

ENGLISH SUMMARY

Background

Due to emotional difficulties, a growing number of children are referred to regional educational-psychological advisory services and child psychiatric services with mental problems related to emotional vulnerabilities. For instance, from 2011 to 2012, a U.S. National Survey of Children's Health revealed that 16.5% of 3–17-year-olds had a current diagnosis. In Europe, the same tendency has been demonstrated. For instance, in Denmark from 2006 to 2016 there was a 91% increase in referrals to child and adolescent psychiatric services.

The practice of assessing children's emotional development based on a theoretical foundation of attachment theory, developmental psychology, trauma theory and brain research is fast developing within the field of clinical psychology and family social work. One of these integrations is neuroaffective developmental psychology (NADP), which has been developed with the aim of understanding and navigating in the complex world of emotional development and parent-child intersubjectivity. The effort has been to create relevant intervention plans to meet the needs of children's emotional, personal and social development. The NADP framework is a way of understanding children's normal emotional development and of examining how this development may be promoted or disturbed by relational issues (Hart, 2011). Within this theoretical framework, the researcher (since 2012 in cooperation with colleagues) has developed a measurement tool, the Emotional Development Scale (EDS), to assess the current emotional functioning level of 4–12-year-olds.

Purpose

The main focus of the empirical study is to investigate the reliability and validity of the EDS by measuring functions, that is, competencies and vulnerabilities, on three distinct levels of mental organization: the autonomic, the limbic and the prefrontal, as a basis for developing structured and specific intervention plans and measuring the effect of these interventions. To examine the validity of the EDS, it is correlated with a tool that measures the intersubjectivity between child and caregiver and a tool for measuring the caregiver's mentalizing capacity and two evidence-based standardized questionnaires.

Literature Review

Before the empirical study was initiated, a literature review was conducted to test the assumption that it is difficult to find measurement tools that focus on emotional development. The literature review revealed that it is relevant to develop a

measurement tool that offers helpful information on emotional-age-specific development, emotional competencies and emotional vulnerabilities. The literature review focused on measurement tools aimed at 4–12-year-old children’s emotional development, competencies and vulnerabilities. A block search, a reference search (snowball), a free-word search and a keyword search were conducted using the search engines Primo and Google Scholar. In addition, a search was conducted of established psychological test publishers’ catalogues as well as a hand search of psychological assessment methods and tests used in clinical settings. A thesaurus search was undertaken to help find synonyms to define new keywords in addition to keywords drawn from the theoretical and empirical literature as well as the keyword combinations found using Boolean connectors.

The literature review found a predominance of measurement tools consisting of self/other-reporting via questionnaires completed by children, parents and/or teachers whose answers are transformed into rating scales; this accounts for 18 (60%) of the 30 assessment methods found. Eight performance tests were found that address aspects of emotional capacity, but they did not consider the aspects in a structure designed to assess emotional development. Concerning performance tests, no tests were found that included a theoretical approach of mental organizations of emotional development or scales that measure the level of emotional development. Also, no measurement method was found that divides emotional dimensions into mental organizations and looks at emotional development, apart from the NMT (Perry & Hambrick, 2008; Mackinnon, 2012; Perry, 2008; Barfield et al., 2014).

Measurement Tools

The EDS consists of the EDS-Performance (EDS-P), which is a performance test, and the EDS-Assessment (EDS-A), which is a structured assessment consisting of two parts that informs the psychologist about the child’s level of emotional functioning concerning aspects that are not measured by the EDS-P. The EDS-A is designed as a structured interview for parents, caregivers or professionals who know the child well. The EDS-P and the EDS-A are designed to support each other. The EDS-P is administered in a structured setting, where the psychologist challenges the child through activities and asks questions. The psychologist assesses the child’s ability to handle the activities and assesses the quality of the answers with regard to the child’s mentalizing capacity. The EDS-A involves asking as many informants as possible who know the child well about the child’s emotional competencies and vulnerabilities outside the clinical setting. The psychologists score the answers.

