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Impact Evaluation for the *Parent Child Plus* Program, Newark Trust for Education

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Contents

Summary

The Newark Trust for Education (NTE) *Parent Child Plus* (PC+) program is an evidence-based early childhood education program for families in the Newark, NJ**.** NTE seeks to evaluate performance by conducting analyses of existing data for a cohort of over 80 families, assessed four times over 46 weeks using observational measures of parenting practices and children's socio-emotional skills. PC+ is intended to result in "improved child behaviors related to social-emotional development and self-regulation skills" (Organizational Research Services [ORS], 2010, p. 23).

The *Quality-Impact-Equity Design and Methods (QDM) Toolbox* (Smith, Peck, Roy, & Smith, 2019; Smith, Peck, & McNeil, 2020) was used to: (a) reconfigure existing measures for Parenting Practice Quality and Child SEL Skill to maximize reliability and validity for measuring socio-emotional skills and learning (SEL); (b) produce holistic profiles of parent and child skill (e.g., "whole child") at each timepoint; and (c) apply pattern-centered analytics to estimate impact and equity effects of the PC+ program as implemented in Newark. Please note: We define *impact* in terms of the actual "in-the-world" structure of causes and effects, not in terms of *counterfactuals*. A brief description of the QDM methodology is provided in Appendix A (see also Smith et al., 2019). Findings include:

- ***PC+ is well fit to the parents and children served***; that is, the program was a good fit with parent and child learning needs in the population served.

- ***Parenting practice quality and child SEL skills grow dramatically over 46 weeks, low-quality skill profiles disappear entirely, and new exemplary profiles emerge.*** From Time 1 to Time 4, there was a 168% increase in parents attaining the optimal range of Parenting Practice Quality and a 243% increase in children attaining the optimal range of SEL Skill.

- ***PC+ fidelity is strongly related to child SEL skill growth.*** We examined the impact of parenting practice on child SEL skill growth from multiple perspectives, using both cross-sectional and longitudinal models replicated at or over each successive timepoint. In the cross-sectional models, parent practice was strongly related to child SEL skill, with statistically significant effects for both overall model fit and key cell-specific hypotheses. In final best-fit impact models, exposure to high PC+ fidelity appeared to cause an additional 20% of children to experience SEL skill growth compared to exposure to the lower PC+ fidelity group.

- ***PC+ appeared to produce equity effects for both the lowest- and highest-skilled children.*** Participation in PC+ appeared to cause children who entered the program with lower SEL skills to grow at rates similar to the rest of sample. The PC+ program also appeared to support equitable outcomes for the most highly-skilled children, who were able to grow from the "high" skill profile to an emergent "exemplary" skill profile.

The PC+ program results reveal an overall impact pattern that suggests both a strong relation between parent and child skills and an effect of home visitors on both parent and child skills. Although, in almost all cases, the children of parents with high or growing parenting skills outperformed children with low or declining parenting skills, many children with parents in the low-skill profile for Parenting Practice Quality still experienced growth in SEL skills. This finding suggests that PC+ is working as it should, with parents and home visitors both having direct effects on child SEL skill growth. To fully demonstrate the impact of the NTE PC+ program given this "triadic" causal flow, we recommend (a) improving measures of PC+ fidelity and (b) including a small no-program sample of parents and children.

Introduction

The Newark Trust for Education (NTE) *Parent Child Plus* (PC+) program is an evidence-based early childhood education program for families in the city of Newark, NJ. NTE seeks to evaluate PC+ by conducting analyses of existing data for a cohort of 89 families, assessed 4 times over 46 weeks using observational measures of parenting practices and children's socio-emotional skills. The pilot study described in the report, *Forming Early Learning Habits* (Gopalan, 2019), provided data and framing for this evaluation of PC+ impacts on parent and child skills.

The PC+ program is intended to result in "improved child behaviors related to social-emotional development and self-regulation skills" (Organizational Research Services [ORS], 2010, p. 23). Data generated as part of the PC+ program implementation include ratings by home visitors using the in-home observation assessment instruments, Child Behavior Traits (CBT) and Parent and Child Together (PACT), that "were specifically developed to evaluate the social-emotional status of low-income children age two to four and the positive parent-child interaction behaviors of low-income parent-child dyads, respectively" (ORS, 2010, p. 10).

The home visit curriculum is delivered in the family home using four major strategies: (a) a strengths-based approach, (b) using parents/caregivers as teachers, (c) focusing on children's learning and development outcomes, and (d) involving siblings and family members to reinforce the child's learning experience. The PC+ home visits are made up of the following elements: A *program schedule* (VISM) for the home visit curriculum that thematically pairs books (in English, Spanish and Portuguese) and toys together for a family to receive for a given program cycle. A *manualized curriculum* (VISM Guide) that explains key concepts, related to the books and toys received by the family, for the parent/caregiver to focus on after the home visit. A *contract* that obligates the parent/caregiver to maintain the predetermined home visit schedule and be present during the home visits. The standard home visit is a half-hour, during which the parent/caregiver and child practice specific positive interactions around the use of the books and toys provided by the PC+ program. A *storage bin* is provided to the family by PC+ for keeping books and toys organized.

Theory of Change

Socio-emotional learning (SEL) skills can be described generally in terms of children's management of immediate social conditions and their corresponding thoughts, feelings, and behavior. For example, we describe SEL skills in terms of children's schemas, beliefs, and awareness and how they function together as integrated SEL skills. A person's *SEL history* can be described as their cumulative learning history. This history reflects all of the things the person has experienced and stored in long-term memory and is often characterized particularly by strong past emotional experiences linked to beliefs and schemas that are regularly re-activated to influence current thinking, feelings, and behavior. People who have had difficult SEL histories are also described as having had adverse childhood experiences (e.g., exposure to trauma or chronic stress). *SEL equity* refers to situations in which learning contexts have been improved to support children with lower SEL skill who have a hard time engaging with the content that the setting has to offer. Because SEL skills are critical learning skills, they have a compounding effect on many developmental outcomes (e.g., academic achievement): SEL skills beget other types of skill (i.e., *dynamic complementarity*; Heckman, 2007).

According to the generic theory of change shown in Figure 1, children who experience high-quality parenting practices are more likely to experience socio-emotional skill growth and then to apply those skills in other settings, causing a wide variety of positive outcomes (e.g., school readiness, early literacy).

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Importantly, the cascade of causes and effects on children's skill growth flows through both the parent's and the home visitor's direct engagement with the child.

Figure 1. Generic Theory of Change
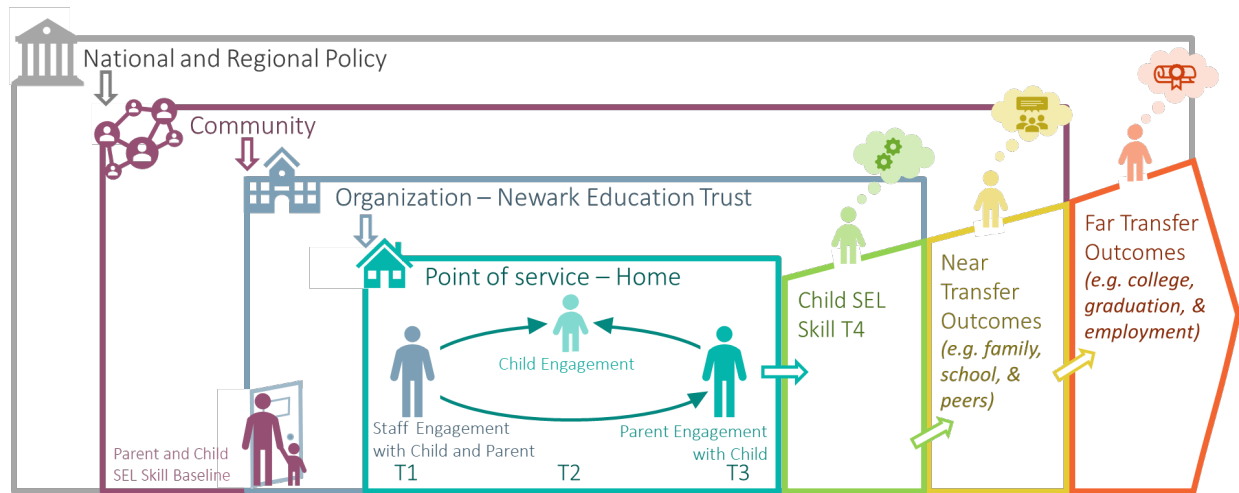
Research Questions

Four research questions guide the current study:
1. What are the skills that parents and children present at program entry?
2. How do parenting practices and child SEL skills change during the program?
3. What is the impact of exposure to PC+ parenting practices on child SEL skill growth?
4. Are there "equity effects" for children who enter the PC+ program with very low (or very high) skill levels?

