Preterm births and Psychopathology.

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Abstract

Aims: In our study we investigate how the parent’s traumatic experience affects the development of the emotional regulation of the child, through the evaluation of parental reflexive functions.

Materials and Methods: In this study the sample was reduced to 90 subjects (ages 4 to 6 years). We investigated the behavioural functioning through the administration of CBCL scales and the evaluation of parental reflexive functions through the questionnaire RFQ 8.

Results: We found an inverse correlation between the sub-scale Certainty and internalizing disorders. We then found an inverse correlation between the Uncertainty sub-scale and the externalizing disturbances.

Conclusions: In this study we also demonstrated that parental reflexive functions had an implication in determining dysfunctional behaviour in children. Our analyses have shown that as parents become more certain about their mental states, internalizing behaviour of children decreases, while parents become more uncertain about their mental states, reduce the externalising behaviour of children.

Keywords: Preterm infants, Psychopathology, Externalizing disorders, Reflexive functions.

Introduction

Premature birth is considered a risk factor for the development of the child: the preterm infant is in fact "at risk" both from the neurobiological and psychopathological point of view, due to prolonged hospital stay and separation from the mother, as well as the deriving difficulties. Preterm birth is defined primarily by a Gestational Age (GA) less than 37 weeks new-borns present difficulties especially from a physiological point of view, which result in serious damage, (including vascular damage), to the central nervous system [1,2]. Its causes may include individual behavioural and psychosocial factors, environmental exposures, medical conditions, infertility treatments, biological factors, and genetics. Many of these factors occur in combination, particularly in those who are socio-economically disadvantaged or who belong to ethnic and racial minority groups. Therefore, premature birth is characterized by the interaction of multiple variables and risk factors, both biological and socio-environmental, which impact on neuro-psychological development. Despite the significant nosography difficulties in the field of neurodevelopment thanks to the numerous formalized and screening tools, recently studies that reveal how children born with VLBW (Very Low Birth Weight), are more likely to develop psychiatric disorders than children born on term [3,4]. The neurobiological, hormonal, social and psychological processes that affect an early delivery can be considered the reason why, during the development process, premature infants, would be more prone to certain psychiatric problems could be explained through, as matter of fact, many preterm parts can alter the typical development of the brain and physiological systems that participate in emotional and behavioural regulation [5]. Therefore, several studies have reported a significant association between very preterm birth and a series of psychiatric disorders such as depression, anxiety, schizophrenia, bipolar disorder, affective disorder [6-8]. During development, in school age, the symptoms of behavioural disorders gain more homogeneity, so much that it is possible to talk about a real "behavioural phenotype", that is a set of behaviours characterized by inattention, emotional, communicative and relational problems [9]. Behavioural disorders and socio-emotional difficulties at the age of five become significant predictors for psychiatric disorders at the age of seven and 11 years [10]. Finally, higher risks of internalising disorders diagnosis were observed at 1, 6 and 13 years old, becoming important markers for a diagnosis of anxiety disorder in adolescence [11-13]. It has been shown that the so-called VLBW (subjects born prematurely at 6 months) present greater difficulties in emotional regulation compared to a group of peers born at term [4]. Through the administration of questionnaires to parents such as the Infant Toddler Socio-Emotional Assessment-ITSEA and Child Behaviour Check List-CBCL, more significant rates were detected linked to disorders internalisation such as anxiety, depression, inhibition, separation and regulation problems (sleeping cycle, diet, altered sensory reactivity) in VLBW [14,15]. In particular, the parents (especially the mothers) described a traumatic experience referring to the preterm birth, but the information reported was rather general and implicit. In our study we investigate how the parents traumatic experience affects the development of the emotional regulation of the child, through the evaluation of parental reflexive functions and the behavioural aspects experienced by children through the administration of the CBCL Scales, in particular, the significant correlations between parental reflexive functions and behavioural alterations at the CBCL scales were sought [16,17].
Materials and Methods

Participants

In this study we considered a population of 150 preterm-born children, specifically those born between the 26th and the 30th week of gestation. All children born with infantile cerebral palsy, neurological deficits, and non-coding motor disorders or who had reported ischemic abnormalities to MRI were excluded from the sample. Therefore, the sample was reduced to 90 subjects (ages 4 to 6 years). The data were collected at the Pediatric Psychiatry clinic of FINDS ( Fondazione Italiana Neuroscienze Disordini del Neurosviluppo) in collaboration with the TIN (Neonatal Intensive Care) and the Caserta Civil Hospital and with the University of Salerno. We investigated the behavioural functioning through the administration of CBCL scales and the evaluation of parental reflexive functions through the questionnaire RFQ-8. Thus, to identify any defined psychopathological disorders, we performed the K-SADS-PL diagnosis-oriented test, whereas, for autistic spectrum disorder, ADOS and ADI-R tests were used, for ADHD, evaluation was performed with Conner’s (Table 1).