The EDS was correlated with the newly developed measurement tool, the Neuroaffective Mentalizing Interview (NMI) (recently renamed the Emotional Mentalizing Scale (EMS)), which is a structured interview for assessing adults’ mentalizing capacity. The NMI is based on a brief interview aimed at addressing implicit mentalizing, connecting mental language with body language and

synchronization capacity (Birck, Corlin, Hart & Hellborn, 2018). The EDS was also correlated with the Marschak Interaction Method (MIM), which is a structured play-based dyadic observation assessment method aimed at gaining insight into the quality and nature of the caregiver-child relationship, that is, the intersubjectivity between caregiver and child. In the empirical study, the qualitative assessment was converted into a quantitative study, and psychometric qualities with a rating scale were developed for the four dimensions and renamed Marschak Interaction Method of Psychometrics (MIM-P). The EDS was finally correlated with the Parent Stress Index (PSI) and the Parent-Child Relationship Inventory (PCRI), which are evidence-based, standardized, clinical and research-based self-report questionnaires described as a screening and diagnostic assessment method designed to yield a measure of stress in the parent-child system and examine how caregivers view the task of parenting, and how they feel about the child.

Research Questions

The dissertation examined the following research questions:

I:

What are the psychometric properties of the EDS, including reliability and validity of the autonomic, limbic, prefrontal and total scores on the EDS-P and EDS-A scales?

II:

Is the correlation between autonomic, limbic and prefrontal scores on both the EDS-P and the EDS-A predictive of emotional developmental progression as described in NADP?

III:

What is the correlation between the tested children's emotional development, as measured with the EDS; parent-child intersubjectivity, as measured with the Marschak Interaction Method of Psychometrics (MIM-P); and parental mentalizing capacity, as measured with the Neuroaffective Mentalizing Interview (NMI)?

Design and Method

The research design is based on a fixed correlational design with quantitative data and statistical analysis and is part of an effort to develop and bring more structured measurement tools based on NADP into the clinical work in order to obtain relevant structured information to guide interventions (Poulsen & Simonsen, 2017). The research design incorporates post-positivist scientific methods in order to produce reliable and valid finding, and the epistemological rationale behind the study rests on pragmatism, that is, a concern for practical matters that is guided by practical experiences rather than solely by theory (Coolican 2009; Phillips & Burbules, 2000;

Robson & McCartan 2016).

The study focuses on interrater reliability, test-retest, internal consistency, concurrent, predictive and construct validity of the EDS-P and EDS-A. As the EDS is developed in collaboration with Hogrefe Ltd., the preliminary ad hoc sample (n=213) from Hogrefe Ltd. is correlated with the empirical data regarding concurrent and predictive validity. The preliminary ad hoc sample from Hogrefe Ltd. is not a part of the empirical study, and only data that were found to be relevant to elucidate certain aspects of the empirical study were included. The study of concurrent validity consists of an analysis between non-referred and referred used to investigate the difference between the two groups together with age and gender differences. The study of predictive validity was used to investigate the progression between the autonomic, limbic and prefrontal levels. It was conducted by merging the sample of the empirical study and the preliminary ad hoc sample from Hogrefe Ltd. The analysis was conducted by calculating the mean based on a percentage of max scores. The scores were analysed across age and age groups – 4–8-year-olds and 9–12-year-olds – and across gender. Since no measurement tools were found that matched the exclusive focus on emotional development, the construct validity was analysed by correlating the EDS with the MIM-P, the NMI, the PSI and the PCRI.

Data Collection and Analysis

Subjects in the study were 36 children, aged 4–12 years, along with one of their parents, who had been referred to a day-family-treatment centre due to family-related difficulties prior to the selection. The mean age of the children was 8.58 years ($SD = 2.16$), boys; 54.3%, girls; 45.7%. The researcher strove to comply with all ethical rules and considerations. As the families were considered to be in a vulnerable situation when they were referred to the family-care centre, they were treated with a high degree of respect and given as much information as possible without overwhelming them with excessive or overly complex information. If the parents who were referred for family treatment declined to take part in the research study, this was respectfully accepted.

