Abstract Title Page
Not included in page count.

Title: The Transactional Influence of Parents and Children in a Parent-Administered School Readiness Program

Authors and Affiliations: Erin T. Mathis, The Pennsylvania State University; and Karen L. Bierman, The Pennsylvania State University

Abstract Body

Background / Context: Several school readiness interventions utilize parents as the teachers or implementers of the intervention, (e.g. Parent-Child Home Program, Levenstein, Levenstein, & Oliver, 2002; Home Instruction Program for Preschool Youngsters (HIPPY), Lombard, 1981; Parents As Teachers Program (PAT), Pfannenstiel & Seltzer, 1989). In general, these programs have produced mixed effects across studies, suggesting that only a subset of parents or children may benefit from them (Gomby, 2005). Yet, rarely has the processes of change associated with these interventions been studied to determine whether or how pre-intervention parent or child characteristics might affect intervention outcomes. These home visiting interventions have in common a focus on improving parent support and sensitivity in parent-child interactions and increasing parent involvement in learning activities with children (reading, learning games) as a way of improving child academic readiness outcomes. Central to the logic model of these interventions is the assumption that supportive parenting is a necessary condition to engage children in reading and learning activities and furthermore, that parents who are supportive when they work with their children will have a greater impact on the growth in child skills (Landry, Smith, & Swank 2006; Levenstein et al., 2002; Pfannenstiel & Seltzer, 1989). Most models of these parenting practices recognize transactional influences between parents and children, anticipating that parental support and sensitivity is shaped over time to some degree by child skills and characteristics, as well as having an impact over time on child outcomes. Yet, little is known about the degree to which pre-intervention parental support or child emergent literacy skills might affect the transactional processes between parents and children over the course of an intervention that uses parents as teachers, or how they might moderate the impact of the intervention on improving either parental support or child emergent literacy skills.

This study addressed this critical gap in the research by exploring transactional processes between parental support and child emergent literacy skills over the course of a school readiness intervention using parents as teachers, and examining the degree to which pre-intervention levels of parental support and child emergent literacy skills moderated intervention impact on post-intervention parent and child outcomes.

Purpose / Objective / Research Question / Focus of Study: This study examined changes in parent support and child emergent literacy skills over time as children moved from Head Start into kindergarten. It compared the transactional parent-child influences in families randomly assigned in Head Start to receive an enriched home visiting program that emphasized parents as teachers relative to a control group. In addition, it examined the impact of pre-intervention levels of parental support on change over time in child emergent literacy skill acquisition. It thus tested the logic model of the intervention and assessed moderation of intervention impact.

Setting: Children and their parents were recruited from 26 Head Start Programs in three counties of Pennsylvania for a randomized-trial evaluation of a home visiting intervention designed to increase parental involvement in interactive reading and learning games. The Head Start programs served a range of small urban, suburban, and rural communities.

Population / Participants / Subjects: Participants included two cohorts of children recruited in sequential years (total $N = 210$; mean age at time 1 = 4.8; 55% girls; 20% Hispanic, 25% African-American, 55% European American). The caregivers who participated in this study (hereafter referred to as "parents") were 88.57% mothers, 4.27% fathers, 5.24% grandmothers, and 1.92% other (e.g. other relative, stepparent, or foster parent).

Intervention / Program / Practice: The REDI-Parent (Research-based Developmentally-Informed-Parent) intervention was designed to extend the Head Start REDI classroom program (Bierman et al., 2008) by enriching home visiting services. Outcome analyses indicated that children in the intervention group showed significantly greater gains in literacy skills measured in kindergarten relative to children in the control group (Bierman et al., 2013). The present study examined the process of change in this intervention and the degree to which pre-intervention levels of parental support moderated treatment outcomes.

REDI-P was designed to enrich the standard Head Start home visiting program. Beyond the "usual practice" home visits, the REDI-P program included 10 additional sessions focused on increasing parent involvement in learning activities linked empirically with improved child school readiness outcomes (e.g., interactive reading, conversations, learning games). These home visits also included 6 "booster" sessions for parents after their child transitioned into kindergarten. Parents in the REDI-P program were provided with books, learning activities and games, and coached in the use of these materials. The goal was to increase child emergent literacy skills with the parent's use of dialogic reading (Whitehurst & Lonigan, 1998; Whitehurst et al., 1994; Stevenson & Fredman, l990), letter and letter-sound recognition games (Evans et al., 2006; Senechal, 2006), and increased conversation. Parents also supported self-regulation skills that children were learning in their Head Start classroom. Supportive parenting strategies were highlighted by watching videotapes and discussions with the home visitor, and reviewing tapes of their own interactions with their children.

