

Title: Variability and Change in Autism Symptom Severity Trajectories across Childhood

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Introduction: Autism symptom severity in an individual can change across childhood. However, the prevalence of change and the extent to which it occurs are still not well understood. Several publications have documented small groups of children that increased or decreased in symptom severity across childhood (Gotham et al. 2012; Venker et al. 2014; Szatmari et al. 2015). But, in our previous work, we found that approximately half of the autistic children experienced significant change in symptom severity during early childhood, suggesting that change might be more common than previously portrayed (Waizbard-Bartov et al. 2020). In the current study, we evaluated symptom severity trajectories across childhood, from age 3 up to age 11, for a group of 183 children diagnosed with autism.

Methods: The current study included 183 autistic children (128 boys and 55 girls) evaluated at three time points across childhood: beginning of early childhood (T1; approximately age 3), end of early childhood (T3; approximately age 6), and during middle childhood (T4; approximately age 11). Autism symptoms were measured using the Autism Diagnostic Observation Schedule-2 (ADOS-2) and symptom severity was assessed using the standardized Calibrated Severity Scores (CSS). Combined symptoms were evaluated based on ADOS CSS as well as separately for Social Affect symptoms (SA CSS) and Restricted, Repetitive Behaviors (RRB CSS). Symptom trajectories were modeled using Latent Change Score (LCS) models and Mixture Models. Symptom severity change was also evaluated using the Reliable Change Index (RCI), to determine the amount of change (in CSS) between measurement points that could be considered a significant change in severity.

Results: The ADOS symptom trajectory for all participants taken together indicated a small decrease in severity during early childhood (age 3 to age 6) followed by a small increase in severity during middle childhood (age 6 to age 11). However, symptom severity change demonstrated large individual differences between children. We identified several subgroups of children, ranging in size from 5%-27% of the sample, that demonstrated a common change tendency across childhood. Two groups of children consistently decreased in severity across childhood: one group decreased from high to moderate severity levels and the other from moderate to minimal severity levels, no longer meeting diagnostic criteria for autism. A third group of children experienced a large increase in symptom severity, especially during middle childhood. Change in symptom severity was also characterized by differences between early and middle childhood; children who decreased in severity during early childhood tended to increase in severity during middle childhood, and vice versa. The two symptom domains (SA and RRB), showed different change patterns across childhood. While SA symptoms tended to increase in severity for a large proportion of children during middle childhood, most children decreased in RRB severity. The fact that these different change patterns balanced out in the combined ADOS trajectory, contributed to the apparent stable presentation over time. Change in SA and RRB severity was also characterized by individual differences between children, with specific subgroups demonstrating different change patterns across development. Domain severity change was characterized by differences across time as well, with children changing differently during early and middle childhood. These differences canceled out to mask the extent of change occurring in symptom severity, especially for RRB severity, which changed more than SA symptoms during early childhood. Girls demonstrated a stronger tendency to decrease in symptom severity than boys, a tendency which became more evident through childhood and led to girls having lower scores with age.

Discussion: A substantial number of children in our sample experienced decreases or increases in symptom severity across childhood. Combining two analysis methods, our findings showed symptom severity change was highly variable and characterized by three types of differences: individual differences in change between children, different change patterns within children across time and differences in change between the symptom domains. These differences balanced out in the sample trajectory, creating

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a stable presentation across time that did not reflect the extent and prevalence of severity change in the individuals that constituted the sample. The current study adds information regarding developmental periods in which specific children might be more susceptible to specific types of severity change. For instance, SA symptoms tended to increase for some children during middle childhood, while many children experienced a decrease in RRB severity during this time. Determining what biological and social factors contribute to the varying trajectories of autism severity during childhood will be a fertile area for research in the future.

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