Evaluation Design

Participants

Of the 89 families that participated in the NTE PC+ program, 41% identified as African American, 10% as African, and 49% as Hispanic and/or Latino. Thirty nine percent of these families had an annual family income of $15,000 or less, 32% had a family income of $15,001 - $25,000, 25% had a family income of $25,001 - $40,000, and 4% had a family income of greater than $40,000. Eighty-two percent of the families also reported receiving financial government assistance. The ages of the children in the NTE PC+ program ranged from 1.5 to 4 years old, with 15% being 1.5 to 2 years old, 37% being 2 to 2.5 years old, 24% being 2.5 to 3 years old, 20% being 3 to 3.5 years old, and 4% being 3.5 to 4 years old.

Method

The evaluation methodology was drawn from the *Quality-Impact-Equity Design and Methods (QDM) Toolbox* (Smith, Peck, Roy, & Smith, 2019; Smith, Peck, & McNeil, 2020) and included four steps: (a) reconfiguring existing PACT and CBT scales to maximize the reliability and validity of the measures; (b) using pattern-centered analytics to identify holistic profiles of parent and child skill at each timepoint; (c) validating profiles using Family Survey data, and (d) applying pattern-centered analytics to model impact and equity effects.

The primary purpose of the evaluation design is to compare different pathways of child SEL skill growth (e.g., moderate skills at Time 1 [T1] to high skills at T4 vs. moderate skills at both T1 and T4)

across different kinds of setting quality (e.g., low- vs. high-quality parenting practices). This "skill growth by levels of quality" design has been used in early childhood evaluations (e.g., Karoly, 2014; Thornburg, Mayfield, Hawks, & Fuger, 2009) and was the subject of extensive study in the literature on aptitude-treatment interactions (Cronbach & Snow, 1977). We summarize the pattern-centered design used here in the "The Pattern-Centered Quality-Outcomes Impact Design" section of Appendix A.

Measures

The Child Behavior Traits (CBT) and Parent and Child Together (PACT) home observation assessment instruments "were specifically developed to evaluate the social-emotional status of low-income children age two to four and the positive parent-child interaction behaviors of low-income parent-child dyads, respectively" (ORS, 2010, p. 10). Using the PACT, "Home Visitors completed an observational assessment of the frequency of 20 positive caregiver behaviors and interactions with children" (ORS, 2010, p. 15). Using the CBT, "Home Visitors completed an observational assessment of the frequency of 20 positive child behaviors" (ORS, 2010, p. 23).

Details about the four PACT scales (i.e., Warmth, Responsivity, Scaffolding, and Attention) and three CBT scales (i.e., Schemas, Beliefs, and Attention) used to create the parenting quality profiles and child SEL skill profiles used throughout this report are presented in Appendix B. Given the central role of the PACT and CBT item response scales for interpreting the meaning of the parenting quality and child SEL skill profile graphs shown below, we present them here: Each PACT and CBT item was rated on a five-point scale, where 0 = "Never," 1 = "Rarely (*less than half* of home visits)," 2 = "Sometimes (about *half* of the home visits)," 3 = "Often (*more than half* of the home visits)," and 4 = "Always (*every* home visit)."

The Family Survey administered near the end of the PC+ curriculum included parent ratings for three aspects of PC+ fidelity (i.e., Parent PC+ Efficacy, Parent PC+ Behaviors During the home visit, and Parent PC+ Behaviors Post the home visit) and four aspects of child SEL skill (i.e., Language Development, Self-help Behaviors, Advanced Cognition and SEL Skills, and School Readiness), which are described in Appendix B. These PC+ fidelity and child SEL Skill ratings from parents were used to validate the profiles for parenting quality and child SEL skill.

Results

Parenting Quality Profiles

Profiles of parenting quality were derived by subjecting the four modified PACT scores (i.e., Warmth, Responsivity, Scaffolding, and Attention) to pattern-centered analyses at each of the four time points (i.e., T1-T4). The details of this process are summarized in the "Pattern-Centered Profile Analysis" section of Appendix A.

The resulting T1 Parenting Practice Quality Profiles, along with the corresponding subgroup sizes (*n*) and profile homogeneity coefficients (*hc*), are shown in Figure 2. Each profile represents a specific subgroup of parents who share a distinct pattern of parenting practices.

Figure 2. Time 1 Parenting Practice Quality Profiles

	I	II	III	IV	V	VI	VII
n	22	28	8	10	4	13	4
hc	0.16	0.3	0.31	0.46	0.74	0.6	0.26
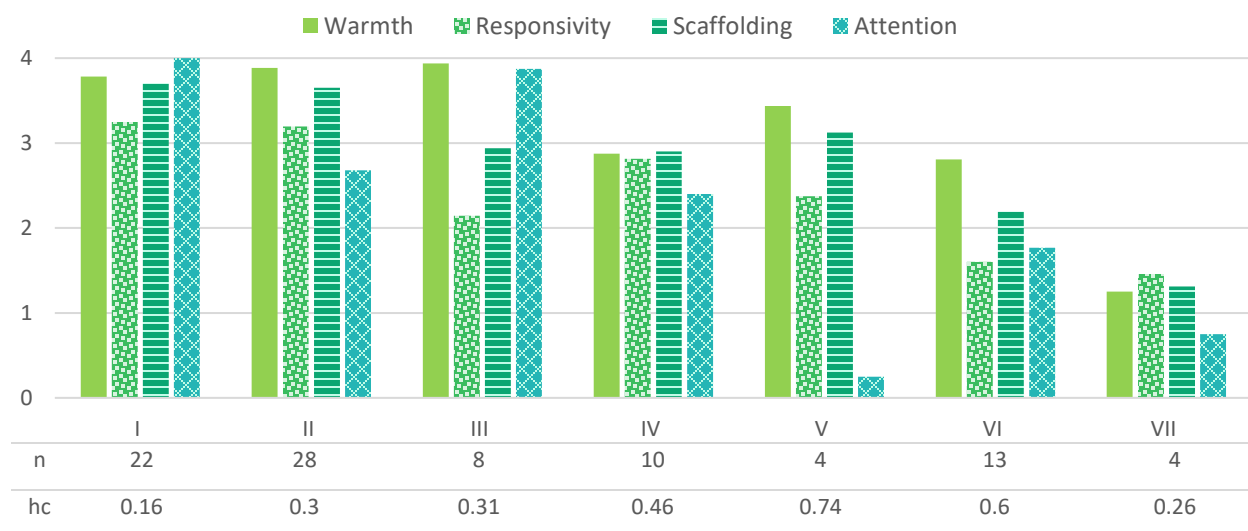
Note: *hc* = cluster homogeneity coefficient (with lower values indicating more similar profile members). patterns.

As shown in Figure 2, parents characterized by *Profile I* (25% of the sample) were marked by relatively-high scores on all four of the cluster-input variables, indicating that they "often" (i.e., "more than half of the home visits") demonstrate warmth, responsivity, and scaffolding and "always" (i.e., "every home visit") "gain the child's attention." This near-optimal pattern of parenting practice suggests that Profile I parents were quite skilled at providing their child with the kinds of developmentally-appropriate experiences that promote secure attachment styles (e.g., feelings of safety), exploratory behavior (e.g., curiosity), and SEL skill growth (e.g., adaptive basic regulation skills). Notably, this was the only profile group in which parenting practice was characterized by both responsivity and attention occurring during more than half of the home visits.

Parents characterized by *Profile II* (32% of the sample) scored highly on three out of the four cluster-input variables but were marked particularly by gaining the child's attention during less than half of the home visits. This profile pattern is counterintuitive to the extent that attentive responses from the child are expected to follow naturally from high levels of parent warmth and responsivity; consequently, parents in Profile II may have been more likely than parents in Profile I to demonstrate preferred parenting practices mainly in the presence of home visitors.

Parents characterized by *Profile III* (9% of the sample) scored highly on warmth and gaining the child's attention but only moderately on responsivity and scaffolding. This pattern suggests parents who were loving and present for their child but who may have not yet developed the skills necessary to provide timely and specific feedback related to the child's current needs (e.g., the child has trouble retrieving a toy and begins to cry and, rather than helping to make the toy more accessible, the parent lifts and hugs the child while saying "you poor baby, everything's ok").

Parents characterized by *Profile IV* (11% of the sample) were marked by moderate scores on all four of the cluster-input variables, indicating the use of constructive parenting practices during approximately, or slightly more than, half of the home visits. This less-than-optimal pattern of parenting practice suggests that Profile IV parents had substantial room for growth in developing the kinds of parenting practices likely to promote healthy child development.

Parents characterized by *Profile V* (5% of the sample) were marked by relatively-high levels of warmth and responsivity, moderate levels of scaffolding, but extremely low levels of gaining the child's attention. Similar to Profile II, given that attentive responses from the child are expected to follow naturally from parent warmth and responsivity, such low levels of gaining the child's attention may reflect parenting practices (or other factors; e.g., lead poisoning) that occur regularly during times other than the home visit.

Parents characterized by *Profile VI* (15% of the sample) were marked by moderate scores on warmth and responsivity and relatively-low scores on scaffolding and gaining the child's attention. This non-optimal pattern of parenting practice suggests that Profile VI parents had substantial room for growth in developing the kinds of parenting practices likely to promote healthy child development.