Research Design: After caregivers and children were recruited for the study and completed the pre-intervention assessments, they were randomly assigned at the level of the child (within Head Start classrooms) to receive the home visiting intervention or to receive mail-home learning materials (the control group). The current study uses pre-test data collected during the pre-kindergarten (time 1) and post-test data collected during kindergarten (time 2).

Data Collection and Analysis: Recruitment letters were distributed to caregivers of children attending Head Start. Parents who indicated an interest in the study were visited at home, where informed consent was attained. A team of two research assistants conducted a structured interview with the parent and then administered and video-taped a structured parent-child interaction, in which parents engaged in a book-reading and teaching task with their child. After the home visit, the research assistants each completed post-visit ratings to record their impressions of the parent and the parent-child relationship. About two months into the pre-school year, child assessments were conducted at school by trained research assistants during two individual 'pull-out' sessions (30-45 minutes each), scheduled in coordination with the teacher.

Post-test ratings were conducted in April of the children's kindergarten year. Post-test parent ratings were again collected via structured interview with one of the trained research assistants. During this visit, two research assistants video-taped the same structured parent-child interaction that was conducted during the pre-assessment, and after the visit, research assistants each completed a set of post-visit ratings. Child assessments were conducted at school by a trained research assistant during an individual 'pull-out' sessions (45 minutes each). Parents were compensated for their time completing assessments.

Parental support. During the home visit assessments, parents engaged in a book-reading task and a tangram teaching task with their parents, and these interactions were videotaped and later coded in the lab. *Parent support on tasks* included six rating items based on these videotaped interactions, each rated with a 5-point scale, including availability and warmth, sensitive responsiveness, collaboration, emotional support, parent gratification and parent

communication style. The percent inter-rater agreement ranged from .87 to .96 and their ratings were averaged across items to create a total score representing parent support on tasks.

Immediately following the home visit interview with the parent, research assistants completed a modified version of the *Post-Visit Inventory* (PVI; Dodge, Bates & Pettit, 1990) that included 17 items that assessed parent warmth and sensitivity (e.g. "Spoke to child in a positive tone.") and evaluated their overall availability, responsiveness, and emotional support. Raters used a 5-point scale ranging from never to always (inter-rater $r = .55$). The *parent support at home* variable was created by standardizing and averaging the ratings of the two assistants.

Child emergent literacy skills. At the pre-treatment assessment, children's emergent literacy skills were assessed using subscales from the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen & Rashotte, 2007, formerly the Pre-CTOPP). The *Blending* subtest assessed children's phonological processing. For this assessment, children were asked to combine different parts of a word and say the full word or point to the correct picture. For example, children were given "b" and "air" or "hot and "dog" ($\alpha = .86$). For the *Elision* subtest, children were asked to take apart compound words and point to the correct picture. For example, children were asked to, "Point to 'snowshoe' without 'snow'" or "Say 'airport' without 'air'" ($\alpha = .83$). At the post-test assessment, emergent literacy assessments included The *Letter-Word Identification* subscale of the Woodcock-Johnson Tests of Achievement III – Revised (Woodcock, McGrew, & Mather, 2001) which assesses children's letter recognition and basic sight word knowledge; total standard scores were used in the analyses ($\alpha = .90$). It also included the Letter Naming Fluency subscale of the DIBELS (Good, Gruba, & Kaminski, 2001), in which children were presented with a page of upper- and lower-case letters arranged in random order and asked to name as many letters as they could. Their score was the number of letters named correctly in one minute ($\alpha = .93$). In an extension of this activity, children were then asked to provide the sound made by each letter. They received a score reflecting the number of correct letter sounds provided in one minute. These two scores were each standardized within the sample and labeled *DIBELS Letter-Sound*.

