**Title**: Feasibility of an Automated Dietary Assessment Tool for Capturing Food Intake and Variety in Autistic and Non-Autistic Children.

**Authors**: Katherine Gowan1, Kimberly Liles1, Amanda Neal2, Sallie Nowell1, Anna Wallisch3, and Clare Harrop1

**Introduction**: Given the importance of healthy eating behaviors and high prevalence of food selectivity in children with neurodevelopmental conditions, there is a need for easy to use, yet comprehensive diet recall measures. Diet recalls of varying lengths are present in current research, with most studies using 24 hour recalls and others expanding to include between 2 to 28 days (Ambrosini et al., 2003, Castell, 2015, Herbert et al., 1997). 24-hour recalls are historically done retroactively, with information recorded during an in-person or telephone interview (Castell, 2015). Within autism research various diet recall methods have been used; however, data typically reflects a 24-hour period or 3 non-consecutive 24-hour periods (Compañ-Gabucio et al., 2023, Kim et al., 2018, Kral et al., 2023). Previous research in non-autistic infants and toddlers highlights that 24-hour recalls are often inaccurate (e.g. overestimating non-preferred and underestimating preferred foods) suggesting that different tools and time periods are required to accurately track diet and eating behaviors in autism (Fisher et al., 2008). Recent projects display promising trends using online automated diet recall platforms to better protect for over- and under- estimation of food consumption (Park et al., 2018). This study had two broad aims: (1) assess the feasibility of an online 3-day diet recall with families with autistic and non-autistic children; and (2) examine preliminary differences in food intake and variety between young autistic and non-autistic children.

**Method**: 70 caregivers of children (25 autistic – 36% female, 45 non-autistic – 51% female), ages 4 to 8, who completed an in-person assessment as part of Eating in Autism (EAT) study, were invited to complete a 3-day diet recall via the Automated Self-Administered 24-Hour (ASA24®) Dietary Assessment Tool. The ASA24® was developed by the National Cancer Institute for the purpose of providing researchers and clinicians with a cost-free method to collect food diaries from participants and/or patients (ASA24®, n.d.). Researchers can program the tool for the desired number of consecutive days, with each day prompting the user to input food intake, asking for details regarding time, ingredients, and portion size. In this study, caregivers selected three consecutive days (2 weekdays, 1 weekend day) to track their child’s food intake via the ASA24®.

**Results**: Of the 70 caregivers who received invitations to complete the ASA24®, 58 (82.9%) completed at least one day. The average number of days completed was 2.2. Of the 58 complete or partially complete records, 63% of caregivers completed 3 full days and 73% at least 2 days. Caregivers of autistic children were less likely to start the ASA24® than caregivers of non-autistic children, *t*(68)= 2.08, *p* = .02. Within the autism sample, caregivers of females had more complete diet recalls than caregivers of males, *t*(23) = -2.20, *p* = .02 – a trend not found in the non-autistic group. When started, there were no differences in the average number of ASA24® days completed between autistic and non-autistic children, *t*(56)= -.06, *p* = .47. There were no differences in the total number of different foods reported across groups, *t*(56) = -.04, *p* = .48, however the average number of different foods per day approached significance, *t*(56) = 1.42, *p* = .08, with less diversity in the autistic group (9.88 vs. 11.34). There were no differences in the types of food groups reported (fruit, vegetables, protein, grains, and dairy) between groups (all *p’s* >.05). Of the autistic children whose caregivers did not start the ASA24® (*N* = 8), males were overrepresented (87.5%) – a trend not found in the non-autistic non-completers. Families of non-completers were more likely to have another child or parent with a neurodevelopmental disorder and/or mental health concerns.