Parents characterized by *Profile VII* (5% of the sample) were marked by low scores on all four of the cluster-input variables, indicating that they "rarely" (i.e., "less than half of the home visits") demonstrated warmth, responsivity, and scaffolding and almost never gained the child's attention. This non-optimal pattern of parenting practice indicates that Profile VII parents were in need of substantial support in developing the kinds of parenting practices likely to promote healthy child development.

Sample-Level Stability and Change in Parenting Quality Profiles

A central task in the pattern-centered analysis of PC+ impact is to describe individual-level growth (e.g., parenting quality or child skill growth) by reference to the full range of profile types found within the sample at each of the four time points. This means that we align the profiles across time so that what we call, for example, the "high-skill" profile at T1 has the same meaning as the "high-skill" profile at T4.

We applied the pattern-centered *centroid* matching procedure (see Appendix D) to compare the original T1 parenting quality profiles to the original T2 parenting quality profiles (repeating the analysis for T2 compared to T3 and T3 compared to T4). The results of the centroid analyses indicate that, at the sample level, there were substantial structural changes in Parenting Quality profiles across 46 weeks of the PC+ program. For example, a new, "exemplary" form of parenting practice emerged at T2, very low and low-quality parenting practices disappeared by T3, and all of these structural changes persisted through T4.

Whereas only 25% of the parents at T1 were characterized by high-quality parenting practices, 46% of the parents had achieved the high-quality parenting practices benchmark by T2, and 67% of the parents had achieved the high-quality parenting practices benchmark by T4. Similarly, whereas 5% of the parents were characterized by *very* low-quality parenting practices at T1, and 7% were characterized by low-quality parenting practices at T2, 0% of the parents were characterized by low or very low quality parenting practices by T4.

Figure 3 summarizes the sample-level changes in Parenting Quality profile membership from T1 to T4. The lines shown in Figure 3 reflect changes in the sample-level proportion of parents demonstrating high-, moderate-, and low-quality parenting practices at each point in time (i.e., by reference to the simplified Parenting Quality profiles described below and shown in Appendix F). Note, however, that these lines do not reflect the *individual-level* pathways followed by any particular parent.

Figure 3. Changes in Sample-Level Parenting Quality Profile Membership from Time 1 to Time 4
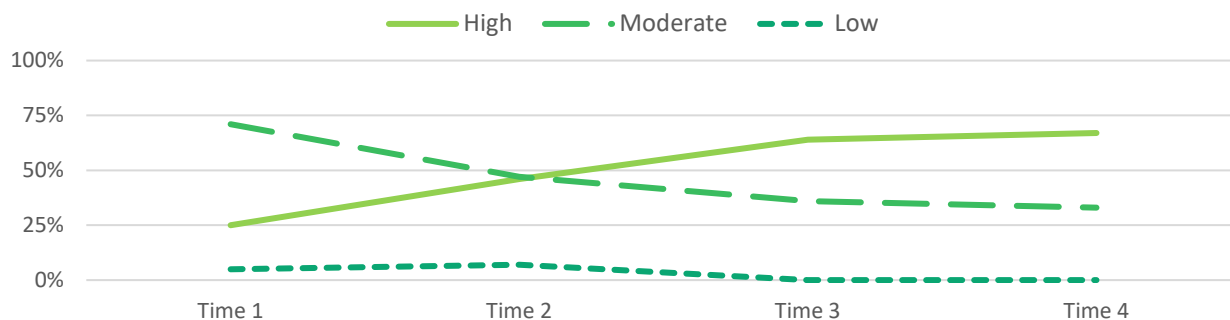
Individual-Level Parenting Quality Pathways

As described in Appendix H, the individual-level parenting quality pathways were identified by reference to combinations of the *aligned* parenting quality profile group memberships across adjacent time points. In order to simplify the full range of possible parenting quality pathways into a manageable number of pathways, we classified each parent into one of three possible forms of parenting quality change across each adjacent point in time: Growth, Stability, or Decline. For example, if a parent was in the high-quality parenting profile group at T1 and the exemplary-quality profile group at T2, they were classified as following a T1 to T2 *growth* pathway. The results of applying these classification procedures to the respective combinations of the aligned parenting quality profile variables are summarized in Figure 4.

Figure 4. Individual-Level Parenting Quality Pathways
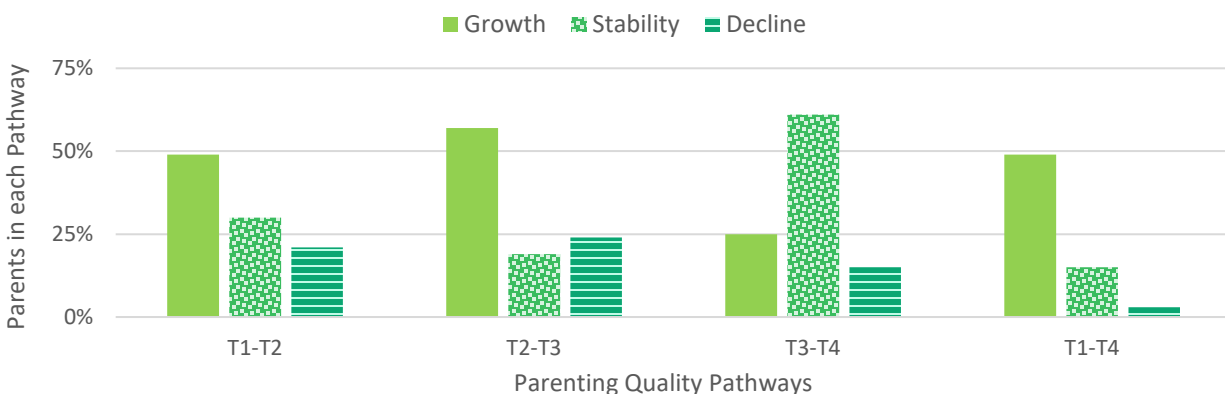
Simplified Parenting Quality Profiles

The seven different parenting practice profiles shown in Figure 2 provide the most detailed information about the specific patterns of parenting at T1 (with the corresponding original parenting profiles for T2, T3, and T4 shown in Appendix C). These are the profiles that should be used where considering how best to tailor home visits to the specific needs of the respective parents at each point in time. However, for impact modeling, it is often useful to have a simplified representation of the full range and complexity of profile patterns.

The original T1 Practice Quality Profiles (see Figure 2) were simplified by re-assigning them to a high-, moderate-, or low-quality parenting profile according to their aligned profile labels (see Appendices D & E). For example, at T1, we re-assigned original Profile I parents to a simplified "high-quality" parent quality profile, Profiles II through V parents to a simplified "moderate-quality" parent

quality profile, and Profiles VI and VII parents to a simplified "low-quality" parent quality profile. As shown in Figure 5, at T1, 25% of the parents were in the high-quality parenting practice profile, 56% were in a moderate-quality profile, and 20% were in a low-quality profile. This process of simplification was repeated for the T2, T3, and T4 PACT data (see Appendix F for all of the simplified profile graphs).

Figure 5. Simplified Time 1 Parenting Practice Quality Profiles
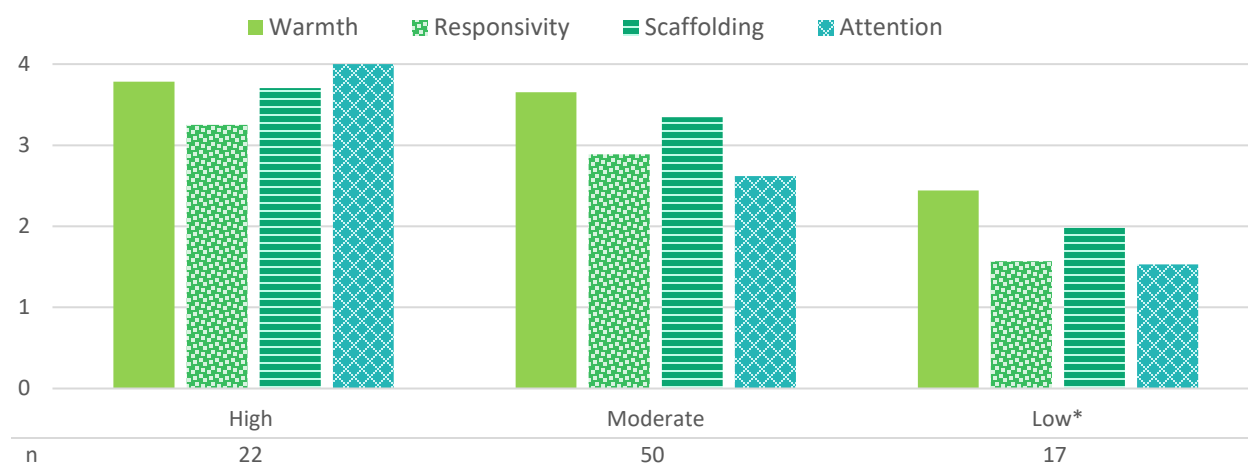
*Includes M.Low

Validation of the Simplified Parenting Quality Profiles

Given the simplified, three-group representation of Parenting Quality profiles, we next determined the extent to which these profiles corresponded to descriptions of parenting quality derived from other sources. We used three scales constructed from the NTE Family Survey parent ratings of their own parenting practices: Parent PC+ Efficacy , Parent PC+ Behaviors During the home visit, and Parent PC+ Behaviors Post the home visit (see Appendix B). The validity of the Parenting Quality profiles was demonstrated by examining the extent to which scores on the Family Survey scales varied in predicted ways across the high-, moderate, and low-quality parenting practice profile groups.