Findings / Results: First, to assess the degree to which intervention affected transactional processes over time linking parental support with child emergent literacy skills, multi-group (treatment group versus control group) cross-lag structural models were computed. Initially, multi-group (treatment group versus control group) measurement models were used to determine the comparability of the factor loadings and structural paths for families in the intervention vs. control groups. These measurement models systematically constrained the factor loadings only and then constrained the factor loadings and structural paths to identify significant group differences. The chi-square difference test comparing these two models showed that the fully constrained model was significantly different from the unconstrained model, $\chi 2$ ($df = 10$, $N = 210$) = 19.89, $p = 0.03$, demonstrating significant differences in the transactional processes characterizing parents and children in the intervention vs. control groups. The optimal model (see Figure 1) constrained the factor loadings of measures representing the constructs, but allowed the structural paths to vary freely.

Next, models were compared to determine which specific structural paths were different for parents and children in the intervention vs. control groups. Constraints were systematically lifted on the structural paths until all possible combinations had been achieved. These analyses determined that there were two models that fit better than the rest. The first model allowed one path to vary freely: the path from parental support at time 1 to time 2. The second model that fit well allowed this same path to vary freely as well as a second path, the crosslag association from

parental support at time 1 to child literacy skills at time 2. We conducted a chi-square test to determine if the model fit was significantly impaired by allowing the second path to vary freely and determined that the model fit was not significantly impaired $\chi 2$ (df = 1, N= 210) = .997, p = 0.32. The final model (see Figure 2) demonstrated two significant differences in parent-child transactions over time: 1) the stability of parental support from pre-school to kindergarten was greater for the control group than for the treatment group, indicating that the intervention was associated with greater change in level of parental support, and 2) parental support at time 1 was more strongly associated with child emergent literacy skills at time 2 for families in the intervention group than in the control group, suggesting that initial preschool levels of parental support had a greater impact on growth in child emergent literacy skills in families receiving intervention.

Follow-up Analyses

Next, follow-up analyses were conducted to explore the nature of the changes in parental support that accounted for the differential stability over time in the intervention vs. control groups. First, parents were categorized as relatively high or low in parent support at the pre-intervention assessment, using median splits on each of the two measures of parental support (videotaped *parent support on tasks*, and research assistant ratings of *parent support at home.*). The pre-test and post-test scores of parents high vs. low in parent support were compared for parents in the intervention and control groups, in order to determine why parent support was less stable over time in the intervention group. As shown in Figure 3, no group differences emerged on the measure of *parent support at home*. However, as shown in Figure 4, on the measure of *parent support on tasks* parents in the intervention group who were low in support initially increased their supportive parenting practices over time, whereas the other groups remained stable. This indicates that the REDI-P program mostly improved parent's supportive parenting practices among the sub-set of parents who initially had poorer skills in this area.

Follow-up analyses were also conducted to explore intervention-control differences in the association between parental support at time 1 and child literacy skills at time 2, which was stronger in the intervention group than the control group. These follow-up analyses also represented a test of moderation of intervention impact by pre-intervention levels of parental support. Because different measures were used over time, child literacy skills were standardized and averaged to create a composite emergent literacy score at each time point, and change scores were then created by subtracting pre-test scores from post-test scores. Changes in child literacy scores were compared for the groups of parents who showed high vs. low support at pre-intervention (determined by a median split, as described above). Mean change scores are graphed in Figure 5 (parents high vs. low in *support at home)* and Figure 6 (parents high vs. low in *support on the videotaped tasks).* Both graphs indicated that children who had supportive parents, and were in the treatment group increased in emergent literacy skills more than the other groups. This indicates that parents who started the program with good supportive parenting skills were best able to take advantage of and teach the literacy skills used in the REDI-P program.

Conclusions: Overall, these findings suggest that the REDI-P program improved supportive parenting skills for the sub-group of parents with initially poorer skills in this area. These changes emerged primarily in the context of parent-child reading and teaching activities, which were the direct focus of the intervention and did not appear to generalize more broadly. Additionally, parents who entered the program with more supportive parenting skills were able to take the most advantage of the teaching games and activities provided by the program and their children showed the greatest gains in literacy skills.

Appendices

Appendix A. References

Bierman, K.L., Domitrovich, C.E., Nix, R.L., Gest, S.D., Welsh, J.A., Greenberg, M.T., Blair, C., Nelson, K. & Gill, S. (2008). Promoting academic and social-emotional school readiness: The Head Start REDI program. *Child Development, 79,* 1802-1817.

