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Research report

Implicit association to infant faces: Genetics, early care experiences, and cultural factors influence caregiving propensities

Vincenzo Paolo Senese[a,*], Kazuyuki Shinohara[b], Gianluca Esposito[c,d], Hirokazu Doi[b], Paola Venuti[c], Marc H. Bornstein[e]

[a] Psychometric Laboratory, Department of Psychology, Second University of Naples, Caserta, Italy
[b] Department of Neurobiology and Behavior Unit of Basic Medical Sciences Course of Medical and Dental Sciences, Nagasaki University Graduate School of Biomedical Sciences, Nagasaki, Japan
[c] Department of Psychology and Cognitive Sciences, University of Trento, Trento, Italy
[d] Social & Affiliative Neuroscience Lab, Division of Psychology – School of Humanities and Social Sciences, Nanyang Technological University, Singapore
[e] Child and Family Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, United States

HIGHLIGHTS

- A gene-by-environment effecton implicit associations to in- and out-group faces was investigated.
- G-homozygotes (rs53576) had a more positive response to in-group faces than A-allele carriers.
- L-homozygotes (5-HTTLPR) had a more positive response to out-group faces than S-allele carriers.
- rs53576 and 5-HTTLPR moderated the effect of early care experiences to in-group faces only.
- 5-HTTLPR effects on in-group faces are consistent with differential susceptibility hypothesis.

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ABSTRACT

Genetics, early experience, and culture shape caregiving, but it is still not clear how genetics, early experiences, and cultural factors might interact to influence specific caregiving propensities, such as adult responsiveness to infant cues. To address this gap, 80 Italian adults (50% M; 18–25 years) were (1) genotyped for two oxytocin receptor gene polymorphisms (rs53576 and rs2254298) and the serotonin transporter gene polymorphism (5-HTTLPR), which are implicated in parenting behaviour, (2) completed the Adult Parental Acceptance/Rejection Questionnaire to evaluate their recollections of parental behaviours toward them in childhood, and (3) were administered a Single Category Implicit Association Test to evaluate their implicit responses to faces of Italian infants, Japanese infants, and Italian adults. Analysis of implicit associations revealed that Italian infant faces were evaluated as most positive; participants in the rs53576 GG group had the most positive implicit associations to Italian infant faces; the serotonin polymorphism moderated the effect of early care experiences on adults' implicit association to both Italian infant and adult female faces. Finally, 5-HTTLPR S carriers showed less positive implicit responses to Japanese infant faces. We conclude that adult in-group preference extends to in-group infant faces and that implicit responses to social cues are influenced by interactions of genetics, early care experiences, and cultural factors. These findings have implications for understanding processes that regulate adult caregiving.

1. Introduction

Modern societies are becoming more and more multicultural; therefore, the investigation of psychological factors that affect the way individuals of different ethnic groups interact is becoming essential [1]. The quality of the multi-ethnic interaction is particularly significant when adults (e.g., children's caregivers, nannies, teachers, et al.) interact with an infant [2] as the nature and valence of adults' interactions can affect the child development [3].

* Corresponding author.
E-mail address: vincenzopaolo.senese@unina2.it (V.P. Senese).

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1.1. Adults' responsiveness to in- and out-group infant faces

Numerous empirical investigations show that people perceive and evaluate in-group individuals compared to out-group individuals in specific ways. The Other-Race-Effect (ORE; or Other-Race bias), the tendency to more readily recognize members of one's own ethnic group, is a robust finding in adult face perception and recognition [4]. ORE is considered a universal phenomenon because it emerges very early in life (about 3–9 months of age) and is independent of the ethnic group [5,6]. As regards evaluations or valence, people also manifest a tendency to favour the social group to which they belong, an effect known as in-group bias [7–9]. In-group bias is also robust and universal and has been observed in adults and children in many social groups [8,10].

Infant faces represent biologically relevant stimuli that immediately and automatically capture attention and are implicitly associated with positive evaluations [11–13]. Infant cues are processed both at conscious levels (controlled) and at relatively automatic levels (without deliberate thought or awareness [14]; see also [15,16]). Therefore, it is crucial and revealing to evaluate and compare adults' response to infants at both explicit and implicit levels.

Esposito et al. [17] investigated in-group preferences for infant faces by comparing responses to infant and adult faces of own and other groups in Japanese and Italian females. These authors considered implicit and explicit measures and found that in-group preference was moderated by the measure and by the facial stimuli. At an explicit level (willingness to interact), adults showed an in-group preference for adult faces, not infant ones, whereas at an implicit level (autonomic reaction), adults showed a general preference toward babies that was independent of ethnic group, and no in-group preference was observed. Hodsoll et al. [18] investigated if the baby schema influenced preferential allocation of attention independently of infant race by means of a dot-probe task. These investigators compared responses of South Asian and UK-born White females to Asian and Caucasian infant faces and found that infant faces captured attention only when they matched the ethnicity of the participant, suggesting that, in absence of specific condition (e.g., motivation, expertise or training), sensitivity to other-group infant cues is reduced. Despite their several merits, in both studies the facial stimuli were not matched for attractiveness (see for example [19,20]), only females were considered (limiting the generalizability of the results), and more germane here the implicit responses considered could not assess response valence (see [13]).

