Background: Previous research has shown that changes in pupill size reflect cognitive resource allocation. Moreover, pupillary response is often used as a physiological measure for emotional arousal. Therefore, pupillary responses potentially can provide more insight in cognitive deficits and stress regulation as an underlying mechanism in deficits characteristic for Autism Spectrum Disorders (ASD).

Objectives: The aim of this study is to investigate which aspect primarily affects the physiological response (i.e., pupillary response) to a gaze following task in children with ASD and age-matched typically developing children. i.e. an object presence or an adult’s eyes state.

Methods: Twenty children were divided into three groups: 7 children with an ASD (mean chronological age 64 months, SD 7.6 months and mean mental age 35.8 months, SD 19.9 months), 7 mental-age-matched children (mean chronological age 65.1 months, SD 9.2 months) and 6 chronological-age-matched typically developing children (mean chronological age 63.1 months, SD 9.2 months). All children were observed when seeing a video clip in which a female adult model, wearing a black shirt, sat behind a table against a neutral background. The clip had two open-eyes state conditions and two closed-eyes state conditions. Each condition was once performed towards an object (object-present) and once towards an empty space (object-absent), resulting in four conditions in total.

Results: Multilevel regression analyses revealed a statistically significant negative association between the object presence and pupillary response (b=-0.1, SE=0.04, p=0.3). No association was found between the eyes state and pupillary response. Furthermore, both the mental-age-matched and chronological-age-matched typically developing children had a significant larger pupil dilatation (b=0.15, SE=0.07, p=0.04; b=0.29, SE=0.08, p<0.001) than children with an ASD. No significant interaction was found between group (i.e., ASD vs. mental-age-matched and chronological-age-matched children) and object presence.

Conclusions: The results of this study confirm earlier studies showing altered physiological reactivity to a gaze following task in children with an ASD. More specifically, we found that children with an ASD show less pupill dilatation over all conditions compared to typically developing children. Additionally, the present study suggests that children’s pupillary responses are not influenced by the adult’s eyes, but rather by the presence of objects. Children showed less pupil dilatation when the adult looked at an object compared to an empty space, but this response did not differ between children with ASD and mental- and chronologically age-matched peers.