Bierman, K.L., Welsh, J.A., Heinrichs, B.S., Nix, R.L., Gest, S.D., & Gill, S. (2013). Enriching home visiting enhances Head Start impact on kindergarten achievement. Unpublished Manuscript, Department of Psychology, The Pennsylvania State University, State College, Pennsylvania.

Dodge, K., Bates, J. E., & Pettit, G. S. (1990). Mechanisms in the cycle of violence. *Science, 250*(4988), 1678-1683. doi:10.1126/science.2270481.

Evans, M.A., Bell, M., Shaw, D., Moretti, S., & Page, J. (2006). Letter names, letter sounds and phonological awareness: An examination of kindergarten children across letters and of letters across children. *Reading and Writing, 19,* 959–989. doi:10.1007/s11145-006-9026-x.

Gomby, D. (2005). *Home visitation in 2005: Outcomes for children and parents.* Committee for Economic Development: Invest in Kids Working Group: www.ced.org/projects/kids.shtml. October 15, 2005.

Good, R. H., Gruba, J., & Kaminski, R. A. (2001). Best Practices in Using Dynamic Indicators of Basic Early Literacy Skills (DIBELS) in an Outcomes-Driven Model. In A. Thomas & J. Grimes (Eds.), Best Practices in School Psychology IV (pp. 679-700). Washington, DC: National Association of School Psychologists.

Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology, 42,* 627–642.

Levenstein, P., Levenstein, S., & Oliver, D. (2002). First grade school readiness of former child participants in a South Carolina replication of the Parent-Child Home Program. *Journal of Applied Developmental Psychology, 23,* 331-353.

Lombard, A. (1981). *Success Begins at Home.* Lexington, MS: Lexington Books.

Lonigan, C. J.,Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (2007). TOPEL: Test of Preschool Early Literacy. Austin, TX: Pro-Ed.

Pfannenstiel, J. & Seltzer, D.A. (1989). New parents as teachers: Evaluation of an early parent education program. *Early Childhood Research Quarterly, 4,* 1-18.

Senechal, M. (2006). Testing the Home Literacy Model: parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies on Reading, 10,* 59-87.

Stevenson, J. & Fredman, G. (l990). The social environmental correlates of reading ability. *Journal of Child Psychology and Psychiatry, 31,* 681-698.

Webster-Stratton, C. (1998). Preventing conduct problems in Head Start children: Strengthening parenting competencies. *Journal of Consulting and Clinical Psychology, 66,* 715-730.

Whitehurst, G. J., Epstein, J. N., Angell, A. C., Payne, A. C., Crone, D. A., & Fischel, J. E. (1994). Outcomes of an emergent literacy intervention in Head Start. *Journal of Educational Psychology, 86,* 542-555.

Whitehurst, G. J. & Lonigan, C. J. (1998) Child Development and Emergent Literacy. *Child Development, 69,* 848-872.

Woodcock, R.W., McGrew, K.S., & Mather, N. (2001). Woodcock Johnson Psychoeducational Battery-Third Edition. Chicago: Riverside Publishing.

Appendix B. Tables and Figures

Figure 1. *Parent Support and Child Literacy Skills: Multi-Group Measurement Model for Treatment and Control Groups with Factor Loadings Constrained*

