**Title**: Behavioral manifestations of gastrointestinal symptoms in autistic children

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**Introduction**: Challenging eating behaviors among autistic children are highly prevalent (Mayes & Zickgraf, 2019), and up to 45-90% present with co-occurring gastrointestinal (GI) symptoms (Coury et al., 2012). Many of these co-occurring GI symptoms (e.g., constipation, reflux, diarrhea) are associated with pain, which may make autistic youth more susceptible to developing ongoing feeding issues (Sdravou et al., 2019). However, little is known about how GI symptoms influence the eating behaviors of autistic children. Research studying pain processing in autistic children has yielded mixed results, with some studies suggesting that autistic youth experience heightened pain sensitivity, and others indicating that autistic youth experience diminished pain sensitivity (Liu et al., 2020). When children experience chronic or recurrent pain, there are often behavioral manifestations (e.g., vocalizations, grimacing, activity avoidance), but less is known about pain expression in autistic children experiencing GI pain. Characterizing the internalizing and externalizing behaviors associated with GI pain in autistic youth is critical for advancing future feeding interventions. Additionally, females are underserved in autism research, and given some studies report a higher prevalence of GI symptoms in autistic females compared to autistic males, it is also important to understand sex differences in behaviors associated with GI pain (Leader et al., 2022). Therefore, the purpose of this study was to understand how parent reported behaviors and child biological sex predicted GI symptoms associated with GI pain.

**Method**: We conducted a secondary data analysis of data collected from an outpatient developmental pediatric clinic at a large academic medical center. We included children who eventually received an autism diagnosis, were between the ages of 12 – 120 months (*M*= 52.75; *SD*= 26.02; 21.06% female), and had complete data on intake paperwork, resulting in a total sample of 565 children. Prior to a diagnostic evaluation, parents completed comprehensive intake paperwork (e.g., demographics, medical history, behavioral history) that asked questions related to current GI symptoms (i.e., constipation, stomachache / reflux, vomiting / nausea, and diarrhea). We used these questions as a proxy for GI pain, and if a parent reported 1 or more of these symptoms, we categorized them into a GI pain group (*n*= 118) and those with no symptoms reported were categorized into a no GI pain group (*n*= 447). On intake paperwork, parents selected from a pre-defined list of behavior issues, including: 1) anxious or worries, 2) excessive fears, 3) short attention, 4) depressive symptoms, 5) hyperactivity, 6) impulsive, 7) obsessive, 8) aggressive, 9) self-injury, and 10) sensory problems. We conducted chi-square statistics or independent samples t-test analyses (depending on variable type) to determine group differences in behavioral issues and biological sex.

**Results**: Due to the broad age range, we first examined group differences on age to determine if any covariates were needed. However, there were no significant differences (*t*(563)= -1.17, *p*=0.24) since the GI pain group (*M*= 55.24; *SD*= 29.37 months) and no GI pain group (*M*= 52.09, *SD*= 25.05 months) had very similar age compositions. Chi-square tests revealed that significantly more females were in the GI pain group compared to males (χ2= 5.29; *p*= 0.02). For behavioral issues, anxious (χ2= 5.29; *p*= 0.02), unusual fears (χ2= 5.82; *p*= 0.02), depressive symptoms (χ2= 8.46; *p*= 0.004), self-injury (χ2= 4.89; *p*= 0.03), and sensory differences (χ2= 6.33; *p*= 0.01) were all reported significantly more frequently by parents with children in the GI pain group; however, all other behavioral issues did not significantly differ between groups.

**Discussion:** Given recent calls for more research related to GI symptoms in autism (Halladay et al., 2024), we investigated symptoms associated with GI pain and potential behavioral manifestations in autistic youth. Findings indicated that the GI pain group included more youth assigned female at birth, which aligns with pediatric chronic pain research suggesting a higher prevalence of abdominal pain among females (Korterink et al., 2015). We found that many internalizing behaviors (i.e., parent report of their child being anxious, having excessive fears, or seeming depressed) were significantly more frequent in the GI pain group compared to the no GI pain group; however, self-injurious behaviors were the only externalizing behavior reported significantly more frequently in the GI pain group. Sensory processing is thought to be one mechanism related to pain processing in autism (Liu et al., 2020), and our analyses revealed that significantly more parents in the GI pain group reported sensory differences in their child compared to the no GI pain group. Overall, these findings suggest that clinicians should examine GI pain as a potential underlying factor associated with combinations of internalizing behaviors and self-injurious behaviors. Future research should investigate these behavioral manifestations in minimally verbal autistic children who may not express pain in a similar way to non-autistic youth. Last, future research should also continue to understand bio-behavioral relationships among GI symptoms and challenging behaviors (e.g., feeding difficulties), especially among females, to support the development of better treatment models.

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