Title: Predicting Parenting Stress among Parents of Toddlers with Autism Using Quantile Regression Mixed Models

Authors: Andy Schlink1, Justin Williams1, Maria Pizzano1, Amanda Gulsrud1, & Connie Kasari1

Introduction: Parents of children with Autism Spectrum Disorder (ASD) are known to experience levels of stress significantly higher than those experienced by parents of children with other disabilities (Osborne, McHugh, Saunders, & Reed, 2008). Even among a homogeneous sample of children with ASD, the compounding variability of autism symptomatology presentation and heterogeneous parental characteristics can create a wide spectrum of parenting stress. To better understand how parents who rank differently in parenting stress at the beginning of a treatment study might be affected by particular intervention strategies, a novel linear model is proposed: a linear quantile mixed model (LQMM) (Geraci & Bottai, 2007). LQMMs directly model discreet quantiles of the outcome variable and differ from commonly used longitudinal models, such as linear mixed effect (LME), which model the mean response. The premise of a LQMM is that risk factors may induce differential rates of change to distinct quantiles of the outcome variable, for instance infants with low birthweight may be more adversely affected by parental smoking than average weight infants (Koenker & Bassett 1978; Geraci, 2014). With respect to parenting stress scores, a LQMM may illuminate the differential effect of treatment in parents with low, average, or high beginning levels of parenting stress.

Method: Participants in the original RCT were 86 toddlers with ASD and their primary caregiver (Kasari, et al., 2015). The toddler-caregiver dyads were randomized to receive either individualized caregiver coaching in a naturalistic developmental behavioral intervention (Joint Attention, Symbolic Play, Engagement and Regulation- JASPER) or a parent psychoeducational intervention (PEI).

The Parenting Stress Index (PSI; Abidin, 1990) is a 120-item parent report scale that measures the stress in the parent/child system. It contains two subdomains: the parent domain and the child domain. The sum of these subdomains yield a total stress score, where higher scores indicate greater perceived levels of parenting stress. The PSI was administered at entry, exit, 3-month follow up, and 6-month follow up within this intervention research study.

Two separate LQMMs were constructed to predict parent domain scores and child domain scores. A model including total parenting stress was not included as subdomain scores would give a more nuanced description of the nature of stress. Each model contained the fixed effect of the treatment assignment (JASPER vs. PEI) and time (entry, exit, 3-month follow up, and 6-month follow up) along with an interaction of treatment by time. Additionally, random intercepts were incorporated to account for the within-subject variability across timepoints. Chronological age was also controlled for in each of the models due to evidence of significant differences between groups. Five specific quantiles (tau) of the outcome variables were investigated (0.1, 0.25, 0.5, 0.75, and 0.9). Operationally we can think of these groups as very-low, low, average, high, and very-high stress.

Statistical analysis was conducted in R (R Core Team, 2013) using the lqmm package (Geraci, 2014; Geraci & Bottai, 2014).

Results: There were no significant treatment effects observed within the child domain across any of the quantiles. However, within the parent domain model, a significant interaction occurred between treatment and time from entry to 3-month follow up in the very-low (τ = 0.1) stress group (β = 11.25, SE = 5.00, p = 0.025). Parents in the JASPER group with very low initial stress entered the study with stress scores of 94.58. At 3-month follow-up, these stress scores had risen to 101.91 (+7.33). Conversely, parents in the PEI group with very low initial stress came in with stress scores of 98.01 at entry and decreased their scores at 3-month follow-up to 94.08 (-3.93). This trend from entry to 3-month follow up was consistent across all of the quantiles (β = 11.25, 7.29, 9.60, 8.26, 5.74 for τ = 0.1, 0.25, 0.5, 0.75, 0.9), but the magnitude of the very-low group was much higher suggesting that these parents were most affected.

Discussion: This study suggests a more nuanced examination of parenting stress as it relates to participation in a parent-mediated early intervention study. We previously reported a reduction in overall parenting stress for parents in the PEI group compared to the JASPER group (Kasari et al, 2015). This study indicates that the difference may be especially pronounced for
parents entering with low stress, with greater reductions for parents in PEI and actual increases in parenting stress for parents in the JASPER group.

References:


\(^1\)University of California, Los Angeles