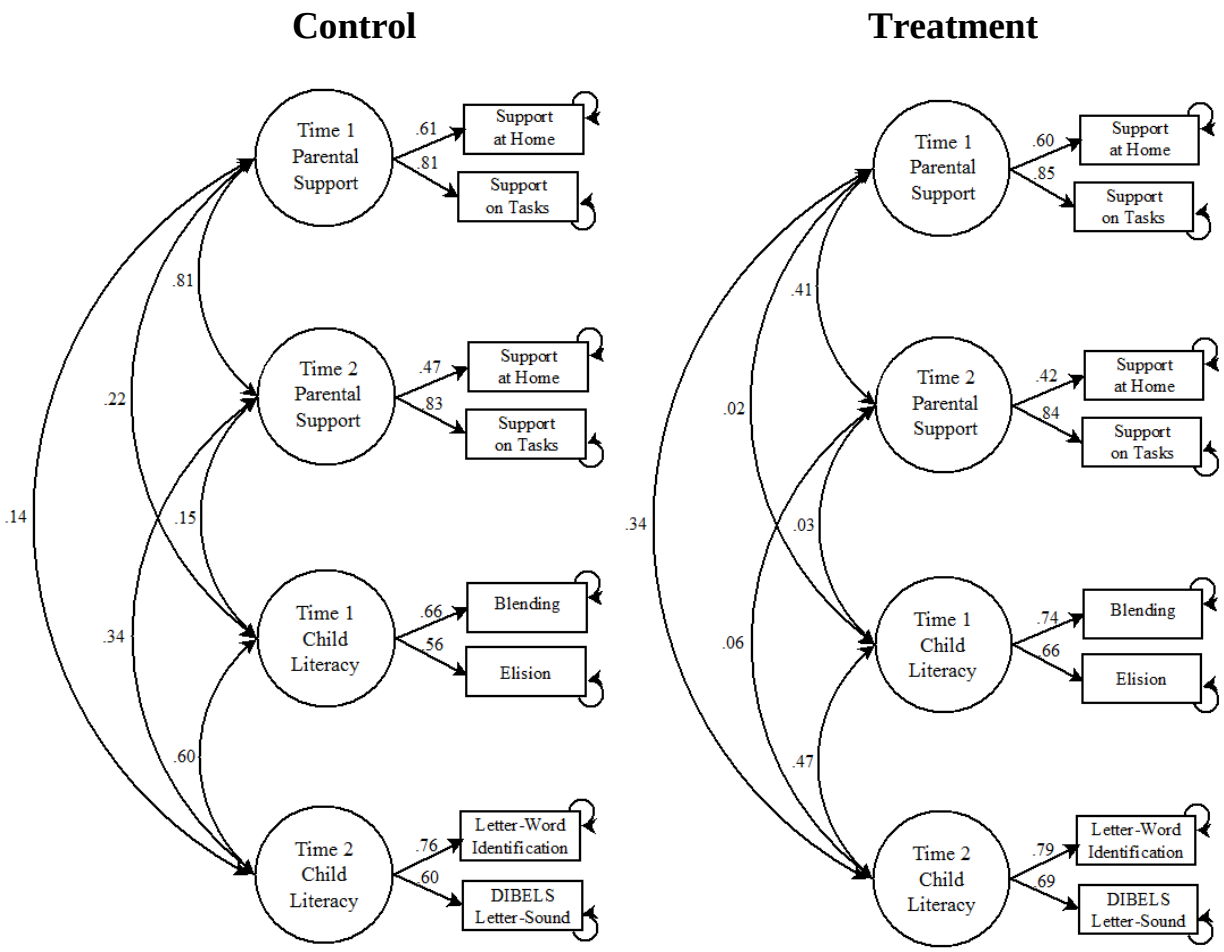
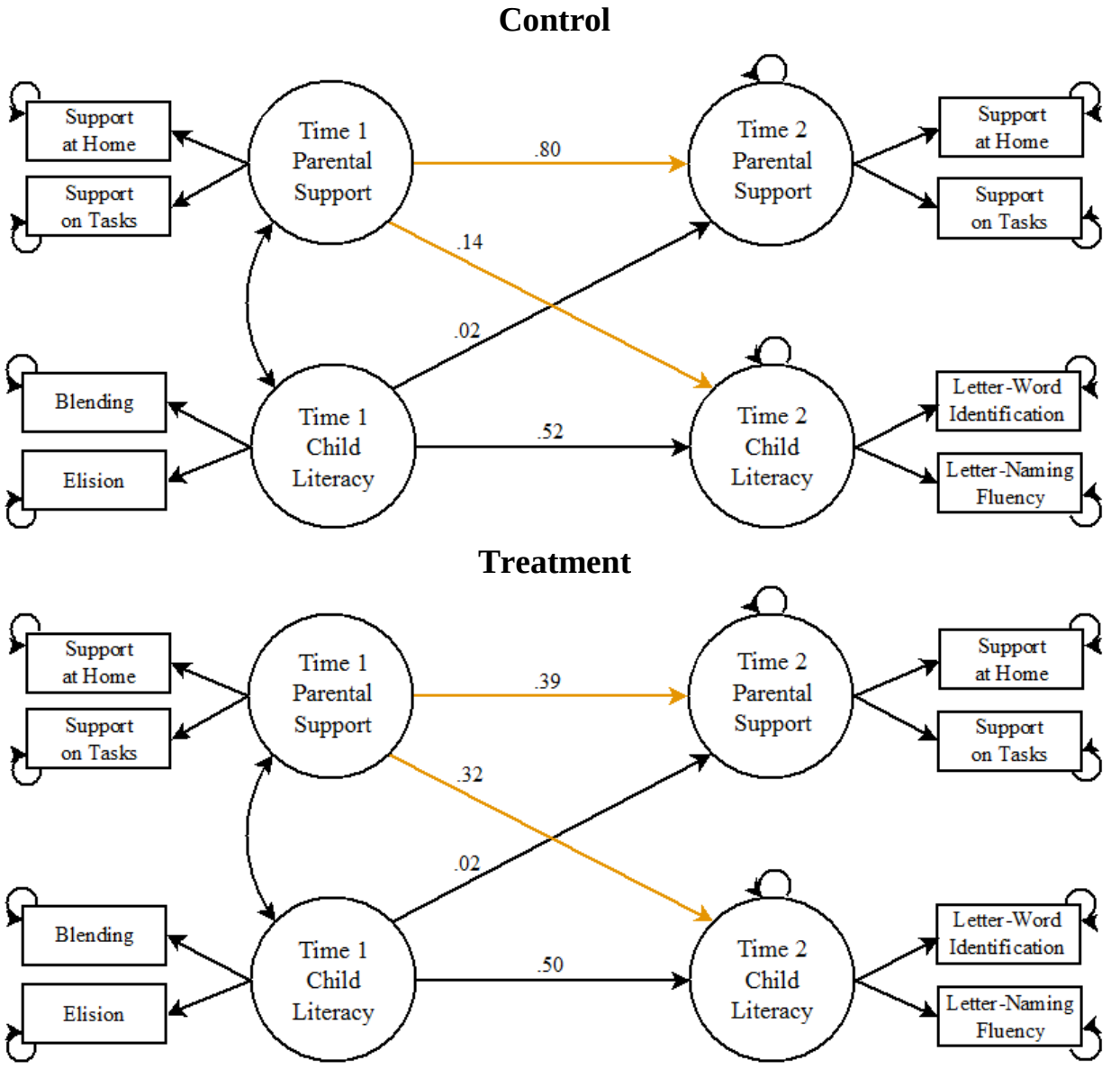