The children and parents were recruited at the beginning of their stay at the treatment centre. The referred child conducted the EDS-P together with the psychologist; the child's mother or father participated with the child in the MIM-P, was interviewed for the NMI and EDS-A and completed the standardized questionnaires (PSI & PCRI).

Included in the study were eight day-family-treatment centres located in various parts of Denmark, each of which had a minimum of two psychologists to handle the uptake and scorings. Eighteen psychologists participated in the experimental design. The same two psychologists at each treatment centre who were in charge of recruiting the families were also in charge of conducting and scoring the and assessments/tests. To ensure interrater reliability, the EDS-P, the NMI and the MIM-P were video-recorded

to allow for blinded ratings. To ensure test-retest reliability within one to seven weeks, a retest of the performance part of the EDS-P was conducted before the intervention was implemented. For the validity study, all tests were conducted before the intervention period began.

All the participants in the empirical study were referred, while 86.6% in the preliminary ad hoc sample (n=213) from Hogrefe Ltd. were non-referred, which made it possible to correlate the EDS with a referred and a non-referred group.

Results

There was a significant, positive correlation between the scoring of psychologist 1 and 2 in EDS-P, which indicates strong agreement between raters. A significant positive correlation was found in the test-retest analysis of the EDS-P, which indicates a strong correlation between the first and the second testing of the child. The EDS-P appear to have good internal consistency: Cronbach's alpha = .838. The correlations between scores ranged from .727 to .973, $p < .001$. The EDS-A also appears to have good internal consistency: Cronbach's alpha = .874. The correlations between scores ranged from .809 to .952, $p < .001$. The four different scores in, respectively, the EDS-P and the EDS-A (autonomic, limbic, prefrontal and total) appear to have good internal consistency: Cronbach's alpha = .813. The correlations between scores ranged from .084 to .400.

In the comparison of similarities and differences between the referred and the non-referred groups, two control variables from demographic data – gender and age – were analysed. Independent samples t-test revealed no significant difference between the referred and non-referred groups regarding age and gender. In comparing referred and non-referred groups, independent samples t-test revealed a significant difference between the referred and non-referred with regard to all the levels as well as total scores on the EDS-P and the EDS-A. Independent samples t-tests revealed significant differences between referred and non-referred 4–8-year-olds in terms of scores on the autonomic, prefrontal and total score on the EDS-P. At the limbic level there was no significant difference ($p \geq 0.05$). Independent samples t-test and Mann-Whitney U test revealed significant differences between referred and non-referred 9–12-year-olds in terms of scores on the autonomic, limbic, prefrontal and total scores. Independent samples t-test revealed a development in emotional competencies between 4–8-year-olds and 9–12-year-olds in both the non-referred and the referred group regarding EDS-P, although the development was larger for the non-referred group compared to the referred group.

Independent samples t-tests revealed significant differences between referred and non-referred girls in terms of scores on the autonomic and prefrontal and total score. On the limbic level there was no significant difference ($p \leq 0.05$). Independent

samples t-tests revealed significant differences between referred and non-referred boys in terms of scores on all levels.

The analyses of predictive validity suggest a progression or equality of levels between the autonomic, limbic and prefrontal mental organizations across age groups and genders. The same clarity was not found for the group of non-referred participants, which showed a low limbic level on the EDS-P and a high limbic level on the EDS-A. The analyses of the differences between the EDS-P and the EDS-A shows that in the group of referred the mean of scores on the EDS-A is lower than on the EDS-P, but in the group of non-referred group, the mean of scores on the EDS-A is higher than on the EDS-P.

