also looking on the variability of maternal sensitivity, and as it turned out the stability of maternal sensitivity over the time of a play session explained differences between groups even better. This seems reasonable, because from a child's point of view higher stability of maternal behavior implies better predictability. This means that a child can better anticipate maternal reactions to his/her behavior and can better adjust to the mother's interaction style.

Results showing that more positive and less negative kinds of feedback, and a joint-attention style that follows the child's attentional focus are less prevalent in troubled mother-child dyads are also supported by previous research that has found those maternal behaviors to be more favorable for children (e.g., Carpenter et al., 1998; Jacquez et al., 2004). Only one finding was rather unexpected. Mothers who often solely verbally commented on what their child was doing (*Joint Attention category verbal maintenance*) tended to have children with lower scores in socio-emotional development ($r = -.59$). In addition, looking at Table 1 reveals that this category is also more often used by case mothers and intervention mothers than by control mothers. This came unexpected, because *verbal maintenance* was initially considered a beneficial maternal behavior category as it is a strategy of following the child's attentional focus. There might be several reasons that could explain this finding. One possibility is that the relation might be inversely u-shaped. Thus, too high as well as too low levels of *verbal maintenance* might be unbeneficial for the child. For

diagnostic and intervention purposes it will thus be necessary to determine the extent of *verbal maintenance* that is most beneficial for a child.

Correlating behavioral interaction measures with developmental measures of the child showed that the two were hardly related. Therefore, it can be concluded that two different constructs are being assessed that can add information to each other. Nonetheless some correlations turned out to be relevant. Higher maternal sensitivity was related to better socio-emotional development of the child. This is in line with previous research that shows that maternal sensitivity is related to emotional as well as social skills in preschoolers (Raikes & Thompson, 2008; Sroufe, 2005). Additionally, mothers who more often manipulated their child's attention while playing with him/her had children with lower verbal cognitive abilities. This seems reasonable since it has previously been observed in 1-year olds that a mother's following of the child's attentional focus is predictive of the child's linguistic competences (Carpenter et al., 1998). Thus, our research extends those findings to an older age group.

Limitations of our study include our rather small sample size. On the other hand this is counterbalanced by abundant data point that originate from long times of video sequences. Certainly, though, more research in this area would be desirable. Furthermore, in our study, developmental measures were only applied to children whose mothers had consulted a psychologist. Further research should extend the application of developmental measures to a sample of inconspicuous mother-child dyads.

Further research should also especially address questions of the ideal level of certain maternal behaviors. As discussed above, certain behaviors might only be beneficial for a child, if they are applied neither too seldom nor too often. The appropriate level might also vary with regard to the age of the child. Research regarding those questions seems especially important considering the idea that information gained by observing mother-child interactions should be useful for interventions and educational counseling.

In conclusion, the present study showed that observing mother-child interactions systematically is a useful and promising approach when counseling mothers who are concerned about their child's development.

References

- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant-mother attachment and social development: 'Socialisation' as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99-135). Cambridge: Cambridge University Press.
- Alessandri, S. M., & Lewis, M. (1996). Differences in pride and shame in maltreated and nonmaltreated preschoolers. *Child Development, 67*, 1857-1869. doi:10.1111/j.1467-8624.1996.tb01832.x
- Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. Cambridge, UK: Cambridge University Press.
- Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development, 63*, 1-174. doi:10.2307/1166214
- Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Cox, A., & Drew, A. (2000). Testing joint attention, imitation, and play as infancy precursors to language and theory of mind. *Cognitive Development, 15*, 481-498. doi:10.1016/S0885-2014(01)00037-5
- Conway, A. & Stifter, C. A. (2012). Longitudinal antecedents of executive function in preschoolers. *Child Development, 83*, 1022-1036. doi:10.1111/j.1467-8624.2012.01756.x
- Dallaire, D. H., & Weinraub, M. (2005). Predicting children's separation anxiety at age 6: The contributions of infant-mother attachment security, maternal sensitivity, and maternal separation anxiety. *Attachment & Human Development, 7*, 393-408. doi:10.1080/14616730500365894

Egger, H. L. & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry*, *47*, 313-337. doi:10.1111/j.1469-7610.2006.01618.x

Glascoe, F. P. (2000). Evidence-based approach to developmental and behavioural surveillance using parents' concerns. *Child: Care, Health and Development*, *26*, 137-149. doi:10.1046/j.1365-2214.2000.00173.x

Hirschmann, N., Kastner-Koller, U., Deimann, P., Aigner N., & Svecz, T. (2011). INTAKT: A new instrument for assessing the quality of mother-child interactions. *Psychological Test and Assessment Modeling*, *53*, 295-311.

Jacquez, F., Cole, D. A., & Searle, B. (2004). Self-perceived competence as a mediator between maternal feedback and depressive symptoms in adolescents. *Journal of Abnormal Child Psychology*, *32*, 355-367. doi:10.1023/B:JACP.0000030290.68929.ef

Kastner-Koller, U. & Deimann, P. (2012). *WET – Wiener Entwicklungstest: Ein Verfahren zur Erfassung des allgemeinen Entwicklungsstandes bei Kindern von 3 bis 6 Jahren* [WET – Viennese Developmental Test: A test for assessing the developmental status of children 3 to 6 years of age] (3rd revised ed.). Göttingen: Hogrefe.

Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development*, *71*, 358-375. doi:10.1111/1467-8624.00150

Lunkenheimer, E. S., Dishion, T. J., Shaw, D. S., Connell, A. M., Gardner, F., Wilson, M. N., & Skuban, E. M. (2008). Collateral benefits of the Family Check-Up on early childhood school readiness: Indirect effects of parents' positive behavior support. *Developmental Psychology*, *44*, 1737-1752. doi:10.1037/a0013858

- Markus, J., Mundy, P., Morales, M., Delgado, C. E. F., & Yale, M. (2000). Individual differences in infant skills as predictors of child-caregiver joint attention and language. *Social Development, 9*, 302-315. doi:10.1111/1467-9507.00127
- McKown, C., Gumbiner, L. M., Russo, N. M., & Lipton, M. (2009). Social-emotional learning skill, self-regulation, and social competence in typically developing and clinic-referred children. *Journal of Clinical Child and Adolescent Psychology, 38*, 858-871. doi:10.1080/15374410903258934
- NICHD Early Child Care Research Network. (1998). Early child care and self-control, compliance, and problem behavior at twenty-four and thirty-six months. *Child Development, 69*, 1145-1170. doi:10.2307/1132367
- NICHD Early Child Care Research Network. (2005). Duration and developmental timing of poverty and children's cognitive and social development from birth through third grade. *Child Development, 76*, 795-810. doi:10.1111/j.1467-8624.2005.00878.x
- Raikes, H. A., & Thompson, R. A. (2008). Attachment security and parenting quality predict children's problem-solving, attributions, and loneliness with peers. *Attachment & Human Development, 10*, 319-344. doi:10.1080/14616730802113620
- Roskam, I., Meunier, J.-C., & Stievenart, M. (2011). Parent attachment, childrearing behavior, and child attachment: Mediated effects predicting preschoolers' externalizing behavior. *Journal of Applied Developmental Psychology, 32*, 170-179. doi:10.1016/j.appdev.2011.03.003
- Saltaris, C., Serbin, L. A., Stack, D. M., Karp, J. A., Schwartzman, A. E., & Ledingham, J. E. (2004). Nurturing cognitive competence in preschoolers: A longitudinal study of intergenerational continuity and risk. *International Journal of Behavioral Development, 28*, 105-115. doi:10.1080/01650250344000316
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development, 7*, 349-367. doi:10.1080/14616730500365928

Vaughan Van Hecke, A., Mundy, P. C., Acra, C. F., Block, J. J., Delgado, C. E. F., Parlade, M. V., ...

Pomares, Y. B. (2007). Infant joint attention, temperament, and social competence in preschool children. *Child Development, 78*, 53-69. doi:10.1111/j.1467-8624.2007.00985.x

Wang, F., Christ, S. L., Mills-Koonce, W. R., Garrett-Peters, P., & Cox, M. J. (2013). Association

between maternal sensitivity and externalizing behavior from preschool to preadolescence.

Journal of Applied Developmental Psychology, 34, 89-100. doi:10.1016/j.appdev.2012.11.003

Table 1: Means (*SD*) for all INTAKT variables in cases, controls, and dyads that were referred to intervention

INTAKT category	case mothers (<i>n</i> = 12)	control mothers (<i>n</i> = 12)	intervention mothers (<i>n</i> = 8)
<i>Maternal Sensitivity</i>			
Mean	5.19	5.54	4.75
SD	0.83	0.64	0.87
<i>Feedback</i>			
Positive Feedback	30.3% (13.1)	31.9% (22.7)	26.6% (10.6)
Corrective Feedback	50.0% (19.4)	58.4% (23.8)	48.7% (23.0)
Negative Feedback	19.7% (22.9)	9.7% (7.8)	24.8% (26.5)
<i>Joint Attention</i>			
Active Maintenance	55.3% (14.4)	70.4% (9.1)	52.0% (16.1)
Verbal Maintenance	24.8% (12.2)	16.1% (6.1)	24.4% (14.3)
Passive Maintenance	14.9% (7.5)	12.2% (9.9)	17.8% (6.4)
Attention Manipulation	2.7% (2.7)	0.9% (1.4)	3.2% (3.1)
Attention Switching	1.5% (1.8)	0.2% (0.3)	1.6% (2.0)
No Joint Attention	0.7% (1.3)	0.3% (0.4)	1.0% (1.5)

Table 2: Relations between maternal interactive behavior and child development

	<i>Maternal Sensitivity: Mean</i>	<i>Maternal Sensitivity: SD</i>	<i>Positive Feedback</i>	<i>Corrective Feedback</i>	<i>Negative Feedback</i>	<i>Active Maintenance</i>	<i>Verbal Maintenance</i>	<i>Passive Maintenance</i>	<i>Attention Manipulation</i>	<i>Attention Switching</i>	<i>No Joint Attention</i>
motor skills ^a	$r = -.35$	$r = .25$	$r = .09$	$r = -.10$	$r = .03$	$r = -.24$	$r = .04$	$r = .29$	$r = -.07$	$r = .44$	$r = .51$
visual-motor coordination ^b	$r = .50$	$r = .17$	$r = .18$	$r = .22$	$r = -.40$	$r = .24$	$r = -.14$	$r = -.14$	$r = -.33$	$r = .01$	$r = -.01$
memory ^b	$r = .42$	$r = -.45$	$r = -.46$	$r = .34$	$r = .04$	$r = .38$	$r = -.36$	$r = -.10$	$r = -.04$	$r = -.10$	$r = -.25$
non-verbal cognitive skills ^b	$r = .37$	$r = .17$	$r = .06$	$r = -.07$	$r = .02$	$r = .01$	$r = -.24$	$r = .30$	$r = -.00$	$r = .18$	$r = .16$
verbal cognitive skills ^a	$r = .23$	$r = .51$	$r = .02$	$r = .47$	$r = -.52$	$r = .35$	$r = -.15$	$r = -.17$	$r = -.68^*$	$r = -.21$	$r = .12$
language skills ^b	$r = .37$	$r = .27$	$r = .33$	$r = -.03$	$r = -.27$	$r = .22$	$r = -.18$	$r = -.16$	$r = -.21$	$r = .31$	$r = .29$
socio-emotional development ^b	$r = .59^\dagger$	$r = -.46$	$r = .02$	$r = -.30$	$r = .31$	$r = .48$	$r = -.59^\dagger$	$r = -.22$	$r = .46$	$r = .40$	$r = -.08$

^a $n = 10$. ^b $n = 11$.