Figure 2. *Parent Support and Child Literacy Skills: Multi-Group Crosslag Model for Treatment and Control Groups with two significant paths allowed to vary freely*



Note. Colored pathways were allowed to vary freely, black pathways were held constant across treatment and control groups.

Figure 3. *Changes over time in parent support at home for parents with initial high or low levels in the intervention vs. control group*

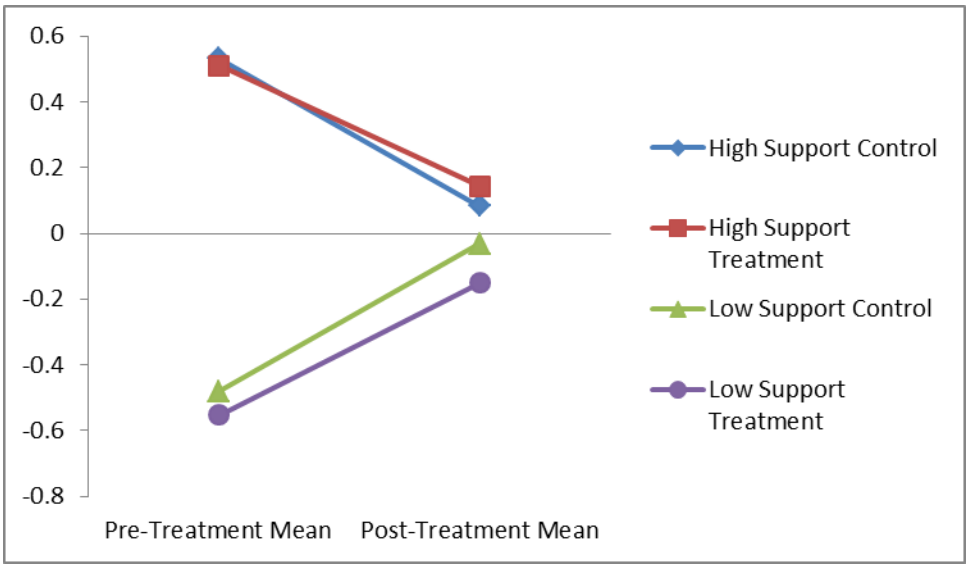


Figure 4. *Changes over time in parent support on tasks for parents with initial high or low levels in the intervention vs. control group*

