

Title: Behavioral Outcomes of Siblings of People with Autism Spectrum Disorder

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Introduction: Research on typically developing siblings of individuals with Autism Spectrum Disorder (ASD) has been increasingly conducted in recent decades. Previous meta-analysis found a small but significant likelihood that siblings of people with ASD (ASD-siblings) have more negative outcomes (e.g., less-close sibling relationships, greater rates of mental illness symptoms) compared to siblings of individuals without ASD. However, many mixed results of behaviour outcomes of ASD-siblings were still accumulated partially because of limited size and different demographics of samples, which were not resolved by meta-analysis. Therefore, the current study attempted to do a comprehensive analysis of what factors - e.g., age, gender, etc. - most impact individual differences in behavioural problems, autism-related symptoms, and adaptive functioning. Sibling data from the Simons Simplex Collection (SSC) was utilized in the current study to replicate previous existing studies after controlling for validated measurements and demographic variables. The large sample size of the SSC allowed for greater statistical power and precision of age range in constructing replication samples. These procedures led the methodological replication close to the original studies to the great extent. The major aim of the current study was to rigorously replicate previous studies and thus present a comprehensive view of behavioural outcomes of ASD-siblings.

Method: As a nationwide dataset, the SSC collected ASD-siblings' behavioural outcomes through parent-report questionnaires such as the Child Behaviour Checklist (CBCL; Achenbach & Rescorla, 2009a), the Vineland Adaptive Behaviour Scales-II (VABS-II; Sparrow, Cicchetti, & Balla, 2005), Social Responsiveness Scale (SRS; Constantino & Gruber, 2005), and the Social Communication Questionnaire-Lifetime (SCQ; Rutter, Bailey, & Lord, 2003) across 12 sites in the U.S. and Canada. All the peer-reviewed articles in Google Scholar clarifying the same versions of measurements and presenting the behavioural data were replicated in the current study, after controlling the demographic variables such as age range, gender, birth order, study location (e.g., data collected in the United States or Canada), etc. Independent-sample t-tests were used to compare the relevant outcome variables between the existing studies and the SSC dataset. The sign test was utilized to test whether behavioural outcomes of ASD-Sibs in SSC, overall, were better than those of siblings in these empirical studies.

Results: Overall, ASD-siblings in the SSC dataset showed better behavioural outcomes than those from previous existing studies. Specifically, scores reflecting autism-related symptoms measured by SRS in the SSC were significantly lower than those of replicated studies ($p = .039$). Although results from other scales were not statistically significant due to the limited articles included, the overall sign test supported a significant better performance of ASD-siblings in the SSC dataset across all measures ($p = .043$).

Discussion: The replication results provided a notable insight that the SSC dataset cannot fully replicate previous results. There were some potential reasons. First, the "typically developing" characteristics of siblings in the SSC were screened overly strictly. Individuals with any mental illness or developmental issues were excluded. Thus, the strict eligibility criteria possibly resulted in the better behavioural performance of individuals compared to those in previous studies. Second, our results also supported a widely existing critique that limited sample sizes of research on special populations greatly increased the bias and thus possibly led to results with limited generalizability. Third, although all the articles met with the eligibility criteria were included in our study, the number of samples was still limited. Therefore, replication methodology should continue to be used in the future.

References: Shivers, C. M., Jackson, J. B., & McGregor, C. M. (2019). Functioning among typically developing siblings of individuals with autism spectrum disorder: A meta-analysis. *Clinical Child and Family Psychology Review*, 22, 172-196.

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