[†] $p < .10$. * $p < .05$.

5.3. Paper 3

Hirschmann, N., Kastner-Koller, U., Deimann, P., Huber, P., Reischer, N., & Vogler, J. (submitted). Child developmental aspects of mother-child interaction: Maternal sensitivity and feedback, and the interactive style in joint-attention episodes. *Journal of Family Psychology*.

Title

Child Developmental Aspects of Mother-Child Interaction: Maternal Sensitivity and Feedback, and
the Interactive Style in Joint-Attention Episodes

Running head: Interaction and Child Development

Abstract

The way mothers interact with their children, particularly sensitivity towards and feedback to the child, as well as interactive style in joint-attention episodes, has an important role in child development. This study explored this influence by assessing the relation between two comprehensive measures of child development and maternal interactive style (namely, WET and INTAKT) in 40 mother-child dyads with children 3 to 5 years of age. The WET (Viennese Developmental Test) uses playful material to assess child developmental status in various domains, whereas INTAKT consists of a videotaped play situation between mother and child, which is later coded for maternal interactive behavior. Regression models revealed inconsistent maternal sensitivity ($\beta = -.39, p = .009$) as well as negative maternal feedback ($\beta = -.31, p = .036$) as the most relevant predictors of negative child development. Negative maternal feedback had an adverse impact on the verbal development of children, whereas inconsistent maternal sensitivity had an adverse impact on the non-verbal development. Interventions designed to improve mother-child interactions should therefore focus on preventing these two problematic aspects.

Keywords: mother-child interaction, child development, maternal sensitivity, INTAKT (maternal interactive style measure), WET (Viennese Developmental Test)

Introduction

Mother-child interactions and their effects on child development have been of interest to researchers for several decades. Much evidence suggests that the way mothers interact with their children has an influence on later child development (e.g., Landry, Smith, & Swank, 2006).

Three concepts that have been widely used to assess mother-child interactive quality are maternal sensitivity, maternal feedback to the child, and maternal interactive style in joint-attention episodes. These concepts are usually looked at separately from each other, but recently an instrument has been developed for the assessment of all three of them (INTAKT; Hirschmann, Kastner-Koller, Deimann, Aigner, & Svecz, 2011). In the following, a short overview of the importance of the three concepts is provided.

Maternal sensitivity is rooted in attachment theory. It has been introduced by Ainsworth and colleagues and focuses on the ability of the mother to perceive and to interpret accurately the signals and communications implicit in her infant's behavior, and given this understanding, to respond to them appropriately and promptly (Ainsworth, Bell, & Stayton, 1974, p. 127). It has been shown to be of primary importance for the development of a secure attachment relationship between a mother and her child (e.g., Ainsworth, Blehar, Waters, & Wall, 1978).

Furthermore, maternal sensitivity positively influences a child's social problem-solving skills at preschool age and is negatively associated with aggressive responses to hypothesized offenses at the end of first grade (Raikes & Thompson, 2008). It is predictive of higher self-control, more compliance, and fewer problem behaviors in toddlers (NICHD Early Child Care Research Network, 1998). Higher maternal sensitivity further predicts better social and cognitive development in middle childhood (Stams et al., 2002) and has been shown to mediate negative effects of poverty on children's cognitive and language performance (NICHD Early Child Care Research Network, 2005). As well as being predictive of children's separation anxiety, it also seems to mediate the influence of a

mother's separation anxiety on her child's separation anxiety (Dallaire & Weinraub, 2005). Longitudinally, it even positively influences adjustment in adolescence (Feldman, 2010).

Maternal evaluative feedback is considered a source of information for children about the appropriateness of their actions and the resulting outcomes. It can take several forms, including positive evaluative statements, negative evaluative statements, and corrective statements (Kelley, Brownell, & Campbell, 2000). The kind of feedback a mother provides to her child also takes an influence on the child's development. Positive and corrective maternal feedback were found to relate to children's persistence in the face of difficulty (Kelley et al., 2000) and to less shame following task failure (Alessandri & Lewis, 1996).

Negative maternal feedback, in turn, is related to more shame following task failure and less pride following success (Alessandri & Lewis, 1996; Kelley et al., 2000). Additionally, it has been shown that mothers who have an officially recorded history of maltreating their children provide more negative feedback (Alessandri & Lewis, 1996). High levels of negative maternal feedback, coupled with low levels of positive feedback, are associated with adolescent negative self-perceptions, which, in turn, place adolescents at risk for depressive symptoms (Jacquez, Cole, & Searle, 2004). Negative maternal feedback regarding a child's failure, in interaction with a child's experienced negative events, tends to predict a more negative cognitive style, entailing greater cognitive vulnerability to depression (Mezulis, Hyde, & Abramson, 2006).

Joint attention refers to the ability of children to coordinate their attention with a social partner with respect to an object or event. Concerning a mother's behavior during episodes of joint attention with her child, she can generally either follow the attentional focus of her child or switch the attentional focus of her child. It could be shown that for children older than 6 months it is more beneficial if a mother follows their attentional focus (Saxon, Colombo, Robinson, & Frick, 2000). Children, 9 to 15 month of age, with mothers who use language that follows into their infant's focus of attention, rather than leading the infant's attention away, have better early skills of gestural and

linguistic competence (Carpenter, Nagell, & Tomasello, 1998). Moreover, children's independence in cognitive and social skills is supported by a mother's maintenance of her child's interest at 2 years of age (Landry, Smith, Swank, & Miller-Loncar, 2000).