Methods

Neuropsychological assessment included the administration of standardized tests such as: K-SADS-PL, RFQ (Reflective Functioning Questionnaire), CBCL (Child Behaviour Checklist) [17,18].

K-SADS-PL DSM 5: Diagnostic interview for the evaluation of psychopathological disorders (past and present) in children and adolescents according to the criteria of DSM-5. In particular, it allows detecting the presence of mood disorders, psychotic disorders, anxiety disorders, attention deficit and disruptive behaviour disorders, substance abuse.

RFQ: To assess the level of mentalization obtained through two sub-scales, which evaluate certainty (RFQ_C) and uncertainty (RFQ_U) on the mental states of oneself and others. The highest subscale score indicates two distinct RF disorders, respectively, hypomentalization and hypermentalization. Hypomentalization reflects concrete thinking and poor understanding of mental states of oneself and others, while hypermentalization describes the attitude to identifying with overly certain and detailed states of oneself and others, while hypermentalization describes the attitude to identifying with overly certain and detailed states of oneself and others. When the variation of an element affects, directly, and the other, or indirect (also inverse or negative) namely, to the correlation of an element corresponds, in the opposite sense, to the other. The degree of correlation between two variables is expressed by the correlation index; the value assumed is between-1 (inverse correlation) and 1 (direct and absolute correlation), with an index equal to 0 resulting in the absence of correlation. In this case, the Pearson correlation index is calculated as the ratio between the covariance of the two variables and the product of their standard deviations.

The correlation does not depend on a cause-effect relationship but on the tendency of one variable to change as a function of another. In this study we performed a Correlation analysis to investigate whether the reflective parental functions may influence the behavioural aspects of their children. From our analysis it emerged that 17 subjects out of 90 included in the total sample, were affected by disorders externalizing (18.8%) of these, 5 subjects were diagnosed with Autistic Spectrum Disorder (5.5%), and 9 were diagnosed with ADHD (Inattentive Deficit and Hyperactivity) (10%), 3 subjects instead had undefined externalizing disorders (Figure 1). We therefore excluded 14 subjects from the Correlation analysis because they had a Neurodevelopment Disorders (Neurobiological Disorder) (Figure 2). Specifically, we found an inverse (or negative) correlation between the sub-scale Certainty and internalizing disorders (r=-0.86; p<0.01). This data indicates that as the confidence about the mental states of the parent’s increases,
the internalizing behaviours of the children decrease. Certainty represents the ability of parents to understand their own and their child's mental states defined as hypermentalization.

A difficulty in mentalization skills therefore reflects the parents' inability to act as scaffolding for the child's anxieties and fears. We then found an inverse (or negative) correlation between the Uncertainty sub-scale and the externalizing disturbances \((r=-0.34; p<0.01)\). This data indicates that as uncertainty about the mental state increases among parents, the externalizing behaviours of the children decrease. A high level of uncertainty is called hypomentalization and reflects the tendency to carry out concrete reasoning and unable to grasp one's own and others' mental states (Table 2).

<table>
<thead>
<tr>
<th>RFQ_C</th>
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<tr>
<td>CBCL_EX</td>
<td>0.34</td>
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<tr>
<td>CBCL_EX</td>
<td>0.86</td>
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**Discussions**

The amount of stress in the first days of life, isolation and the lack of early maternal contact are all risk factors for premature births according to Imafuku's study, aiming to investigate the gaze and attention of children born preterm; especially in children between 6 and 12 months, it was noted that the latter were much more attracted by geometric patterns, rather than by images of people, and also presented more difficulties when comparing the gaze-following behaviour with children born on term, consequently demonstrating how the different plan and evolutionary continuum between born on term and preterm births differs substantially especially in the first year of life. There is also clear evidence that extremely preterm-born children tend to have less accomplishments in tasks that assess attentive abilities and these children themselves are at greater risk of developing ADHD symptoms than peer's born-on-term.

