

**Supplemental Partially-Nested Multilevel Analyses of In-Home Family Services  
Randomized Trial**

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In 2020, our manuscript was published summarizing a randomized trial of the Boys Town In-Home Family Services (IHFS) program (Duppong Hurley et al., 2020). While the manuscript described the training and implementation of the intervention, we realized that we could have mentioned more about the staff involved in delivering and supervising the IHFS intervention. Specifically, the study would benefit from re-examining the significant posttest outcomes while explicitly modeling the asymmetrical partial nesting present in the study in order to more comprehensively account for the variation attributable to treatment families being nested within Family Consultants on outcomes. The goal of this brief supplement is to re-examine the results using a partially-nested multilevel modeling framework. We only provide information pertinent in this context and expect that the original study (Duppong Hurley et al., 2020) will be consulted for all other study details.

### **Delivery of Intervention by Family Consultants**

The IHFS program was delivered August 2012-August 2016 by 17 Family Consultants. These Family Consultants held a bachelor's degree or higher and successfully completed training in the Boys Town IHFS program. Family Consultants served a four-county region with a population of over 1 million residents, yet with they could feasibly travel for weekly in-home visits via a car. During any moment in time between 3-5 Family Consultants were typically serving families in the treatment condition. As is the case in human services agencies, there was high turnover with staff continually joining the team. These Family Consultants had multiple layers of supervisors and administrators. During the study 14 supervisors and administrators were responsible for oversight of 17 Family Consultants. Family Consultants were involved in the study an average of 766 days (range = 297 – 1491 days; SD = 428 days). Three Family

Consultants were involved in the study for the entire duration of the study (1491 days).

Supervisors were involved in the study an average of 746 days (range = 193 – 1491 days; SD = 455 days). Two supervisors/administrators were involved in the study for the entire duration of the project.

### **Data Analysis**

Because this RCT represents a partially nested RCT (PN-RCT; Lohr, Schochet, & Sander, 2014), the dependency introduced by nesting treatment participants within interventionists (Family Consultants) needed to be accounted for in the analysis model (Bauer, Sterba, & Halfors, 2008; Lohr, Schochet, & Sander, 2014). To this end, we used Hierarchical Linear Modeling v7 software (HLM; Raudenbush, Bryk, & Congdon, 2013) to specify a fixed intercept, random slope multilevel model (MLM) adapted to account for the asymmetrical variance structure of the partially nested RCT. The following model was used to analyze the outcomes:

$$Y_{ij} = \gamma_{00} + \gamma_{10} \text{In-Home}_{ij} + \gamma_{20} (\text{Baseline}_{ij} - \overline{\text{Baseline}_{..}}) + u_{1j} \text{In-Home}_{ij} + r_{ij}$$

Where  $Y_{ij}$  is the posttest score for individual  $i$  nested within intervention cluster  $j$ ,  $\gamma_{00}$  is the mean posttest score for a caregiver in the SAU group conditional on other predictors (i.e., when all other predictors are zero),  $\gamma_{10}$  is the mean difference between the treatment and SAU groups (conditional on the other predictors),  $\gamma_{20}$  is the additive effect of grand mean centered baseline measure,  $u_{1j}$  is the random slope variation for individuals in the treatment condition, and  $r_{ij}$  is the individual-level residual term.

The focus of the analyses was on the statistical significance and magnitude of the (1)  $\gamma_{10}$  coefficient, which represents the impact of treatment on posttest outcomes, and the (2)  $u_1$  variance term, which represents the variation in  $\gamma_{10}$  coefficient attributable to the nesting of

treatment families within Family Consultants. The standardized mean difference (e.g., Hedges' *g*) between conditions was computed from model-adjusted means and unadjusted variances for the caregiver outcome measures, which represents the impact of the intervention in terms of standard deviation units. Because of multiple comparisons (from the original study and this supplement), we evaluated the statistical significance of each test using a per-test alpha level of .05 as well as a conservatively adjusted level of .0043.

### **Results and Discussion**

As shown in Table 1, the results indicated that all four of the posttest outcomes identified as statistically significant at the .05 alpha level in Duppong Hurley et al. (2020) were also significant at the .05 alpha level when analyzed in the partially-nested multilevel modeling framework. Caregiver Strain and Family Resources were also statistically significant at the adjusted alpha level. Effect sizes were moderate for all four outcomes. The  $u_1$  level-2 variance term was non-significant for each of the outcomes indicating that the intervention effects were relatively consistent across each of the Family Consultants. Even though the level-2 variances were non-significant, there is still value in considering the standard deviation of impact estimates across Family Consultants. For the Caregiver Strain Questionnaire (CGSQ) and Parenting Scale (PS), the standard deviation of  $\gamma_{10}$  was 0.032; for the Strengths and Difficulties Questionnaire (SDQ), the *SD* was 0.145; and for Family Resource Money Subscale (FRS-Money), the *SD* was 0.045. Assuming the intervention effects are normally distributed, the range of intervention effects across Family Consultants (Level-2 units) can be computed using the *SDs*.

The supplemental analysis demonstrated that the same four outcomes were statistically significant after accounting for the partially-nested structure of the RCT. By directly modeling the effect of treatment families nested within Family Consultants, we were able to provide

estimates of the variation in the impact estimates attributable to the Family Consultant, which indicated that the intervention was consistently effective across multiple intervention providers.

**Table 1. Results of Effectiveness Analyses for Posttest Outcomes**

Predictor	CGSQ	Parenting Scale	SDQ	FRS Money
<i>Coefficients (S.E.)</i>				
Intercept ( $\gamma_{00}$ )	3.123 (.088)***	3.172 (.079)***	19.618 (.453)***	3.000 (.069)***
In-Home ( $\gamma_{10}$ )	-0.376 (.124)**	-0.288 (.113)*	-1.448 (.641)*	0.333 (.099)***
Baseline ( $\gamma_{20}$ )	0.561 (.068)***	0.627 (.055)***	0.735 (.048)***	0.688 (.050)***
<i>Variance Components</i>				
Level 1 ( $\sigma^2$ )	0.890	0.684	24.227	0.518
Level 2, In-Home ( $u_1$ )	0.001	0.001	0.021	0.002
<i>Exact p-value</i>				
In-Home ( $\gamma_{10}$ )	.003	.012	.026	.001
<i>Effect Size (Hedges' g)</i>				
In-Home ( $\gamma_{10}$ )	-0.350	-0.270	-0.209	0.337

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

## References

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