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Parents attending to nurse visits and birth age contribute to infant development: A study about the determinants of infant development

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ABSTRACT

Life experiences and parenting play an important role in infant development. To prevent developmental risks and support parents in their educational role, it is important to identify the determinants of infant development. In this study, we investigate the association between child, maternal, family and social variables, and infant development, as well as we investigate the determinants of infant development. A sample of 86 healthy infants and their mothers participated in this study. At 11-months, infant development was assessed with Schedule of Growing Skills II (SGSII). To assess mother-infant quality of interaction, the dyads were observed in free play at 12-months using CARE-Index. Maternal sensitivity and infant cooperative behavior were correlated with SGSII global scores and sub-scales. Infant development was associated with maternal years of education, number of siblings, birth weight or risks in pregnancy. Number of nurse visits attended by parents during the infant first year and birth age were determinants of infant development.

1. Introduction

Infant cognitive, social and motor competencies are developed in daily objectal and social experiences. Mothers play an important role in promoting infant development by introducing their infant to new experiences, scaffolding emerging skills, and providing opportunities for the practice [1]. The first year of life is a particularly critical period during which infant development changes rapidly. At the end of the first year of life, infants begin to introduce some symbolic actions into their functional play, the emergence of which is seen in the infant's first words, gestures and play.

Infant symbolic competence is developed at the “zone of proximal development” [2] and requires the adult's sensitive elaboration of the infant's behavior into a shared meaning. Indeed, according to Vygotsky, the adult guides the child by working one step ahead of the child's emerging skills and offering the child support to shift to a progressive symbolic complexity. By offering age appropriate experiences, parents help infants in maintaining attention for longer periods, persisting in their curiosity during exploration, and engaging in reciprocal interactions required to enhance infant cognitive development (e.g., [3–5]). In turn, improvements in infant development encourage parents to engage in more rewarding and sophisticated interactions [6].

Most of these learning experiences occur in social interactions with parents and depends on mothers' sensitive response. Ainsworth and her colleagues originally defined maternal sensitivity as the ability to perceive and to accurately interpret the signals and communications implicit in her infant's behavior and, given this understanding, to respond to them appropriately and promptly [7]. Ainsworth et al. [7] established four main attributes for assessing maternal sensitivity in early mother-infant interactions: sensitivity, acceptance, cooperation, and accessibility. Infants develop internal working models regarding their caregivers' availability and responsiveness and act according to their interaction-based expectations [8]. Accordingly, parents read infants' behavior and adjust their own behavior according to how their infants react.

Learning experiences in the context of parents' sensitive interactive behavior provide the confidence for children to explore news problems and to persist in solving them [9]. A large body of research indicates that mothers contribute to infants' positive developmental outcomes (revision in [10]) and social adjustment (e.g., [11]). Indeed, maternal sensitivity is predictive of a wider array of child outcomes, such as better emotional and physiological regulation [12,13], lower levels of

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aggression [4], behavioral problems [3,5] and mother-infant attachment (e.g., [14,15]). However, fewer research reported direct associations between maternal sensitivity and maturity of object play [16], gains in language acquisition ([17,18]), and cognitive outcomes [3,19].

Many developmental and family theorists stressed that early socialization is a bi-directional, reciprocal, relationship-based process between infant and caregiver (e.g., [20–23]). The use of dyadic measures in infant-caregiver research has increased during the last two decades. However, similarly to the definition of maternal sensitivity, the task of re-conceptualizing "the quality of infant-caregiver interaction" in dyadic terms has led to multi-construct definitions and a wide range of assessment methods (revision in [24]). It is of most importance that multidisciplinary teams with health, development and education professionals, intervene in families at risk for parental problems in repairing dyadic interactions.

Pregnancy and the early years of the child's life offer an opportune time to prevent a range of adverse maternal, child, and family outcomes. Nursing intervention with parents have been successful in achieving the improvement of parental care of the child reflected in better infant emotional and language development [25]. Regular nurse visits promote a close professional relationship with families allow them to play an important role in monitoring children's health, nutrition as well as parents health [26]. According to Prado and Dewey [27], when a child has adequate nutrition is better able to interact with environment and caregivers. These experiences are necessary to optimize brain development. Equally important mother's physical and mental health has an important impact not only on fetal health and development but also on the future child's health [28].

In sum, many risks in family context can affect infants' emotional and cognitive development namely: stress, poverty, low parental education, and number of siblings [29,30] but early intervention, which includes nurses, may prevent development delays and improve parents-infants' interaction [50].