**Discussion:** Overall, the ASA24® was a feasible method of multiple day diet recall for caregivers with a young autistic child. Caregivers of autistic children who started the ASA24® completed as many days and provided as much detail as caregivers of non-autistic children. However, caregivers in the autistic group were less likely to start the ASA24®, particularly if their child was male and if there was additional neurodiversity in the broader family. Thus, while the ASA24® may be an easy-to-use method for the majority of caregivers, it remains cumbersome for some families and adaptions may need to be made to increase starting and completion. While 63% of completed recalls included 3 full days, a number of caregivers appeared to have *complete* days, yet were marked as incomplete (or unsaved) in ASA24®, suggesting more detailed instructions and reminders may be beneficial. Caregivers of autistic females may be more motivated to complete diet recalls than caregivers of autistic males, potentially due to the historic underrepresentation of autistic females in research. Further, novel methods that support automated data capture of nutrition (e.g., using apps / pictures) may reduce burden and increase accuracy of dietary intake. By Spring 2025, we anticipate having a larger sample (~ 100 families) with a more equal distribution of autistic children.

1 University of North Carolina at Chapel Hill

2 University of Southern Alabama

3 Kansas University Medical Center

**References:**

Ambrosini, G. L., van Roosbroeck, S. A. H., Mackerras, D., Fritschi, L., de Klerk, N. H., & Musk, A. W. (2003). The reliability of ten-year dietary recall: Implications for cancer research. *The Journal of Nutrition*, *133*(8), 2663–2668. <https://doi.org/10.1093/jn/133.8.2663>

*ASA24® Dietary Assessment Tool | EGRP/DCCPS/NCI/NIH*. (n.d.). Retrieved October 22, 2024, from <https://epi.grants.cancer.gov/asa24/>

Compañ-Gabucio, L. M., Ojeda-Belokon, C., Torres-Collado, L., & García-de-la-Hera, M. (2023). A Scoping Review of Tools to Assess Diet in Children and Adolescents with Autism Spectrum Disorder. *Nutrients*, *15*(17), Article 17. <https://doi.org/10.3390/nu15173748>

Dwyer, J., & Coleman, K. (1997). Insights into dietary recall from a longitudinal study: Accuracy over four decades. *The American Journal of Clinical Nutrition*, *65*(4), 1153S-1158S. <https://doi.org/10.1093/ajcn/65.4.1153S>

Fisher, J. O., Butte, N. F., Mendoza, P. M., Wilson, T. A., Hodges, E. A., Reidy, K. C., & Deming, D. (2008). Overestimation of infant and toddler energy intake by 24-h recall compared with weighed food records1. The American Journal of Clinical Nutrition, 88(2), 407–415. <https://doi.org/10.1093/ajcn/88.2.407>

Hebert, J. R., Ockene, I. S., Hurley, T. G., Luippold, R., Well, A. D., & Harmatz, M. G. (1997). Development and testing of a seven-day dietary recall. *Journal of Clinical Epidemiology*, *50*(8), 925–937. <https://doi.org/10.1016/S0895-4356(97)00098-X>

Kim, S. Y., Chung, K.-M., & Jung, S. (2018). Effects of repeated food exposure on increasing vegetable consumption in preschool children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, *47*, 26–35. <https://doi.org/10.1016/j.rasd.2018.01.003>

Kral, T. V. E., O’Malley, L., Johnson, K., Benvenuti, T., Chittams, J., Quinn, R. J., Thomas, J. G., Pinto-Martin, J. A., Levy, S. E., & Kuschner, E. S. (2023). Effects of a mobile health nutrition intervention on dietary intake in children who have autism spectrum disorder. *Frontiers in Pediatrics*, *11*, 1100436. <https://doi.org/10.3389/fped.2023.1100436>

Park, Y., Dodd, K. W., Kipnis, V., Thompson, F. E., Potischman, N., Schoeller, D. A., Baer, D. J., Midthune, D., Troiano, R. P., Bowles, H., & Subar, A. F. (2018). Comparison of self-reported dietary intakes from the Automated Self-Administered 24-h recall, 4-d food records, and food-frequency questionnaires against recovery biomarkers. *The American Journal of Clinical Nutrition*, *107*(1), 80. <https://doi.org/10.1093/ajcn/nqx002>

Salvador Castell, G. (2015). ¿Qué y cuánto comemos? Método de Recuerdo 24 horas. NUTRICION HOSPITALARIA, 3, 46–48. <https://doi.org/10.3305/nh.2015.31.sup3.8750>

This project was supported by the Honors Carolina Excellence Fund administered by Honors Carolina.