Pearson's correlation coefficients showed an expected significant negative, but modest, correlation between the EDS-P and PSI as well as significant modest unexpected negative correlation of a few points between PCRI and EDS scores. No correlations and no significance were found between the EDS-P, EDS-A and NMI. Pearson's correlation coefficients showed significant and modest correlations between MIM-P and EDS scores for 4–8-year-olds and for 9–12-year-olds. Several significant and modest correlations were revealed between the MIM-P and EDS scores in the boy group. No correlations were found between the EDS-P/ EDS-A and MIM-P in the girl group. Pearson's correlation coefficients showed many significant and modest correlations between MIM-P and NMI scores.

Discussion

The study revealed that the EDS was administered in a consistent and stable manner with standardized procedures and good psychometric properties. This study together with the standardization procedure implemented by Hogrefe Ltd. moves EDS one step closer to publication.

If EDS captures emotional development on the limbic level the results regarding EDS-P may pinpoint some interesting findings regarding Western European culture. For instance, the difference between referred and non-referred was much weaker on the limbic level compared to the autonomic and prefrontal levels. This may reveal that reasons for referral is not associated with competencies or vulnerabilities on the limbic level but has much more to do with vulnerabilities and self-regulation problems related to autonomic and prefrontal functions. Unexpectedly, perhaps related to the lack of sufficient training of the psychologists, the EDS-A was mostly treated an assessment of the parent's internal representations of the child. The lack of internal consistency between the EDS-P and the EDS-A may reveal that the parents respond to the child's behaviour, and that it may be difficult for them to rate their children correctly. Both the performance test and the structured assessment are aimed at assessing functions on the three emotional levels: autonomic, limbic and prefrontal. The mean differences between the EDS-P and the EDS-A showed that in the group of

referred children the parents' internal representations of the child's emotional competencies are highly negatively biased, and in the group of non-referred children they are moderate or highly positively biased. This may reveal that, if the parents have no cause for concern for their child, they perceive the child to be well regulated with high emotional competencies, and if they do have concerns regarding the child, or if they are perhaps themselves in emotional turmoil, perhaps related to the reasons for referral to family treatment, they perceive their child in a more negative light. It may also indicate that the non-referred child's parents, in contrast to the referred child's parents, is capable of modifying their internal representations according to the child's maturational process, or their internal representations are positively biased.

The result suggests that the large group of non-referred children shows highly developed prefrontal competencies, but not necessarily high limbic competencies. This could be due to demands in Western European society, which place a high priority on the ability to self-regulate, perform acts of will and exercise impulse inhibition, and which assigns a key role to the stimulation of prefrontal structures through education (Rybanska, McKay & Jong, 2017). According to Choudhury (2010) it takes well-developed prefrontal functions to thrive in a Western European society. This may result in an excessive focus on eliminating emotional problems through psychiatric diagnoses and medication (Brinkman, 2016; Jørgensen, 2012).

The absence of significant correlations between the EDS and the NMI suggests that there is no correlation between the referred parents' mentalizing capacity and the child's emotional development and competencies, as measured on the EDS-P. This was an unexpected finding, as much research has found a correlation between secure attachment and high mentalizing capacity (Katzenelson, 2015; Sleede, 2013), and it may reveal that as children grow older they are more influenced by their mutual interaction with the extended environment, that is, other family members besides their parents, including peers, teachers and others for their emotional development. The child's inherent capacities for self-regulation also play an important role in this regard.

Many significant and modest correlations were found between the parent's mentalizing capacity and the MIM-P on parental dimensions. This finding may suggest that the way the parent mentalizes the child has a great importance for the parent's capacity to create an atmosphere of shared intersubjectivity. It may reveal that the quality of the intersubjectivity between parent and child is more dependent on the parent's mentalizing capacity than on the child's emotional development and competencies. From an NADP perspective, the results indicated a connection between the child's emotional development, the parent's mentalizing capacity and the parent-child interaction.

Limitations

Several limitations of the present study are fully recognized. A larger sample size

would enable a more valid normal-range calculation. This fact together with the limitation of only conducting a quantitative study and the absence of a non-referred control group limits the generalizability of the results. Finally, it was not possible to train the psychologists properly in the different measures used in the study, which seems to have been particularly troublesome regarding the EDS-A.