As summarized in Appendix G, the results of examining differences in the three T4 Family Survey scale scores across the three simplified Parent Practice Quality profile groups at each of the four points in time revealed the generally expected pattern of mean differences; that is, parents characterized by high-quality parenting practices tended to score significantly higher than parents characterized by low-quality parenting practices on all three validation variables.

Child SEL Skill Profiles

Profiles of child SEL skills at each of the four time points (i.e., T1-T4) were derived using the same sequence of Q-ODM analyses described above but applied to the three modified CBT scores (i.e., Basic Regulation, Beliefs about the Self and World, and Sustained Attention). The details of this process are summarized in the "Pattern-Centered Profile Analysis" section of Appendix A.

The resulting T1 Child SEL Skill Profiles and corresponding subgroup sizes (*n*) and profile homogeneity coefficients (*hc*) are shown in Figure 6. Each profile represents a specific subgroup of children who share a distinct pattern of SEL skills. Each of the original Child SEL Skill profiles for each of the four points in time is shown in Appendix C.

Figure 6. Time 1 Child SEL Skill Profiles

	I	II	III	IV	V	VI	VII
n	20	10	9	13	16	13	7
hc	0.23	0.17	0.27	0.17	0.23	0.3	0.37
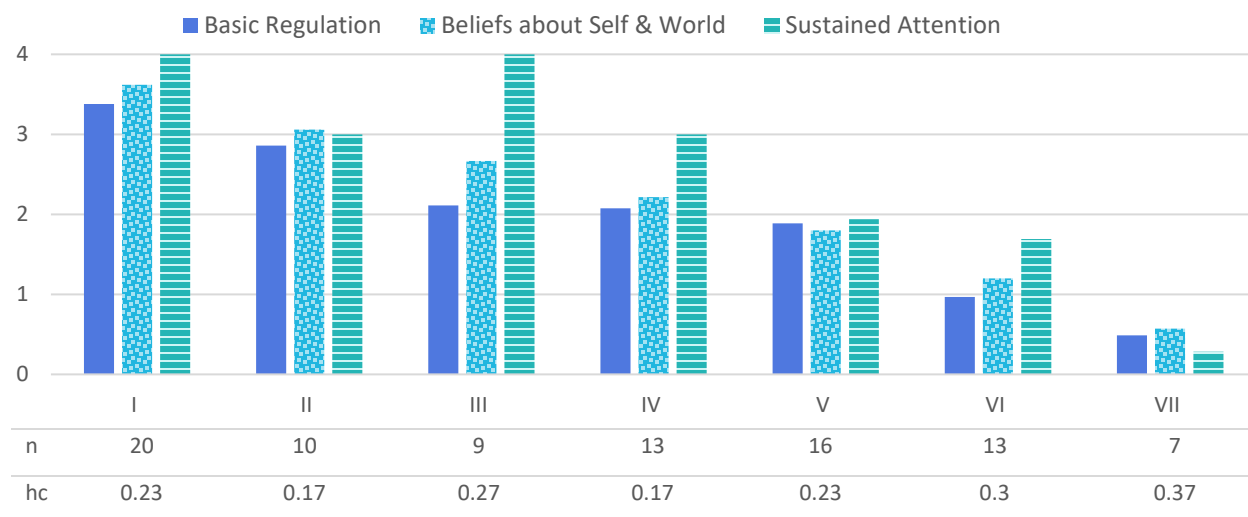
As shown in Figure 6, children characterized by *Profile I* (23% of the sample) were marked by relatively-high scores on all three of the cluster-input variables, indicating that they "often" (i.e., "more than half of the home visits") demonstrated strong basic regulation and beliefs about the self and world skills and "always" (i.e., "every home visit") demonstrated strong sustained attention skills. This near-optimal pattern of child SEL skills suggests that Profile I children entered the PC+ program with secure attachment styles (e.g., feelings of safety); ample amounts of exploratory behavior (e.g., curiosity); an overall SEL skill set sufficient to cope with, and learn from, most average-expectable social environments (cf. Cicchetti & Rogosch, 1997); and at least some room for further SEL skill growth (e.g., increasing basic regulation skills). Notably, this was the only profile group in which child SEL skills were characterized by both beliefs about the self and world and sustained attention occurring during more than half of the home visits.

Children characterized by *Profile II* (11% of the sample) were marked by moderate scores on all three of the cluster-input variables, indicating the use of constructive SEL skills during more than half of the home visits. This less-than-optimal pattern of child SEL skills suggests that Profile II children had substantial room for growth in developing the kinds of SEL skills associated with healthy child development.

Children characterized by *Profile III* (10% of the sample) scored moderately on basic regulation and beliefs about the self and world but very highly (i.e., "always") on sustained attention. Given that sustained attention is expected to follow naturally from basic regulation and beliefs skills, this less-than-optimal pattern of child SEL skills suggests children who attended to social stimuli less as a function of their basic regulation and beliefs skills and more as a function of other factors (e.g., fear based on a previously unpredictable or harsh parenting style), which suggests that these children may have found it difficult to be successful in average-expectable social environments.

Children characterized by *Profile IV* (15% of the sample) were marked by moderate levels of basic regulation and belief skills (i.e., about half of the home visits) and relatively-high levels of sustained attention skill (i.e., more than half of the home visits). Similar to Profile III, this non-optimal pattern of child SEL skills suggests that Profile IV children (a) attended to social stimuli less as a function of their basic regulation and beliefs skills and more as a function of other factors, (b) would have had self-

regulation and learning challenges in average-expectable social environments, and (c) had substantial room for growth in developing the kinds of SEL skills associated with healthy child development.

Children characterized by *Profile V* (18% of the sample) were marked by relatively-low scores on all three cluster-input variables (i.e., slightly less than about half of the home visits). This non-optimal pattern of child SEL skills suggests that Profile V children would have had difficulty coping with, and learning from, most average-expectable social environments and had substantial room for growth in developing the kinds of SEL skills associated with healthy child development.

Children characterized by *Profile VI* (15% of the sample) were marked by low levels of basic regulation and beliefs skills (i.e., less than half of the home visits) and relatively-low levels of sustained attention skill (i.e., slightly less than about half of the home visits). This non-optimal pattern of child SEL skills suggests that Profile VI children would have had difficulty coping with, and learning from, most average-expectable social environments (e.g., they were in need of a high-quality socialization environment) and had substantial room for growth in developing the kinds of SEL skills associated with healthy child development.

Finally, children characterized by *Profile VII* (8% of the sample) were marked by very low scores on all three of the cluster-input variables, indicating that they almost "never" demonstrated the basic regulation, belief, and attention skills necessary to cope with, and learn from, most average-expectable social environments. This maladaptive pattern of child SEL skills suggests that Profile VII were in need of a high-quality socialization environment and had substantial room for growth in developing the kinds of SEL skills associated with healthy child development.

Sample-Level Stability and Change in Child SEL Skill Profiles

In order to determine the extent of *sample-level* stability and change in child SEL skill profiles across the 46 weeks of the 2019 NTE PC+ program, we applied the pattern-centered *centroid* matching procedure (see Appendix D) to compare the original T1 child SEL skill profiles to the original T2 child SEL skill profiles (repeating the analysis for T2 compared to T3 and T3 compared to T4). The results of the centroid analyses indicate that, at the sample level, there were substantial structural changes in Child SEL Skill profiles across 46 weeks of the PC+ program. For example, a new, exemplary form of child SEL skill emerged at T2, the very low-skill SEL profile disappeared by T2, and the low-skill SEL profile disappeared by T4.

Whereas only 23% of the children at T1 were characterized by high SEL skills, 53% of the children had achieved the high SEL skills benchmark by T2, and 79% of the children had achieved the high SEL skills benchmark by T4. Similarly, whereas 8% of the children were characterized by *very* low-skill SEL profiles at T1, and 18% were characterized by low-skill SEL profiles at T2, 0% of the children were characterized by very low or low-skill SEL profiles by T4.

Figure 7 summarizes the sample-level changes in Child SEL Skill profile membership from T1 to T4. The lines shown in Figure 7 reflect changes in the sample-level proportion of children demonstrating high-, moderate-, and low-skill SEL skills at each point in time. Note, again, that these lines do not reflect the individual-level pathways followed by any particular child.