Furthermore, the amount of time a mother spends within joint attention with her child is associated with a range of favorable developmental outcomes for the child. During joint attention episodes, the child's attention is focused on the relevant aspects of the referential world, thus facilitating language acquisition by more easily identifying word-object mappings (e.g., Dominey & Dodane, 2004). Indeed, the amount of time young infants spend in joint engagement with their mothers can predict infants' early linguistic competence (Carpenter et al., 1998; Markus, Mundy, Morales, Delgado, & Yale, 2000). Likewise, there is a strong association between children's ability to initiate and respond to joint attention and their later language and cognitive abilities (Markus et al., 2000; Morales et al., 2000; Mundy et al., 2007), even up to the age of 8 years (Smith & Ulvund, 2003). Concerning a child's social development, more frequent and consistent joint attention is longitudinally related to better social competence and less externalizing behavior (Vaughan Van Hecke et al., 2007), better theory of mind ability (Charman et al., 2000), a more active emotion regulation strategy use, less engagement in low-level play, and a tendency not to engage in self-soothing physical behaviors and to wait longer before attempting to retrieve a delay object (Morales, Mundy, Crowson, Neal, & Delgado, 2005).

As can be seen from the above, there are many studies that support the idea that a child's development is influenced by the way a mother interacts with the child. Nonetheless, each of those studies had a different special focus either concerning which part of maternal behavior was assessed or concerning which area of the child's development was under consideration. There do not seem to be many comprehensive studies looking at various facets of a mother's interactive style and at the same time examining a significant range of developmental areas of the child. In particular, to the best of our knowledge, no study so far has taken a combined look at the effects of maternal sensitivity, maternal feedback, and maternal interactive style in joint attention episodes, all of which seem so

important for child development, as outlined above. Thus, the aim of our study is to use comprehensive measures of maternal interactive behavior as well as of the child's development to figure out which components of interactive style are connected to which areas of child development.

Method

Participants

The sample consisted of 40 mother-child dyads who were unscreened and non-medical. Children's age ranged from 3;0 to 5;11 years ($M = 4;4$ years; $SD = 10$ months). There were 24 girls and 16 boys in our sample. Each child had between none and four siblings ($M = 1.0$; $SD = .88$). Mothers in the sample were between 25 and 50 years old ($M = 35$ years; $SD = 6.6$ years). Participants came from Eastern Austria and mothers had diverse educational backgrounds (ranging from having finished compulsory education only to having a university diploma). All mothers shared a common household with their child, whereas 36 fathers (90.0%) lived in the same household with their child. Fathers were between 28 and 52 years old ($M = 37$ years; $SD = 6.1$ years).

Measures

Mother-child interaction

To assess maternal interactive style, the coding system INTAKT was applied. It uses a videotaped play situation between mother and child and allows to rate the quality of this interaction on three dimensions (*Maternal Sensitivity*, *Feedback*, and *Joint Attention*, as detailed below). Each of them is based on theoretical background and with reference to theory, certain behaviors of the mother are considered more or less beneficial for the child (Hirschmann et al., 2011).

Maternal Sensitivity is a 7-point rating scale, based on Ainsworth's (1974) sensitivity concept. It ranges from *very low sensitivity* (1) to *very high sensitivity* (7) and every other step of the rating scale is precisely verbally anchored, thus describing corresponding maternal behavior. Descriptions, for example, focus on whether the mother notices the child's signals and reacts promptly and

appropriately to them, whether she can adopt the child's viewpoint, and whether her language is appropriate for the child's developmental status. For coding, the video is stopped every two minutes, watched again if necessary, and then maternal behavior during this interval is rated according to the scale.

Feedback is a classification system comprising four categories. The categories *positive feedback* (e.g., mother praises the child for having a good idea) and *corrective feedback* (e.g., mother uses a friendly voice to tell the child how to better hold the scissors) are considered beneficial for the child, whereas the category *negative feedback* (e.g., mother tells the child that he did not draw neatly enough) is regarded as less favorable. *No feedback* (mother gives no feedback to the child) is coded the rest of the time and is considered a neutral category, and therefore not analyzed further. Precise behavioral definitions are offered for each category and the system is applied in an event-sampling procedure.

Joint Attention is a classification system comprising six categories. It allows one to judge whether mothers follow their child's attentional focus (either through *active maintenance* or through *verbal maintenance* or through *passive maintenance*) or switch their child's attentional focus (*attention manipulation* or *attention switching*) in joint attention episodes. Furthermore, there can be episodes of no joint attention between mother and child (*no joint attention*). Considering studies which show that for children older than six months, following the child's attentional focus is more beneficial than manipulating it (Conway & Stifter, 2012; Saxon et al., 2000), the first three categories are considered beneficial whereas the latter three are considered less favorable for the child. Precise descriptions of the corresponding maternal behaviors are provided for each category. An event-sampling procedure is used for assessment.

For *Maternal Sensitivity* we calculated the mean for each mother over the duration of the video in order to assess the level of maternal sensitivity. Thereby, higher values indicate higher maternal sensitivity. We also calculated the standard deviation for each mother over the duration of

the video in order to assess stability of maternal sensitivity over time. Thereby, higher values correspond to more fluctuating maternal sensitivity and less stability over time. For *Feedback* and *Joint Attention* the relative durations of each category (see Table 1) within a video was calculated.

