Multimodal perception in infants with and without genetic risk for autism: a meta-analysis.

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Autism is a neurodevelopmental disorder defined by social interaction and communication impairments and restrictive and repetitive behaviors that is usually manifested at around 2 years old (American Psychiatric Association, 2013). During the last three decades, theoretical approaches and research studies have conceptualized autism on the basis of diagnostic criteria, especially on those related to social abilities. Consequently, research has focused on looking for possible early signs and biological and neurocognitive basis accounting for the origin of the disorder, which has led to run studies exploring social and communication impairments at early ages.

Genetic risk has been associated to this developmental condition, since about 20% of younger siblings of children with autism will develop it (see, for instance, Ozonoff et *al*., 2011). Systematic research on groups of high risk for autism, such as parents, first line family members and, more especially, siblings of children with autism, has shown different developmental trajectories in the autistic cognitive phenotype from the very first months. This set of data has important practical and theoretical consequences, such as early detection and a deeper knowledge on the diversity of human development. Studies exploring the psychological development of siblings of children with autism are of special interest because they make possible to identify neurocognitive risk markers and early developmental signs of the disorder, which suggests that mechanisms and domains involved on its emergency may not be domain specific.

Although most attempts to explain autism have traditionally focused on socioemotional deficits (e.g., Dawson et al., 1998; Mundy et al., 2001; Klin et al., 2009), new empirical evidence and alternative explanatory approaches start to emerge. Recent results suggest that multimodal processing is possibly impaired in individuals with autism spectrum disorders. This capacity is essential for the infant to success, among others, in perception of events and objects, social response and speech perception and production (Lewkowicz, 2014).

To date, the body of research aimed to analyse the early development of multimodal perception ability in infants at risk for autism have led to many contradictory results (see Jones, Gliga et *al*., 2013; Elsabbagh y Johnson, 2010; Rogers, 2009 for reviews). Despite their unquestionable usefulness, these works do not allow to integrate the accumulated evidence, not in a theoretical nor in a methodological way, mostly due to their qualitative and descriptive nature and to the fact that they include very different perspectives and methodologies.

Trying to draw clearer conclusions from previous research, we reanalyzed evidence using meta-analysis, a methodological perspective that allows the integration of diverging results. Due to its quantitative nature and its precision, objectivity and replicability (Botella y Gambara, 2002), meta-analysis seems to be an alternative tool to success in the challenge of finding coherent organizers that possibly contribute to explain heterogeneous evidence.

Studies published in the last 15 years measuring social processing in infants at high genetic risk for autism extracted from database and informal sources (posters and communications, thesis dissertations, personal researcher websites…) were included in our meta-analysis. We aim to assess to what extent siblings of children with autism show an impairment in social information processing and whether those difficulties are modulated by factors such as modality of social stimuli (that is, unimodal or multimodal) or age, as well as to examine possible interactions (that is, different developmental patterns depending on social stimuli modality). Preliminary effect size measures of preferential looking behavioral measures of non-diagnosed high and low genetic risk infants were calculated. Moreover, an analysis of moderator variables (type of modality and age) was carried out in order to test its possible effect on the social impairment of an atypical developmental situation.

Results derived from the meta-analyses are discussed in terms of their theoretical and clinical implications related both to the multimodal processing in typical and atypical development and to early detection of infants at risk of developing autism spectrum disorders.

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