Figure 7. Changes in Sample-Level Child SEL Skill Profile Membership from Time 1 to Time 4
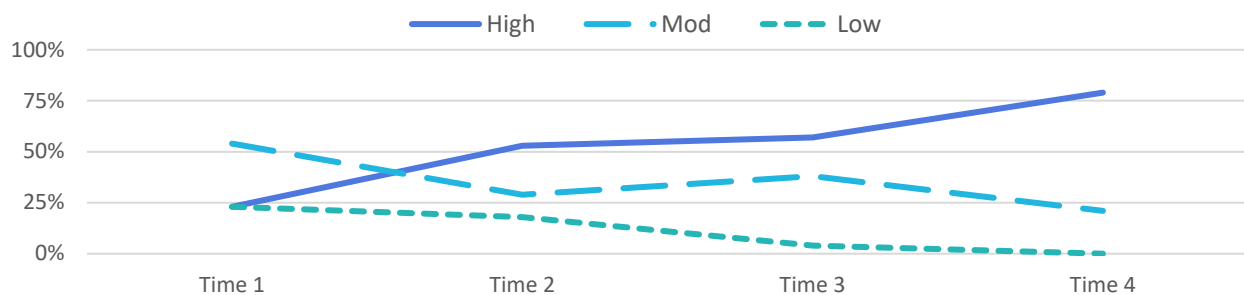
Individual-Level Child SEL Skill Pathways

As described in Appendix H, the *individual-level* child SEL skill pathways were identified by reference to combinations of the *aligned* child SEL skill profile group memberships across adjacent time points. In order to simplify the full range of possible child SEL skill pathways into a manageable number of pathways, we classified each child into one of three possible forms of child SEL skill change across each adjacent point in time: Growth, Stability, or Decline. For example, if a child was in the high-skill SEL profile group at T1 and the exemplary-skill SEL profile group at T2, they were classified as following a T1 to T2 *growth* pathway. The results of applying these classification procedures to the respective combinations of the aligned child SEL skill profile variables are summarized in Figure 8.

Figure 8. Individual-level Child SEL Skill Pathways
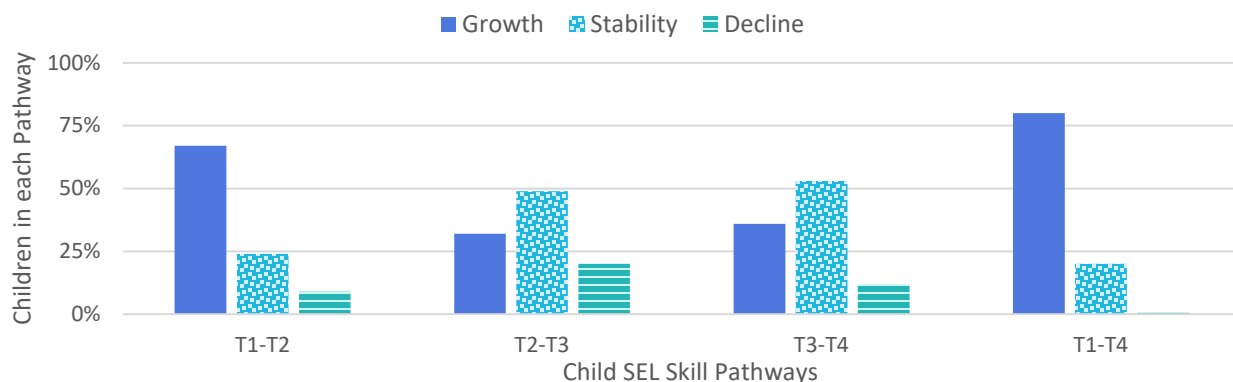
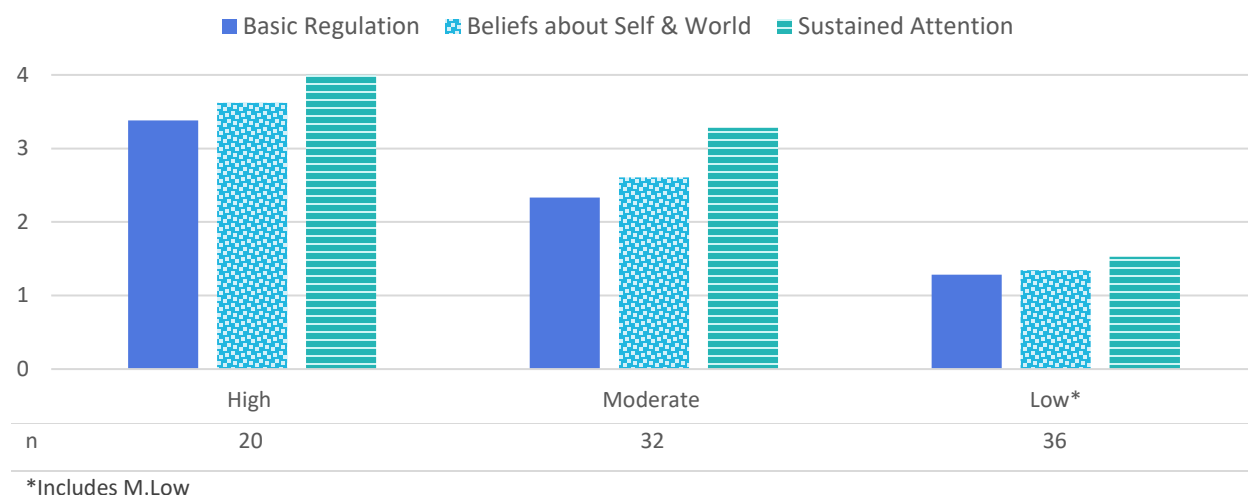

Simplified Child SEL Skill Profiles

Although the seven different child SEL skill profiles shown in Figure 6 provide the most detailed information about the specific pattern of strengths and weaknesses characterizing each of the children participating in the PC+ program at T1, hence should be referenced where considering how best to tailor home visits to the specific needs of the respective children, we simplified the T1 Child SEL Skill Profiles by re-assigning each of the original profile patterns to one of three subgroups corresponding to high-, moderate-, or low-quality child SEL skills.

Specifically, we re-assigned Profile I children to a simplified "high-skill" child SEL skills profile, Profiles II through IV children to a simplified "moderate-skill" child SEL skills profile, and Profile VI and VII children to a simplified "low-skill" child SEL skills profile. As shown in Figure 9, at T1, 23% of the children were in the high-skill child SEL skills profile, 36% were in a moderate-skill profile, and 41% were in a low-

skill profile. We repeated this entire set of pattern-centered analyses for the T2, T3, and T4 CBT data and show the resulting simplified profiles in Appendix F.

Figure 9. Simplified Time 1 Child SEL Skill Profiles

*Includes M.Low

Validation of the Simplified Child SEL Skill Profiles

Given the simplified, three-group representation of Child SEL Skill profiles, we next examined how well they corresponded to ratings of child behavior derived from other sources. We used four scales constructed from the NTE Family Survey parent ratings of their children's SEL skill: Language Development, Self-help Behaviors, Advanced Cognition and SEL Skills, and School Readiness (see Appendix B). The validity of the Child SEL Skill profiles was demonstrated by examining the extent to which scores on the four Family Survey child SEL skill scales varied in predicted ways across the high-, moderate-, and low-skill child SEL profile groups.

As summarized in Appendix G, the results of examining differences in the four T4 Family Survey child SEL skill scale scores across the three simplified Child SEL Skill profile groups at each of the four points in time revealed the generally expected pattern of mean differences; that is, children characterized by high-skill SEL profiles tended to score significantly higher than children characterized by low-skill SEL profiles on all four validation variables.

Summary

Measures were assembled according to theory, profiles were created and validated at each time point, and longitudinal change pathways were established for each parent and child as they moved through the PC+ program and learned new skills. The results indicate that parents and children at all levels of baseline skill improved incrementally across all four time points, including parents and children who entered the PC+ program with the lowest and highest profiles of skill. In the next section, we apply a range of models to examine the impact of parenting quality (i.e., PC+ parenting practices) on children's SEL skill growth.

Basic Impact Models: Parenting Quality and Child SEL Skill Growth

We fit several models to assess the impact of Parenting Quality on Child SEL Skill Pathways. Each of these models addressed the broad hypothesis that exposure to higher-quality parenting practices causes children's SEL Skills to grow more than exposure to lower-quality parenting practices.

Cross-Sectional Models

We began by examining the extent to which parenting quality was related to children's SEL skills within each of the four points in time. Figure 10 shows the relation between parenting quality and child SEL skill at T1. At all four time points, Parenting Quality was strongly related to Child SEL Skill, with statistically significant effects for both overall model fit and key cell-specific hypotheses (see Appendix I). For example, as shown in Figure 10, most of the children (i.e., 88%) in households with T1 *low-quality parenting practices* were in the T1 low-skill SEL profile. In contrast, very few of the children (i.e., 4%) in households with T1 *high-quality parenting practices* were in the T1 low-skill SEL profile. These results indicate that parenting quality and child SEL skill are tightly coupled at each time point and suggest that improvements in parenting practices cause growth in children's SEL skill.