Child Development

Children also completed the Viennese Developmental Test (WET; Kastner-Koller & Deimann, 2012). The WET is a developmental test for 3;0 to 5;11 year olds, which measures children's development in relevant areas of functioning with 14 subscales and a parents' questionnaire (see Table 2). It produces an overall developmental score as well as scores for each subscale. Subscales assessing motor development, visual-motor coordination, memory, and non-verbal cognitive development are considered to assess the child's non-verbal development, because the child does not need to use language to fulfill the tasks. Subscales assessing verbal cognitive development, language development and psychosocial development are considered to assess the child's verbal development, because language is needed to fulfill all of those tasks. Using norm tables from the manual raw scores are transformed into standardized C-scores ($M = 5$; $SD = 2$).

Procedure

All mothers and children took part on a voluntary basis. Two trained research assistants approached mothers in their home regions. They informed them about our interest in mother-child interactions and child development. By word of mouth further participants were opportunistically recruited. Videotaping the interaction and testing the child took place in private homes. All mothers gave written consent for the videos to be taped and analyzed by the researchers.

For video-taping mother-child interaction mothers and children were seated at a table with liquid as well as solid glue, colored felt-pens, scissors for adults as well as for children, and colored fancy papers with triangular roofs, round roof-lights, walls, square windows, and rectangular doors on them. A little apart, a box was placed that contained various play materials (e.g., puppets, cars, small furniture). They were told, "Look, I've got some craft materials here. Could you (*child*) change

that boring house into a beautiful, colored house? Your mom can assist you with it and you (*both*) can use everything that's on the table. Once you are done, there is a box of play materials for you over here." So the children were free to produce the house either by using the papers or by drawing, or by using a combination of both. Whenever they felt the house was completed they were free to go on with playing with the materials in the box. Overall, the interactions lasted between 27:05 and 72:52 minutes ($M = 47:11$ min). Crafting the house lasted between 08:23 and 43:42 minutes ($M = 17:30$ min), whereas the free play situation lasted between 11:40 and 42:07 minutes ($M = 28:32$ min).

The interactions were videotaped and videos were subsequently analyzed and coded by three trained coders according to the INTAKT categories, using the Mangold Software INTERACT. It took approximately five months to code all videos, and a total of 17,468 codings were assigned to the videos. Ten (25% of the total sample) randomly selected videos were coded by a fourth coder to obtain inter-rater reliability estimates.

Results

Preliminary Analyses

As is evident from Table 1 the *Joint-Attention* category *attention switching* was hardly ever applied. There was only one case where the mother switched the attention of the child for more than 1% of the time of the video. Therefore, and because of the similarity between its definition and the definition of the *attention-manipulation* category, those two categories were collapsed.

Inter-rater agreement for *Maternal Sensitivity* was examined using intraclass correlations (ICC; one-way random-effects model). Inter-rater agreement was $ICC = .80$, $p < .001$, 95% CI [.75, .84].

Time-unit kappa with tolerance (Bakeman & Quera, 2011, p. 78) was used as an agreement measure for event-sampling data. Thereby, the stream of events is divided into equal units (1 s intervals in our case). For each time unit it is observed whether the other coder decided for the same

category, at least within a specified tolerance window (plus/minus 3 s in our case). Calculations were accomplished with the Generalized Sequential Querier (GSEQ, Version 5.1), which always reports two kappa values for each calculation, one with each observer as the first. Inter-rater agreement for *Feedback* reached $\kappa = .81/.76$ and for *Joint Attention* $\kappa = .79/.86$.

Maternal interactive behavior and child development

Entering all INTAKT categories (see Table 1) as predictors, a stepwise regression revealed the standard deviation of maternal sensitivity and negative feedback as relevant factors. The model explained 28% of the variance of the child's overall development, $F(2, 37) = 7.28, p = .002$, adjusted $R^2 = .24$, with instability of maternal sensitivity explaining 19% of the variance, and negative feedback explaining another 9%. Thus, the higher the variability of maternal sensitivity, $\beta = -.39, p = .009$, and the more negative feedback a child receives from a mother, $\beta = -.31, p = .036$, the lower the overall developmental score of the child.

With regard to verbal versus non-verbal subscales distinct patterns emerged. For the verbal subscales a stepwise regression revealed negative feedback as the sole relevant predictor, $F(1, 38) = 10.38, p = .003$, adjusted $R^2 = .19$. Thus, the fewer negative feedback a mother provides the better a child's verbal development, $\beta = -.46, p = .003$. For the non-verbal subscales a stepwise regression revealed the standard deviation of maternal sensitivity and the amount of passive joint attention as the relevant predictors, $F(2, 37) = 6.00, p = .006$, adjusted $R^2 = .20$. Thus, the higher the stability of maternal sensitivity, $\beta = -.33, p = .030$, and the more time a mother spends supporting her child's joint attention by watching her/him play, $\beta = -.32, p = .032$, the better the child's non-verbal development.

Discussion

Based on novel and comprehensive measures for the assessment of mother-child interaction and child development, we identified inconsistent maternal sensitivity as well as negative maternal feedback as the most relevant predictors of negative child development. While negative maternal

feedback was especially problematic to the verbal development of children, inconsistent maternal sensitivity was especially problematic to non-verbal development. On the other side, a mother spending more time passively watching her child play and thus supporting the child's joint attention was related to better non-verbal child development.

