

Pathogenic heterogeneity for face processing in autism revealed by support vector machine classification

Impairments in face processing are common in ASD and are reported for recognition of identity and expression. While severity of deficit varies widely, with many individuals on the spectrum showing only moderate impairments, in addition to some who may excel at this task, face impairments are thought to have a negative impact on the already strained social interaction and communication skills in ASD. Therefore, several face-training paradigms have been developed for children with autism to improve face skills, and, ultimately, to bring about a positive impact on social experience. The root cause of face deficits in ASD are not fully understood. One account suggests that developmental prosopagnosia (DP), a heritable disorder characterized by severe facial identity recognition deficits, may be an endophenotype in ASD (Minio-Paluello et al. 2020). While this model offers a potential avenue for meaningful subcategorization within the ASD population based on face processing impairments, it cannot account for the full gamut of face deficits present in ASD. To characterize deficits in face identity processing in ASD in relation to those seen in DP, we tested two groups of adults, (1) with ASD, and (2) with DP, in comparison to a group of healthy neurotypical adults in two main tasks assessing face recognition and social motivation. A support-vector machine was trained to elucidate a boundary that separates the DP and the comparison groups. This boundary, when applied to the ASD data, classified approximately one third of the ASD participants as part of the DP cluster, consistent with previous literature. Interestingly, face recognition performance of the remaining ASD group not categorized as DP, was still significantly reduced compared to the comparison group, demonstrating the presence of subclinical levels of face impairment in the absence of DP. Overall, our results reveal that there are at least two distinct root causes that give rise to face impairments in ASD.