Figure 10.   The Relation between Parenting Quality and Child SEL Skill at Time 1
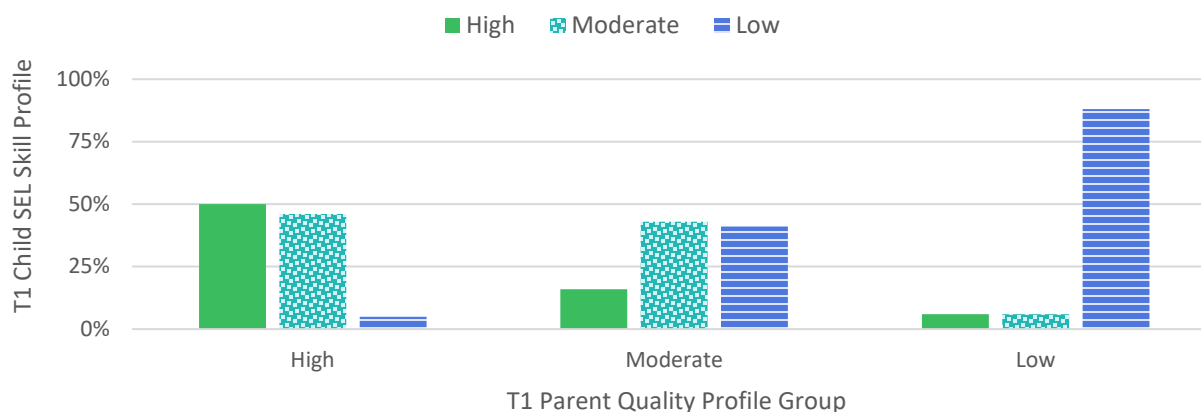

Despite the relatively strong coupling between parenting quality and child SEL skill, the cross-sectional results summarized in Figure 10 (and Appendix I) also illustrate that not all children with high SEL skills are in households characterized by the highest forms of parenting quality (e.g., 20% of T1 high-skilled children are in households with lower T1 parenting quality). This raises an important point for modeling impacts: Considering the overall *configuration* of parenting quality and child SEL skills within each household (e.g., the extent to each parent-child dyad reflects the highest possible forms of functioning) may provide the clearest understanding of how the PC+ program contributes to children's SEL skill growth. Put more simply, child SEL skill growth may occur mainly where both members of the parent-child dyad are in the highest-functioning profiles, thereby creating synergistic developmental dynamics.

We next examined the extent to which changes in parenting quality across adjacent time periods (e.g., growth, stability, or decline from T1 to T2) were related to changes in children's SEL skills across the same time period. Using this cross-sectional change-by-change design, we found that parenting quality growth was related systematically to child SEL skill growth across all three pairs of adjacent time points, with statistically significant effects for both overall model fit and most of the key cell-specific

hypotheses (see Appendix I); that is, we tested these relations across the T1 to T2 period and then replicated them for the T2 to T3 and T3 to T4 periods.

As shown in Figure 11, most children (i.e., 84%) in households where parenting quality was improving from T1 to T2 also experienced T1-T2 growth in SEL skills. In contrast, only about half of the children (i.e., 44%) in households characterized by stable or declining parenting quality experienced similar SEL skill growth. These results indicate that parenting quality and child SEL skill are tightly coupled across time and, again, suggest that improvements in parenting practices cause growth in children's SEL skill.

Figure 11. The relation between T1-T2 Changes in Parenting Quality and T1-T2 Changes Child SEL Skill
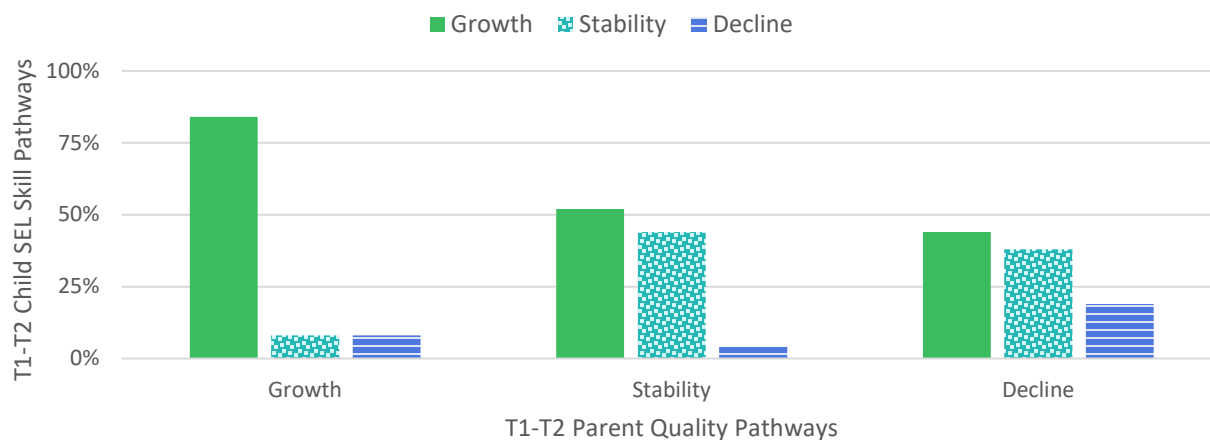

Basic Quality-by-Outcomes Models

Although the results of the cross-sectional models suggest a causal relation between parenting practices and child SEL skill growth, the following longitudinal *quality-by-outcome models* (i.e., baseline parenting quality predicting child SEL skill growth) are designed to detect *causal* effects, as opposed to correlations alone. For example, we tested the impact hypothesis that children exposed to high-quality parenting practices at T1 would experience more T1-T2 SEL skill growth than children exposed to lower-quality parenting practices. As shown in Figure 12, we failed to find statistically significant evidence for the effect of T1 parenting quality on T1-T2 child SEL skill growth.

As summarized in Appendix I, we replicated these null findings across the two following adjacent time periods (i.e., using T2 Parenting Quality profiles to predict T2-T3 Child SEL Skill Pathways and T3 Parenting Quality profiles to predict T3-T4 Child SEL Skill Pathways) as well across the entire study period (i.e., using T1 Parenting Quality profiles to predict T1-T4 Child SEL Skill Pathways). In each case, the challenge of detecting significant effects of parenting quality on children's SEL skill growth appeared to be associated mainly with the fact that, although few in number, nearly all children exposed to the lowest-quality parenting practices at each time point nevertheless experienced substantial SEL skill growth by the following (and final) time point.

Figure 12. The relation between T1 Parent Quality Profiles and T1-T2 Child SEL Skill Growth Pathways
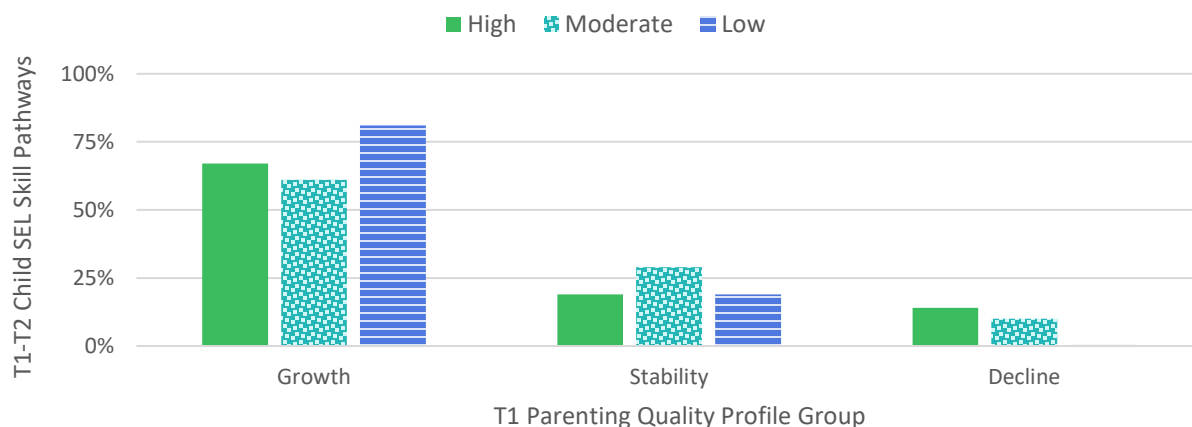

These null impact findings are consistent with the results of the cross-sectional models indicating that parents and children appear to be growing simultaneously. They also provide further evidence that is consistent with conclusion that, in accord with the theory of change presented in Figure 1, there is likely an additional factor that affects simultaneously both parenting practice quality growth and children's SEL skill growth; specifically, the home visitor from the PC+ program.

Finally, Figure 13 shows *equity effects* by describing the relation between parenting quality and children's SEL skill growth pathways for *only* those children characterized by a T1 low-skill SEL profile. Specifically, using *prodigal* analyses (see Appendix A), we estimated a T1 parenting quality impact model for children who were in the T1 low-skill SEL profile and either did or did not improve SEL skills by T2. The results indicate that children who entered the PC+ program with lower SEL skill grew at rates similar to the rest of sample, regardless of parenting practice quality. In other words, children who enter the program with lower SEL skills experience an equity effect, where less-skilled children experience SEL growth similar to their higher-skilled peers.