Previous literature has not specifically focused on the connection between negative maternal feedback and verbal child development. Rather, it has been shown that more negative feedback is connected to more shame following task failure (Alessandri & Lewis, 1996). Considering this, it seems to make sense that children experiencing much criticism and shame are inhibited in their verbal development. Stability of maternal sensitivity, on the other hand, has been assessed a lot in previous literature. Usually though, stability of sensitivity was considered over a much longer period of time, e.g., over the course of two years (Bigelow et al., 2010). Stability as we use it here though does not mean reassessing sensitivity at a later point in time, but rather describes if a mother is keeping her level of sensitivity during one time period of for example 40 to 50 minutes (as most of our videos were about that long). Looking at this kind of stability provides us with an idea of how predictable maternal behavior can be for the child. It seems reasonable to assume that the more stable and therefore more predictive the maternal behavior the easier for the child to adjust.

Concerning maternal behavior during joint-attention episodes, our finding that maternal passive maintenance of children's joint attention is helpful for non-verbal child development is in line with previous research that has proven maternal joint-attention maintenance beneficial for children (e.g., Saxon et al., 2000). Interestingly, previous research has more often focused on connections to verbal development (e.g., Carpenter et al., 1998), whereas our research has detected connections to non-verbal development.

The strengths of our study include not only the use of comprehensive and partly novel, though already validated measures for assessment, but also the very fine-grained analysis of interactive behavior. In combination with long durations of video material this led to an enormous

amount of observational points (>17,000). This is not only necessary in order to be able to see fluctuation in behavior over time. Also, just recently it could be shown that using too thin slices of video footage does not allow for valid conclusions (James, Wadnerkar, Lam-Cassettari, Kang, & Telling, 2012).

Limitations of our study include that we used a conveniently recruited sample. Possibly, most mothers who participated in our study feel they interact well with their children, otherwise they might not have agreed being videotaped. Furthermore, we only used cross-sectional data in our study, thus we cannot draw any causal conclusions. Currently though, longitudinal data are being collected, so we are expecting more findings about long-term effects soon.

Moreover, we are currently taking a look at how much video footage is necessary to reliably and validly code INTAKT categories. So far we have coded as much footage as possible, which was highly time-consuming. Once we are able to prove that coding a smaller portion of the video is just as reliable and valid, the procedure will conveniently be applicable to many contexts, e.g. for monitoring of treatment progress.

In conclusion, our results suggest that INTAKT and WET are well suited for the assessment of maternal interactive style and child development. Stability of maternal sensitivity as well as negative maternal feedback turned out to be the most relevant predictors of negative child development. Therefore, interventions concerning mother-child interaction should specifically focus on these two concepts.

References

- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant-mother attachment and social development: 'Socialisation' as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99-135). London: Cambridge University Press.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.
- Alessandri, S. M., & Lewis, M. (1996). Differences in pride and shame in maltreated and nonmaltreated preschoolers. *Child Development, 67*, 1857-1869. doi:10.1111/j.1467-8624.1996.tb01832.x
- Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. Cambridge, MA: Cambridge University Press.
- Bigelow, A. E., MacLean, K., Proctor, J., Myatt, T., Gillis, R., & Power, M. (2010). Maternal sensitivity throughout infancy: Continuity and relation to attachment security. *Infant Behavior and Development, 33*, 50-60. doi:10.1016/j.infbeh.2009.10.009
- Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development, 63*, 1-174. doi:10.2307/1166214
- Charman, T., Baron-Cohen, S., Swettenham, J., Baird, G., Cox, A., & Drew, A. (2000). Testing joint attention, imitation, and play as infancy precursors to language and theory of mind. *Cognitive Development, 15*, 481-498. doi:10.1016/S0885-2014(01)00037-5
- Conway, A., & Stifter, C. A. (2012). Longitudinal antecedents of executive functions in preschoolers. *Child Development, 83*, 1022-1036. doi:10.1111/j.1467-8624.2012.01756.x

- Dallaire, D. H., & Weinraub, M. (2005). Predicting children's separation anxiety at age 6: The contributions of infant-mother attachment security, maternal sensitivity, and maternal separation anxiety. *Attachment & Human Development, 7*, 393-408.
doi:10.1080/14616730500365894
- Dominey, P. F., & Dodane, C. (2004). Indeterminacy in language acquisition: The role of child directed speech and joint attention. *Journal of Neurolinguistics, 17*, 121-145. doi:10.1016/S0911-6044(03)00056-3
- Feldman, R. (2010). The relational basis of adolescent adjustment: Trajectories of mother-child interactive behaviors from infancy to adolescence shape adolescents' adaptation. *Attachment & Human Development, 12*, 173-192. doi:10.1080/14616730903282472
- Hirschmann, N., Kastner-Koller, U., Deimann, P., Aigner N., & Svecz, T. (2011). INTAKT: A new instrument for assessing the quality of mother-child interactions. *Psychological Test and Assessment Modeling, 53*, 295-311.
- Jacquez, F., Cole, D. A., & Searle, B. (2004). Self-perceived competence as a mediator between maternal feedback and depressive symptoms in adolescents. *Journal of Abnormal Child Psychology, 32*, 355-367. doi:10.1023/B:JACP.0000030290.68929.ef
- James, D. M., Wadnerkar, M. B., Lam-Cassettari, C., Kang, S., & Telling, A. L. (2012). Thin slice sampling of video footage for mother/child interaction: Application to single cases. *Journal of Psychopathology and Behavioral Assessment, 34*. 351-360. doi:10.1007/s10862-012-9282-9
- Kastner-Koller, U., & Deimann, P. (2012). *WET – Wiener Entwicklungstest: Ein Verfahren zur Erfassung des allgemeinen Entwicklungsstandes bei Kindern von 3 bis 6 Jahren* [WET – Viennese Developmental Test: A test for assessing the developmental status of children 3 to 6 years of age] (3rd rev. & ext. ed.). Göttingen: Hogrefe.