1.1. Present study

The primary aim of this study was to investigate the association between mother-infant quality of interaction and infant Passive Posture, Active Posture, Locomotor, Manipulative, Visual, Hearing and Language, Speech and Language, Interactive Social, Self-care Social; Cognition and global development. The second major goal was to identify other contributes for infant development. Those variables, namely, birth age, infant gender, APGAR, birth weight, number of siblings, socio economic status (SES), services to support families (e.g., nurse visits at Primary Health Care Center, medical services), and maternal years of formal education were tested to verify their association with infant development.

2. Material and methods

This is a sub-study of a larger quasi-experimental and longitudinal (11 and 12 months measures are repeated at 23 and 24 months) study focused on studying the impact of a clinical nursing intervention using the Touchpoints approach on parenting and child development between the first and the second year of life. Our goal is to frame the use of this approach as a technique likely to be incorporated in nursing practice. Thus, the same sample and similar proceedings are published in other publications of this team.

2.1. Participants

Participants were 86 healthy Portuguese infants (48 first born; 46 girls; 40 boys) and their mothers (M maternal age = 30.63 years, SD = 6.40, range: 18–48). Except for two infants (one born with 34 weeks of birth age and another with 36), all were full-term and had no sensory or neuromotor disabilities.

In our study, 13 mothers (15.12%) had pregnancy risks factors associated to mothers age (older than 40 years) and six mothers (6.98%) had diabetes or other chronic illness. Only mother with any known mental health or drug/alcohol addiction problems were selected to participate.

Infants' birth weight ranged from 2060 to 4840 g (M = 3276.45, SD = 508.267) and their birth age at delivery ranged from 34 to 41 weeks (M = 38.98 weeks, SD = 1.39). APGAR scores at 5-minute ranged from 8 to 10 (M = 9.82, SD = 0.50).

The participant families were from middle-class socio-economic backgrounds according to the Graffar Social Classification (12.9% low-income, 34.9% lower middle-class, 31.4% middle-class, 11.6% upper middle-class and 9.3% upper class).

All parents were literate and > 70% complete mandatory education, 18.6% of the mothers and 26.8%of the fathers completed high school and 26.8% of the mothers and 16.3% of the fathers had obtained a college degree or higher education. The remaining 21 mothers (24.4%) and 24 fathers (27.9%) did not complete mandatory education. Unemployment affected 18 mothers.

2.2. Ethics procedures

The board Primary Health Care Center of Angra do Heroism - Azores and the scientific committee of *Instituto de Ciências Biomédicas Abel Salazar da Universidade do Porto* approved the study. This research involved several ethical procedures namely: (i) parents were informed about the study aims and methods and gave their full consent to participate; (ii) anonymity and confidentiality of the data was fully ensured; (iv) guarantee that no harm was expected to be caused to any of the participants; (v) parents were informed that they could withdraw participation at any point.

2.3. Procedures

Mother-infant dyads were recruited at the Primary Health Care Center of Angra do Heroísmo, (Azores, Portugal) by a female research that explained the purpose and procedures of the study. To determine eligibility, the researcher administered a brief interview to collect demographic information after regular consultations.

A total of 96 eligible families agreed to participate in this longitudinal study. Of these, 10 infants lost their eligibility for different reasons: death of child, death of mother, change residence, significant delay in infant development, or by dropping out of the study. The final sample comprised of 86 mother-infant dyads (Fig. 1).

2.3.1. Follow-up visit procedures

The 86 mothers and their infants participated in 2 follow-up visits. In the first visit infant development was assessed using the Schedule of Growing Skills II [31], when infant were around 11 months (M = 11 months and 10 days; SD = 5.42). Following this assessment, family variables were collected with: Family Support Scale [32], Family Needs Survey [33], and Graffar Social Classification [34].

The second appointment took place around 12 months (M = 12 months and 4 days; SD = 6.19) when mother-infant interaction was videotaped during free play according to CARE-Index protocol. [35].

2.4. Measures

2.4.1. Medical and familial demographic information

At the 11 months visit, mothers were interviewed about their infant's medical status and familial demographics. Medical and demographic factors included the infant's delivery method, APGAR score at 1 and 5-minute, birth age at delivery, birth growth measurements (weight, length, head circumference), gender, parity, health status at delivery, prenatal health care (number/frequency of medical