Furthermore, the PC+ program also appears to have supported equitable outcomes for the most highly-skilled participants. For example, the Exemplary profile for both parenting quality and child SEL skill emerged at T2 and, by T4, included 54% of the parents and 31% of the children. These results suggest that the PC+ program produced equity effects – that is, similar or better rates of growth despite different SEL histories – for both the lowest- and highest-skilled children.

Figure 13. Equity Effects of Parenting Quality on T1-T2 Child SEL Skill Growth for Children who Entered the PC+ Program with Low SEL Skills
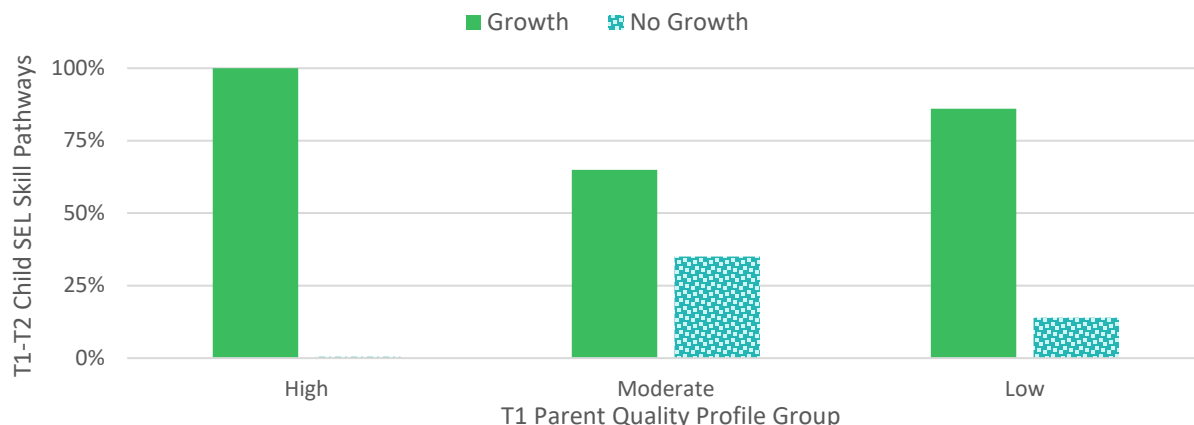
Tests for Confounds

In general, the tests for confounding variables – sample attrition indicated by missingness over time, development effects indicated by child age, implementation fidelity indicated by questions on the Family Survey – were all non-significant. In each case, the overall pattern of effect was consistent at each level of each potential confound, indicating null effects. The one exception to this general rule involved families who self-identified as learning English as a second language (ESL).

Missingness was tested by examining patterns of change over time in relation to baseline profile assignments. In each case, there was no relationship between missing data (e.g., dropping out of the study) and baseline profile assignments, indicating that attrition was random in relation to the key study variables.

Implementation fidelity indicators were created from information available in the Family Survey (see Appendix B). In general, these indicators had little relation to change in home-visitor reported parent practice or child SEL skill. We believe these null findings are largely due to the lack of validity of the fidelity measures rather than any actual lack of association (e.g., although scores on these measures generally revealed high-fidelity to the intended intervention, the measures drawn from the Family Survey were not intended to capture the active ingredients of PC+ fidelity, particularly as instantiated by the home visitors).

Child age is often a critical factor in developmental studies. We tested all profiles and impact models to see if the pattern of results differed for two year olds compared to three years olds. Almost none did, with the exception of a consistent statistically significant result for the effect of parents with declining skill to be more likely to have a three year old with declining skill.

The effects of using *English as a Second Language (ESL)* were tested by examining models separately for families who did versus did not identify English as a second language. The results generally indicated stronger relations for families who did not identify as using ESL and, in some cases, the observed pattern of relations (e.g., the full impact findings reported below) were statistically significant only for families who did not identify as using ESL.

Summary

We tested the relations between parenting practice quality and children's SEL skills using multiple cross-sectional and longitudinal baseline quality-by-outcome change designs. Parenting quality and child SEL skills were similar to each other at each time point and demonstrated similar patterns of growth across time points, indicating a strong relationship. The percent of parent-child dyads who were both in the optimal skill range (i.e., High or Exemplary profiles) rose from 13% at Time 1 to 60% at Time 4. Although, in almost all cases, the children of parents with high or growing parenting quality outperformed children with low or declining parenting quality, many children with parents in the low-quality parenting practice profile still experienced growth in SEL skills, contributing to the null findings from the quality-by-outcomes impact model summarized in Figure 12. Conversely, children who began with lower SEL skills gained SEL skills across time at an equal or better rate than their higher-skill peers.

Full Impact Model

The *full impact* model presented in this section represents our best effort to model the developmental dynamics that are explicit in the PC+ intervention design: The most enduring impact of parenting practices on child development should result from focusing the intervention on the family as whole, as an integrated system of supports. In the absence of information about how other caregivers in the home were contributing to the child's socialization, we focus on the extent to which parents and children were working together at the highest possible levels of functioning.

The concept of high-quality parenting practices and their effects on healthy child development reflects a long history of *person-in-context* models of human development emphasizing the calibration of socialization environments to the current skill levels of participating children, as in Eccles & Midgley's (1989) general concept of *stage-environment fit* and Vygotsky's (1978) more specific concept of the *zone of proximal development*. In either case, the basic idea is that children's learning is best promoted by caregivers scaffolding task demands that are slightly beyond what children can do on their own but that are nevertheless manageable by children where they are well-supported by responsive, empathetic caregivers.

In short, consistent with the theory of change illustrated in Figure 1, children's SEL growth should be influenced most strongly by the specific combination, or *configuration*, of parenting quality and child SEL skills characterizing each parent-child dyad. In particular, parent-child dyads characterized by close fit (e.g., high-quality parenting matched with strong child SEL skills) should have stronger effects on child development than dyads characterized by a misfit between parenting quality and child SEL skills (e.g., high-quality parenting matched with weaker child SEL skills). Consequently, we focus our full impact model on the effects of *parent-child configurations* on children's SEL skill growth.

In addition, because the results our previous model tests of the impact of parenting quality on children's SEL growth indicated strongly that a third variable (e.g., the home visitor) was likely contributing simultaneously to both parent and child growth, we explicitly focused the predictor side of our full impact model on the initial "bump" of growth that occurred between T1 and T2. Specifically, we attempted to capture the simultaneous influences of the home visitors on both parents and children by constructing a predictor variable that reflected the T1 to T2 growth in parent-child dyads, or the extent to which optimal parent-child configurations emerged between T1 and T2 (see Appendix I).

Given that the PC+ program intervention is focused on building parent and child SEL skills simultaneously, high fidelity to the PC+ intervention should be reflected by the early emergence of optimal parent-child configurations which, in this case, can be represented by parent-child dyads growing into an optimal *high-quality by high-skill* profile configuration from T1 to T2.

We cross-tabulated the T1 parent-child configuration variable with the T2 parent-child configuration variable to create a T1-T2 Parent-Child Configuration Pathway variable (see Appendix I). We then used this T1-T2 Parent-Child Configuration Pathway variable to test the full impact hypothesis that children's T1 to T4 SEL skill growth is influenced most strongly by the optimal parent-child configurations that emerge from T1 to T2.

Figure 14. The Impact of T1-T2 Parent-Child Configuration Pathways on T1-T4 Child SEL Skill Growth
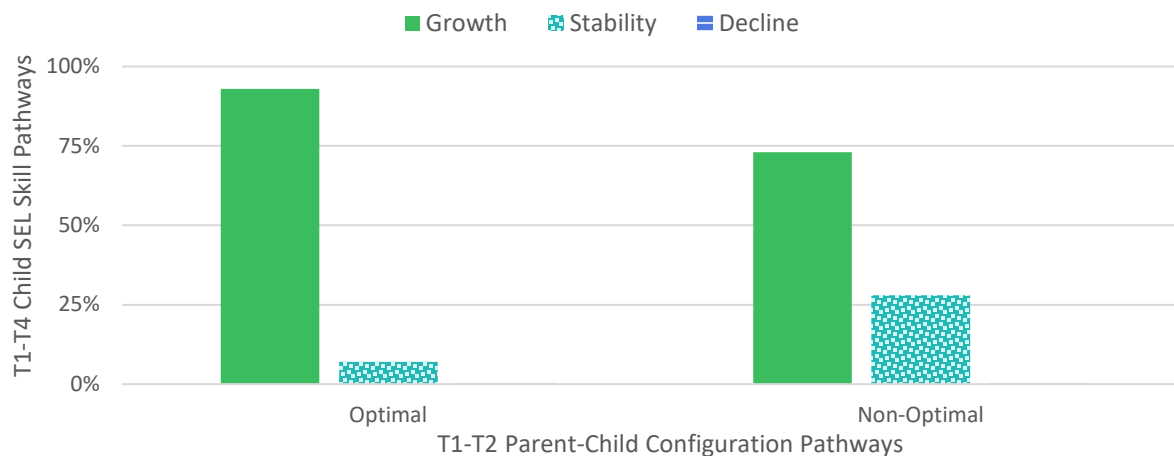
As shown in Figure 14, children who experienced the emergence of optimal configurations of parenting quality and SEL skill by T2 demonstrated substantially more T1-T4 SEL skill growth than children who did not experience the emergence of an optimal configuration, with statistically significant effects for both overall model fit and key cell-specific hypotheses (see Appendix I). For example, most of the children (i.e., 93%) in households characterized by an optimal T1-T2 parent-child configuration pathway experienced T1-T4 SEL skill growth. In contrast, fewer of the children (i.e., 73%) in households characterized by a non-optimal T1-T2 parent-child configuration pathway experienced T1-T4 SEL skill growth.