- Kelley, S. A., Brownell, C. A., & Campbell, S. B. (2000). Mastery motivation and self-evaluative affect in toddlers: Longitudinal relations with maternal behavior. *Child Development, 71*, 1061-1071. doi:10.1111/1467-8624.00209
- Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology, 42*, 627-642. doi:10.1037/0012-1649.42.4.627
- Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development, 71*, 358-375. doi:10.1111/1467-8624.00150
- Markus, J., Mundy, P., Morales, M., Delgado, C. E. F., & Yale, M. (2000). Individual differences in infant skills as predictors of child-caregiver joint attention and language. *Social Development, 9*, 302-315. doi:10.1111/1467-9507.00127
- Mezulis, A. H., Hyde, J. S., & Abramson, L. Y. (2006). The developmental origins of cognitive vulnerability to depression: Temperament, parenting, and negative life events in childhood as contributors to negative cognitive style. *Developmental Psychology, 42*, 1012-1025. doi:10.1037/0012-1649.42.6.1012
- Morales, M., Mundy, P., Crowson, M. M., Neal, A. R., & Delgado, C. E. F. (2005). Individual differences in infant attention skills, joint attention, and emotion regulation behaviour. *International Journal of Behavioral Development, 29*, 259-263. doi:10.1080/01650250444000432
- Morales, M., Mundy, P., Delgado, C. E. F., Yale, M., Messinger, D., Neal, R., & Schwartz, H. K. (2000). Responding to joint attention across the 6- through 24-month age period and early language acquisition. *Journal of Applied Developmental Psychology, 21*, 283-298. doi:10.1016/S0193-3973(99)00040-4

- Mundy, P., Block, J., Delgado, C., Pomares, Y., Vaughan Van Hecke, A., & Parlade, M. V. (2007). Individual differences and the development of joint attention in infancy. *Child Development, 78*, 938-954. doi:10.1111/j.1467-8624.2007.01042.x
- NICHD Early Child Care Research Network. (1998). Early child care and self-control, compliance, and problem behavior at twenty-four and thirty-six months. *Child Development, 69*, 1145-1170. doi:10.2307/1132367
- NICHD Early Child Care Research Network. (2005). Duration and developmental timing of poverty and children's cognitive and social development from birth through third grade. *Child Development, 76*, 795-810. doi:10.1111/j.1467-8624.2005.00878.x
- Raikes, H. A., & Thompson, R. A. (2008). Attachment security and parenting quality predict children's problem-solving, attributions, and loneliness with peers. *Attachment & Human Development, 10*, 319-344. doi:10.1080/14616730802113620
- Saxon, T. F., Colombo, J., Robinson, E. L., & Frick, J. E. (2000). Dyadic interaction profiles in infancy and preschool intelligence. *Journal of School Psychology, 38*, 9-25. doi:10.1016/S0022-4405(99)00034-5
- Smith, L., & Ulvund, S. E. (2003). The role of joint attention in later development among preterm children: Linkages between early and middle childhood. *Social Development, 12*, 222-234. doi:10.1111/1467-9507.00230
- Stams, G.-J. J. M., Juffer, F., & van IJzendoorn, M. H. (2002). Maternal sensitivity, infant attachment, and temperament in early childhood predict adjustment in middle childhood: The case of adopted children and their biologically unrelated parents. *Developmental Psychology, 38*, 806-821. doi:10.1037//0012-1649.38.5.806

Vaughan Van Hecke, A., Mundy, P. C., Acra, C. F., Block, J. J., Delgado, C. E. F., Parlade, M. V., ...

Pomares, Y. B. (2007). Infant joint attention, temperament, and social competence in preschool children. *Child Development, 78*, 53-69. doi:10.1111/j.1467-8624.2007.00985.x

Table 1: Summary statistics of all INTAKT variables ($n = 40$)

INTAKT category	Mean	Median	Standard Deviation	Minimum	Maximum
<i>Maternal Sensitivity</i>					
Average Rating	5.26	5.27	0.95	2.38	6.84
Stability	0.58	0.58	0.16	0.19	0.89
<i>Feedback (in %)</i>					
Positive Feedback	1.17	0.93	0.79	0.07	3.04
Corrective Feedback	0.68	0.49	0.78	0.00	3.30
Negative Feedback	0.32	0.20	0.43	0.00	2.22
<i>Joint Attention (in %)</i>					
Active Maintenance	65.94	67.42	12.59	36.04	86.42
Verbal Maintenance	11.73	9.89	7.18	2.54	38.38
Passive Maintenance	17.39	17.70	9.10	3.77	38.19
Attention Manipulation	4.03	3.54	2.91	0.16	14.11
Attention Switching	0.20	0.10	0.36	0.00	1.97
No Joint Attention	0.70	0.22	1.33	0.00	7.69

Table 2: Subscales of the Viennese Developmental Test (WET)

	Area of development	Subscale	Measured ability	Nr. of items	Cronbach's α
non-verbal development	Motor development	Gymnastics	Gross motor skills	10	.77
		Teddy Bear	Fine motor skills	4	.66
	Visual-motor coordination	Drawing	Drawing	10	.78
		Picture Lotto	Visuospatial perception	24	.89
	Memory	Treasure Casket	Short-term memory – visual processing	3	.70
		Digit Span	Short-term memory – verbal processing	Nr. of items depending on performance of child	
	Non-verbal cognitive development	Block Design	Analyzing patterns	10	.86
		Colored Matrices	Inductive reasoning	10	.88
verbal	Verbal cognitive	Opposites	Verbal reasoning by analogies	15	.84

development	development			
		Quiz	Everyday knowledge	11 .75
		Arithmetic	Mathematical knowledge	11 .81
Language development		Explaining Words	Vocabulary development	10 .82
		Doll Play	Receptive language, grammar comprehension	13 .78
Psychosocial development		Photo Album	Interpreting emotional expressions	9 .71
		Parent Questionnaire	Autonomy	22 .90

7. Publications

Journal Articles

Published

Hirschmann, N., Kastner-Koller, U., & Deimann, P. (2008). Entwicklung und Diagnostik mathematischer Fähigkeiten in der frühen Kindheit [Development and diagnosis of mathematical abilities in early childhood]. *Empirische Pädagogik*, 22, 177-191.