Eighteen psychologists were involved in the interrater reliability study, but the study was carried out in pairs, as only two psychologists were involved in any given rating due to the limited resources of this research project and the prohibitive amount of time it would have required to have additional psychologists rate each sample.

It would have been beneficial to conduct an experimental design with a randomized control trial using a control group, for example with a non-referred group as part of the empirical study, where the results from the non-referred group could undergo the same reliability and validity study as in the referred group. An important limitation was that it was not possible to blind the group of non-referred and referred, which meant that the psychologists knew whether they were rating a referred or a non-referred child, which may have led to bias.

Recommendations for Further Research

The item factor analysis that will be run by Hogrefe Ltd. once the data collection period is completed will enable further analysis of both the EDS-P and EDS-A and of how the EDS-P and the EDS-A can supplement each other. Once the standardization process has been completed, the scoring system has been developed, and the rewriting of the EDS-A is completed, new studies for reliability and validity should be conducted that also take aspects of the psychologist's agency and way of interacting with the child into consideration.

Further research may also reveal whether the EDS-P offers a suitable method for effect studies.

It will be necessary to consider if the focus of the EDS-A should be to assess the caregiver's understanding of the child's emotional vulnerabilities and capacities, to assess how the child is supported by important caregivers or to serve as a structured assessment aimed at revealing the difference between how the child expresses his or her emotional capacities in a calm, structured, safe setting compared to the child's reactions in ordinary and/or very demanding situations in everyday life. Further research may also reveal whether there is a stronger correlation between the EDS-P and the EDS-A for parents with non-referred children, rather than referred.

Clinical Application

The EDS is designed to be performed by a trained psychologist to assist professionals in evaluating the child's emotional competencies and tailoring intervention plans. The assessment tool requires one assessment session, which means that it is not too demanding for the child to take part in the test. Also, most children found the assessment enjoyable, as many of the items consist of play. However, many extreme social vulnerable children did not want to participate in the retest study, perhaps because they found activities focused on intersubjectivity difficult and awkward.

The EDS may also offer an economic advantage for child psychiatric and social and educational services, as it can help to reduce the expense of interventions by tailoring the intervention to the child's zone of proximal emotional development. It may facilitate the assessment process by providing quick and valuable information for professionals in situations where it can be difficult to obtain in-depth details about the child's emotional capacity within a short period of time in order to design an intervention plan.

Finally, the EDS may be helpful in organizing the intervention according to the level of the child's competencies and fundamental difficulties. For instance, an intervention for a child with low scores on the autonomic level may emphasize bottom-up strategies, that is, experiential interventions. On the other hand, interventions for children with high scores on all three levels may profit from top-down interventions, such as cognitive behaviour therapy and mentalization-based treatment, which revolve around dialogues and reflections on emotional topics.

Conclusion

The empirical study together with the preliminary ad hoc sample from Hogrefe Ltd. found that the EDS-P, but not the EDS-A, is a consistent, reliable and valid measure of 4–12-year-old's emotional development. There was a difference between referred and non-referred groups, especially on the autonomic and prefrontal levels; as expected, differences were also found between 4–8-year-olds and 9–12-year-olds. The referred group shows a progression or equality of levels between the autonomic, limbic and prefrontal mental organizations as measured on the EDS-P across all age groups and both genders. In the non-referred group, this progression is found on the autonomic and prefrontal levels across all age groups and both genders.

Despite the differences between the measurement tools, the empirical study revealed correlations between the level of the child's emotional functions, the parents' level of mentalizing and their intersubjectivity, although the findings were less straightforward than expected.

The results of the empirical study are promising regarding the EDS-P. This study

suggests that the EDS seems to offer a consistent measure of the emotional competencies and vulnerabilities of 4–12-year-olds and is suited for determining their emotional developmental age, although more research is needed.