Impairment is not limited to the ability to paying attention to stimuli selectively (selective attention), as performance was also lacking in tasks of sustained attention, coding, executive attention, and divided attention. Attention difficulties can also affect the modus operandi of other cognitive domains, the level of education and social functioning. Therefore, it is crucial that these children are monitored in early childhood [19]. In line with these aspects, there is a high percentage, about 23% of cases, of diagnosis of Attention Deficit and Hyperactivity Disorder (ADHD) in VLBW subjects, especially in the subtype "Inattentive", where there are more emotional issues, such as anxiety or mood disorders, shyness and isolation [20,21]. Moreover, this subtype of ADHD is often found in comorbidity with Learning Disorders and therefore perfectly in line with the problems expressed by VLBW and ELBW [22,23]. Despite practical difficulties, there are some longitudinal studies that investigate the pathogenesis in premature births: Treyvaud et al. analyse a sample of preterm born children, thus calling attention to problems and predictive indices in different age groups [24].

A cognitive profile characterized by externalizing symptoms at 2 years, is predictive of a diagnosis of ADHD by the age of 5 years; socio-emotional problems, however, predict relational difficulties in such age group. Specifically, internalizing behaviours describe a wide class of issues, associated with "internal" dynamics: anxiety, depression and isolation. The externalizing symptoms, on the other hand, mostly refer to "external" dynamics: aggression, impulsiveness, low tolerance to frustrations, reduced adaptability [25]. An interesting study by Rogers et al. highlighted that neonatal variability between the left amygdala and the prefrontal cortex, the posterior cingulate cortex, and the right anterior insula, caused more internalizing symptoms for 2 years old children [26]. Functional connectivity between the amygdala and these regions was found to be implicated in pathophysiology of anxiety disorders, affective states, and depression in older children and adults. These results have been extended to infants.

The regional specificity of the neonatal left amygdala with specific symptoms at 2 years is similar to the associations found in older populations, suggesting that such patterns in childhood are relevant for the subsequent development of psychopathology. Therefore the observation of the neonatal amygdala could predict the appearance of externalizing symptoms at the age of 2 years with regional specificity consistent with the known pathophysiology in older subjects: connectivity with the anterior insula, related to depressive symptoms, with the
anterior cingulate spine related to generalized anxiety, and with the medial prefrontal cortex related to behavioural inhibition. Therefore, the differences in the functional connectivity of the brain between prematurely born and born-on-term babies show that there is already a predisposition to symptomatic groups related to the social and emotional sphere from birth. Our analysis showed that out of the 90 subjects included in the total sample, 17 subjects had externalizing disorders (18.8%) of these 17, 5 subjects were diagnosed with Autism Spectrum Disorder (5.5%), 9 subjects were diagnosed ADHD (Attention Deficit and Hyperactivity Disorder) (10%). These data are in line with what has been expressed by the literature according to which, especially in school age, the increase in a symptomatology attributable to the Autism Spectrum is present in children born Extremely Preterm (EP) (born with GA less than 28 weeks), with evident communication deficits, stereotypies and relationship difficulties, with an incidence percentage that varies from 4% to 8% [27]. It is also hypothesized how structural and functional abnormalities at the brain level, can often predict the development of syndromes such as that of Autism, highlighting the need to identify bio-markers for Autism Spectrum Disorder, for a better diagnosis in very premature born children, due to the overlapping of other developmental disorders symptoms, which have deficient manifestations in the communicative and social area [28].

Further study conducted on a group of VLBW children about 1 year of age, evaluated with psychiatric examination based on the Diagnostic Classification 0-2 (zero to two, 2016), shows a higher incidence of psychiatric disorders than children in the control group: 13% of VLBW had received a diagnosis of Multisystemic Development Disorder (DMSS-Relationship and Communication Disorder), 4% for regulation disorders (emotional and behavioural difficulties in response to a sensory stimulus), 24.6% for emotional disorders [29,30]. In this study we also demonstrated that parental reflexive functions had an implication in determining dysfunctional behaviour in children. Our analyses have shown that as parents become more certain about their mental states, internalizing behaviour of children decreases, while parents become more uncertain about their mental states, reduce the externalising behaviour of children. This shows that parental reflexive functions are very important for functional development in the child. In fact, the Reflective Function (RF) is defined as that mental function that organizes the disorder, especially those who experience externalizing disorders at an early age and if these will represent a full-blown psychopathological disorder. Furthermore, mentalization skills could be deepened not only through the evaluation of the RFQ but also through the deepening of the parents' second-order TOM skills.

**References**

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