Hirschmann, N., Kastner-Koller, U., Deimann, P., Aigner, N., & Svecz, T. (2011). INTAKT: A new instrument for assessing the quality of mother-child interactions. *Psychological Test and Assessment Modeling*, 53, 295-311.

Submitted

Hirschmann, N., Deimann, P., & Kastner-Koller, U. (submitted). Observing mother-child interactions to assist educational counseling. A behavioral observation case-control study.

Hirschmann, N., Kastner-Koller, U., Deimann, P., Huber, P., Reischer, N., & Vogler, J. (submitted). Child developmental aspects of mother-child interaction: Maternal sensitivity and feedback, and the interactive style in joint-attention episodes.

Readers

Hirschmann, N., Kastner-Koller, U., Deimann, P., Tratsch, M., & Decker, R. (2006). Diagnostik mathematischer Fähigkeiten bei 3- bis 6-Jährigen [Diagnosis of mathematical abilities in 3- to 6-year olds]. In B. Gula, R. Alexandrowicz, S. Strauß, E. Brunner, B. Jenull-Schiefer & O. Vitouch (Eds.), *Perspektiven psychologischer Forschung in Österreich* (pp. 431-437). Lengerich, Germany: Pabst Science Publishers.

Hirschmann, N., & Koch, H. (2010). Diagnostik von Lese-Rechtschreibschwäche – Leonie, 9;8 Jahre [Diagnosis of dyslexia – Leonie, 9;8 years]. In K. D. Kubinger & T. M. Ortner (Eds.), *Psychologische Diagnostik in Fallbeispielen* (pp. 131-141). Göttingen, Germany: Hogrefe.

Koch, H., & Hirschmann, N. (2012). Abklärung einer Lese- und Rechtschreibstörung – Fabian (8;2 Jahre) [Assessment of dyslexia – Fabian (8;2 years)]. In K. D. Kubinger & S. Holocher-Ertl (Eds.), *Fallbuch AID* (pp. 125-143). Göttingen, Germany: Hogrefe.

Koch, H., & Hirschmann, N. (2012). Abklärung einer Sozialverhaltensstörung – Leon (7;7 Jahre) [Assessment of conduct disorder – Leon (7;7 years)]. In K. D. Kubinger & S. Holocher-Ertl (Eds.), *Fallbuch AID* (pp. 204-222). Göttingen, Germany: Hogrefe.

Congress Contributions

- Hirschmann, N., Kastner-Koller, U., Deimann, P., Tratsch, M., & Decker, R. (2005, September). *Die Entwicklung mathematischer Fähigkeiten im Kindergartenalter* [Development of mathematical abilities in preschool age]. Poster presented at the 17. Tagung der Fachgruppe Entwicklungspsychologie, Bochum, Germany.
- Hirschmann, N., Kastner-Koller, U., Deimann, P., Tratsch, M., & Decker, R. (2006, April). *Diagnostik mathematischer Fähigkeiten bei 3- bis 6-Jährigen* [Assessment of mathematical abilities in 3- to 6-year olds]. Poster presented at the 7. Wissenschaftliche Tagung der Österreichischen Gesellschaft für Psychologie, Klagenfurt, Austria.
- Hirschmann, N., Deimann, P., & Kastner-Koller, U. (2008, Juli). *Measuring mathematics in preschool age: Rasch model analyses for determining the dimensionality of competences*. Poster presented at the XXIX International Congress of Psychology, Berlin, Germany.
- Kastner-Koller, U., Deimann, P., Aigner, N., Hirschmann, N., & Svecz, T. (2010, September). *INTAKT: Entwicklung eines standardisierten Beobachtungssystems zur Erfassung der Mutter-Kind-Interaktion* [INTAKT: Development of a standardized behavioral observation system for the assessment of mother-child interactions]. Paper presented at the 47. Kongress der Deutschen Gesellschaft für Psychologie, Bremen, Germany.
- Hirschmann, N., Deimann, P., Kastner-Koller, U., Aigner, N., & Svecz, T. (2011, September). *INTAKT: A new instrument for assessing the quality of mother-child interactions*. Paper presented at the 11th European Conference on Psychological Assessment, Riga, Latvia.
- Hirschmann, N., Kastner-Koller, U., & Deimann, P. (2012, Juli). *Development of an instrument for the assessment of the quality of mother-child interactions*. Poster presented at the 8th Conference of the International Test Commission, Amsterdam, Netherlands.

Unpublished work

- Hirschmann, N. (2004). *Die Entwicklung mathematischer Fähigkeiten im Kindergartenalter. Testanalyse der Subskala „Rechnen“ für den Wiener Entwicklungstest (WET)* [Development of mathematical competences in preschool age: Test analysis of the subscale „Arithmetic“ for the Viennese Developmental Test (WET)]. Unpublished Diploma Thesis, University of Vienna, Austria.
- Hirschmann, N., Aigner, N., Deimann, P., & Kastner-Koller, U. (2013). *INTAKT. Ein Video-Beobachtungsinstrument zur Erfassung der Mutter-Kind-Interaktion – Manual*. [INTAKT: A video based behavioral observation instrument for the assessment of mother-child interactions – manual] (2nd ed.). Unpublished manuscript, Vienna, Austria.