**Title**: Longitudinal Microanalysis of the Vineland Adaptive Behavior Scales in Autism Spectrum Disorder: Implications for Adult Outcomes

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**Introduction**: Many studies have documented general deficits in DLS in autistic individuals (Alvares et al., 2019; Smith et al., 2012). Research has also cataloged challenges in adult outcome attainment amongst autistic individuals; strong DLS are associated with a higher likelihood of attaining some adult outcomes in this population (Clarke et al., 2021; Taylor et al., 2014). Little work has examined whether competency in *specific* daily living skills increases the likelihood of attaining adult outcomes for autistic individuals. There is also little understanding of how this may vary with age (in other words, do the specific DLS from age 5 that predict adult outcomes differ from those with predictive utility from age 9 or age 14?). This study addressed these gaps by answering two questions: 1) Are specific DLS more important for supporting adult outcomes than others? 2) Do the DLS important to supporting adult outcomes for autistic individuals vary with age?

**Method**: Data from a well-characterized longitudinal cohort was used to conduct item-level analyses of scores from a common measure of DLS, the Vineland Adaptative Behavior Scales (VABS; Sparrow et al., 2005). Participants were consecutive referrals to developmental clinics identified between ages 2-3 and followed for three decades. Adult outcome data was collected when participants were approximately age 33. To assess the predictive utility of individual DLS items from the VABS, sixteen models eXtreme gradient boosting (XGBoost; Chen & Guestrin, 2016) supervised machine learning classifier models were developed, one for predicting each adult outcome (employment, well-being, living status, and friendships) from individual daily living skills items at each time point of interest (ages 5, 9, 14, and 18) while controlling for salient demographic and personal characteristics (i.e., IQ, autism symptomology, race, gender, maternal education, urbanicity). Datasets for each age were randomly split into a training set (80%) and a test set (20%). Hyperparameter optimization was performed on the training sets via a five-fold cross-validation grid search. Model performance was assessed via the area under the receiving operating curve (ROC AUC), sensitivity, specificity, negative predictive value (NPV), positive predictive value (PPV), and accuracy. The Shapley Additive exPlanations (SHAP) tree explainer method for XG Boost classifiers was used to identify the top 5 predictor variables for each model (Lundberg et al., 2020).

**Results**: In ten of the sixteen XGBoost models, an individual item related to community DLS (i.e., money management, rules, rights, and safety, restaurant skills, etc.) emerged as the top predictor of adult outcomes. This underscores the importance of community-based daily living skills in supporting a range of adult outcomes for autistic individuals. In contrast, an item related to domestic DLS (i.e., kitchen skills, household chores) only emerged as the strongest predictor in one model, and there were no models in which items related to personal DLS emerged as the top predictor (Tables 1 & 2). For predicting adult employment, the age 9 model had the best fit statistics (AUC 0.912; sensitivity 0.963; specificity 0.705), followed by the age 5 model, then the age 14 model and the age 18 model (Table 3). For adult well-being, with the exception of the age 9 model, which performed at chance, the fit statistics for models predicting happiness quotient scores improved with increasing age. The age 18 model showed the largest AUC on the test set (AUC 0.971; sensitivity 0.888; specificity 0.937). For social relationships, the age 9 model had the best fit statistics (AUC 0.799; sensitivity 0.769; specificity 0.777), followed by the age 14 model, then the age 18 model, and finally, the age 5 model. Only the age 18 model predicting living status performed better than chance (Table 3). This model had good AUC and sensitivity, but relatively low specificity (AUC 0.912; sensitivity 0.939; specificity 0.444).

**Discussion:** These findings underscore the importance of learning and practicing daily living skills *in the community* for autistic individuals. Skills needed to navigate community settings independently (i.e., paying for small purchases, crossing the street, ordering in a restaurant) may be especially important to supporting adult outcomes in this population. These results also highlight the need to ensure that autistic individuals of all abilities and ages are provided ample opportunities to practice daily living skills across a range of contexts, to provide opportunities for learning and generalization. Though efforts to define research priorities for understanding autism are increasingly divided, supporting daily living skills development, particularly community skills, can promote positive outcomes for autistic adults of all ages and abilities.

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