The importance of adults' reactions to infant cues has been confirmed in studies showing that adults' reactions to infant stimuli predict child outcomes [21–23]; for example, adults' emotional reactions to baby cues predict later attachment security [22]. Senese et al. [13] adapted the Single Category Implicit Association Test (SC-IAT) to evaluate the valence of adults' implicit associations to infant cues. These authors found that human infant faces are implicitly and uniquely associated with a greater positive valence (apart from social desirability bias) and that individual differences in adults' implicit reactions correlated with their expressed desire to interact socially with infants. However, no study has compared the valence of adults' implicit reactions to infant faces of different ethnicities. Such a test would contribute to understanding the extent adults' responses to infant cues generalize or whether specificity of physiognomic characteristics of the face triggers sensitivity toward infants.

1.2. Genes and adults' responsiveness to infant cues

Even though molecular determinants of parenting have been studied to a far lesser extent, several studies have suggested that certain genotypes are implicated in caregiving (e.g., [24–27]; for a review see [24]) and adults' reactions to infants [26,28–30]. Two prominent ones are oxytocin receptor gene polymorphisms, rs53576 (genotype: AA, AG, GG) and rs2254298 (genotype: GG, GT, TT); a third is the promoter region of the serotonin transporter gene 5-HTTLPR (genotype: SS, SL, LL).

Oxytocin (OXT) is a hormone involved in moderating "social and non social functions in species ranging from nematodes to humans" [24] (p. 174). OXT receptor gene polymorphisms regulate attachment-related behaviours and social cognitions in humans [31,32]. Bakermans-Kranenburg and van IJzendoorn [26] showed that mothers carrying the GG genotype of the rs53576 (OXT) polymorphism engaged in more sensitive interactions with their infants than mothers with the A-allele. A similar result was described by Klahr et al. [33], showing that, independent of child age and gender and participant ethnicity, mothers with GG genotype exhibited greater warmth during parent-child interactions than A-allele carriers (no association between the genotype and parental behaviour was observed for fathers). However, Michalska et al. [30] found that A-carriers exhibited higher levels of positive parenting. GG carriers of the rs2254298 (OXT) polymorphism showed less parental touch during parent-infant interactions than A-allele carriers [29]. Recently, Esposito et al. [34] showed an OXT gene × environment (G × E) interaction on adults' reactions to infant cues. The rs2254298 polymorphism moderated the effect of early care experiences (remembrances of parental bonding) on physiological responses (heart rate and facial skin temperature).

The serotonin transporter gene (5-HTTLPR) genotype regulates serotonin level. The S-allele type is less transcriptionally efficient because it is associated with lower reuptake of serotonin in respect to the L-allele type [35]. S-allele carriers show greater emotion-related brain reaction [36], and 5-HTTLPR moderates (G × E) experience stressors on later emotional and social behaviour [35]. Canli et al. [37] showed that amygdala and hippocampus activation to face stimuli correlated negatively with life stress in S-allele carriers but positively in L-allele carriers, indicating that 5-HTTLPR polymorphism moderates the effect of life stress on brain responses but in an opposite manner. Bakermans-Kranenburg and van IJzendoorn [26] found that mothers with S-alleles were less sensitive than mothers with L-alleles, whereas Mileva-Seitz et al. [38] and Cents et al. [27] observed that mothers carrying the S-allele exhibited higher levels of sensitive parenting than those with L-alleles. Moreover, Mileva-Seitz et al. [38] reported that the 5-HTTLPR genotype moderates the impact of the early care environment on mothers' reactions to infants (G × E). When mothers' gaze orientation (an implicit measure) was considered, mothers with L-alleles who reported more negative early care showed a more negative response to their babies (oriented their gaze away from the infant), whereas when self-reported maternal feelings and attitudes (an explicit measure) were considered, mothers with the S-allele who reported more positive early care showed a more positive responses (perceived attachment to their infant).

To our knowledge, no studies have investigated how adults' implicit responses to infant cues are influenced by adults' genetic characteristics or earlier experiences in their family of origin, and infant ethnicity. This question is relevant from both practical and theoretical perspectives. A better comprehension of the psychological and biological mechanisms that influence or moderate adult responsiveness to infants could help to prevent negative adult-infant interactions and validate parental models proposed into the literature(see [39,40]) by showing how genetics, early care experiences, and cultural factors interact to regulate adults' responses to infants.

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