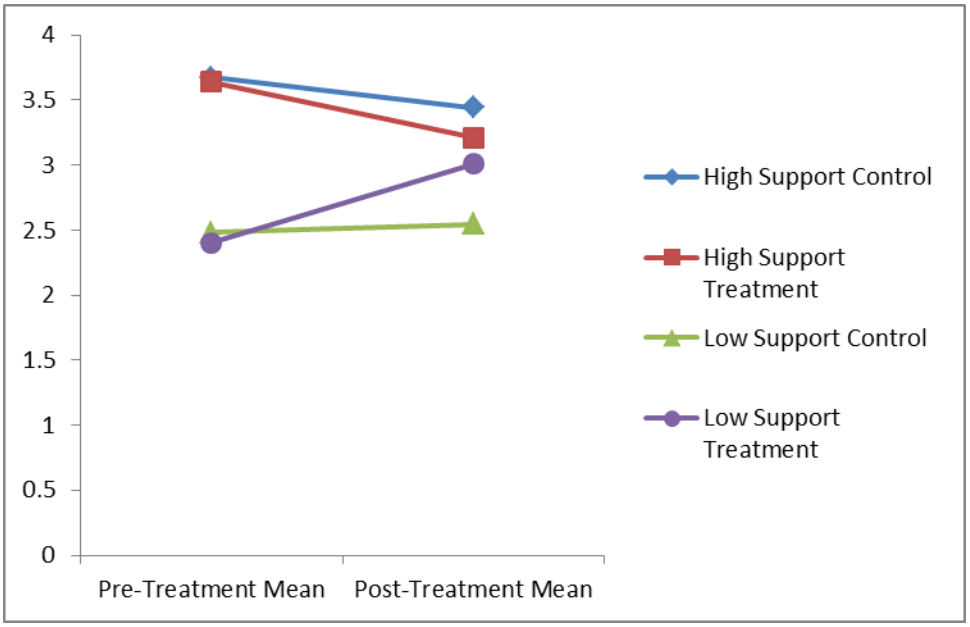


Figure 5. *Intervention-related gains in child literacy skills for parents with high vs. low pre-intervention levels of support at home*

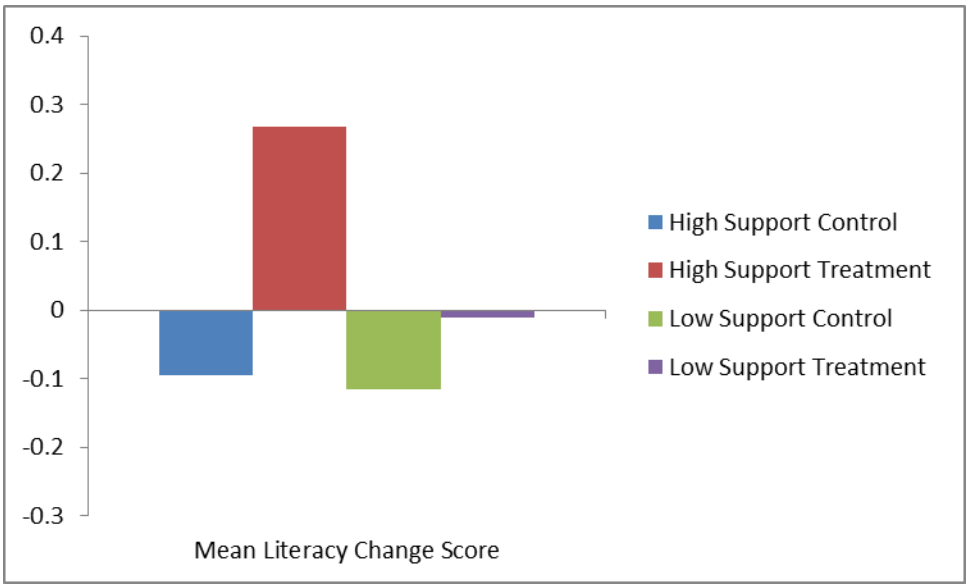


Figure 6. *Intervention-related gains in child literacy skills for parents with high vs. low pre-intervention levels of support on tasks*