Although we were unable to rule out all possible alternative explanations for the observed differences in children's SEL skill growth (e.g., pre-existing differences in SEL skill maturation rates for children in optimal versus non-optimal parent-child configuration pathways; see Appendix A), the results support the full impact hypothesis that children's T1 to T4 SEL skill growth is influenced most strongly by the emerging T1-T2 optimal parent-child configurations. In addition, particularly where considered in relation to the null findings associated with focusing the predictor side of the impact model on parenting quality alone, the configuration pathway results are also consistent with the hypothesis that the impact of parenting quality on children's SEL skill growth is strongest where high-quality parenting is matched with high-skill child SEL functioning.

Discussion

The Newark Trust for Education (NTE) *Parent Child Plus* (PC+) program is an evidence-based early childhood education program for families in Newark, NJ**.** NTE sought to evaluate program impact by conducting analyses of existing data for a cohort of over 80 families, assessed four times over 46 weeks, using observational measures of parenting practices and children's socio-emotional skills.

PC+ is intended to result in "improved child behaviors related to social-emotional development and self-regulation skills" (Organizational Research Services [ORS], 2010, p. 23). The *Quality-Impact-Equity Design and Methods (QDM) Toolbox* (Smith, Peck, Roy, & Smith, 2019; Smith, Peck, & McNeil, 2020) was

used to: (a) reconfigure existing measures of parenting practice quality and child SEL skill to maximize the reliability and validity of the measures, (b) produce holistic profiles of parenting quality and child SEL skill (e.g., "whole child") at each timepoint, and (c) apply pattern-centered analytics to estimate impact and equity effects of the PC+ program as implemented in Newark, NJ.

Findings

In this section, the impact evaluation findings are summarized in relation to the key research questions.

1. What are the skills that parents and children present at program entry?

PC+ is serving the right group of parents and children. Nearly 75% of the parents and children were in moderate- or low-skill profiles at Time 1, indicating substantial room for skill growth. Only 25% of the parents and children were in the optimal skill range at Time 1, and even the Time 1 Optimal group improved to a higher level of the optimal range. This indicates that the PC+ intervention was a good fit with parent and child learning needs of when families were recruited into the program.

2. How do parenting practices and child SEL skills change during the program?

Parenting practice quality and child SEL skills grow dramatically over 46 weeks, low-quality skill profiles disappear entirely, and new exemplary profiles emerge. From Time 1 to Time 4, there was a 168% increase in parents attaining the optimal range of Parenting Practice Quality and a 243% increase in children attaining the optimal range of SEL Skill. At Time 2, the lowest subgroup of parenting quality disappeared and a new all-high Exemplary subgroup emerged. The percent of parent-child dyads who were in the optimal skill range (i.e., High or Exemplary profiles) rose from 13% at Time 1 to 60% at Time 4.

3. What is the impact of exposure to PC+ parenting practices on child SEL skill growth?

PC+ fidelity is strongly related to children's SEL skill growth. We examined the impact of parenting practices on child SEL skill growth from multiple perspectives, using both cross-sectional and longitudinal models replicated at or over each successive timepoint. In both the cross-sectional and longitudinal models, parenting practice was strongly related to child SEL skill, with statistically significant effects for both overall model fit and key cell-specific hypotheses. However, the results of these models suggested that both parent and child skill growth was driven by a "third variable" which, in this case, was probably exposure to the home visitor from the PC+ program. In the final, full impact model, the emergence of an optimal *parenting quality by child SEL skill* configuration from Time 1 to Time 2 appeared to cause an additional 20% of children to experience SEL skill growth from Time 1 to Time 4 (compared to children who did not experience the emergence of an optimal parent-child configuration). In short, impact models with adequate design and fit demonstrate the hypothesized pattern of results (accompanied by evidence for statistical significance) and produce meaningful estimates of the impact on children's SEL growth caused by the parenting practices targeted by the PC+ program.

4. Are there "equity effects" for children who enter the PC+ program with very low (or very high) skill levels?

PC+ appeared to produce equity effects – similar or better rates of growth despite different SEL histories – for both the lowest- and highest-skilled children. Participation in the PC+ program appeared to cause children who entered the program with lower SEL skills to grow at rates similar to the rest of the sample. The PC+ program also appeared to support equitable outcomes for the most highly-skilled children, who were able to grow from the "high" skill profile to an emergent "exemplary" skill profile.

Recommendations

Better Measures of Child Skill, Parenting Practices, and Home Visitor Fidelity. A first recommendation is to improve measures of child SEL skills, parenting practice quality, and PC+ implementation fidelity for both NTE's use and the wider field. Both the PACT and CBT items presented measurement challenges (e.g., items tended to be skewed and kurtotic) and could be substantially improved, particularly by working in collaboration with NTE's staff and expert Home Visitors to improve item content, response scales, and measurement constructs. The power to detect program effects – and to do more effective quality assurance – is related to the precision and meaningfulness of measures. Further, it would be useful to have more explicit measures of fidelity for the home visiting curriculum. These fidelity measures would more accurately describe variation in home visitor practices, including both curriculum content (e.g., books and toys), use of the four strategies (i.e., a strengths-based approach, parents as teachers, focusing on outcomes, and involving family members), and the quality of interaction through which home visitors engage the triadic relations among the parent, child, and home visitor.

Adapting the PC+ Curriculum for Struggling Parents. The second recommendation pertains to adjustments in the NTE PC+ home visit curriculum for parents who struggle with best parenting practices. Because parenting practice quality growth is critical for child SEL skill growth, adapting the PC+ curriculum to keep parents engaged and scaffolded to higher levels of parenting practice is a key objective. One of the primary avenues to reaching the one-third of parents who never attain the optimal skill range is to develop strategies to increase engagement with parents who are below optimal. Conversely, a few parents and children may be in crisis, as indicated by the small percentage of declining scores across the time points. In this case, children of parents/caregivers who decline may need different kinds of support. Parenting practice quality decline was particularly associated with child SEL skill decline for three year olds. Again, this recommendation can be best implemented in collaboration with NTE staff and home visitors who can bring an expert lens to the meaning of the performance data in this report.

Further Evaluation. The PC+ program presents an overall impact pattern that suggests both a strong relation between parenting quality and child SEL skills and an effect of home visitors on both parenting quallity and child SEL skills. Although, in almost all cases, the children of parents with high or growing parenting practice quality outperformed children with low or declining parenting quality, many children with parents in the low-quality parenting practice profile still experienced growth in SEL skills. This finding suggests that the PC+ program is working as it should: Parents and home visitors both have direct effects on children's SEL skill growth. However, to fully demonstrate the impact of the NTE PC+ program, given this triadic causal flow, we recommend (a) improving measures of PC+ fidelity and (b) including a small, randomly-selected, no-program sample of parents and children in a future study.

Study Strengths and Limitations

The study design and methods provided for a quasi-experimental evaluation of the pattern of impact indicated by the data. There are several reasons why these data should be trusted for inferences about impact: First, the measures were constructed from a valid theoretical perspective on what matters for, and changes during, socio-emotional development. Furthermore, profiles constructed from these measures were validated using data from an external data source: the Family Survey. This indicates that parents observe their own parenting practice quality and their children's SEL skills in a way that corresponds to the NTE home visitors who collected the PACT and CBT data. This correspondence increases our confidence in the accuracy of the home visitor assessments.

Second, the pattern-centered analytics emphasized the holistic skill sets that can be observed and reliably tracked over time. Because these findings present a more integrated and tangible picture of the person and their multiple skills (e.g., "whole child"), the findings are logically generalizable to other places and settings that have similar situations, people, and purposes.

Finally, findings produced through the Q-ODM Toolbox, and corresponding Theory of Change, require the application of "hammer-nail reasoning," a type of research design that increases inferential power through the identification of a cascade of causal connections; that is, from (a) PC+ implementation fidelity, through (b) improvements in the quality of parenting practices which, in turn, cause changes in (c) children's socio-emotional skills that, ultimately, (d) transfer to other settings, causing desired outcomes such as school readiness and early literacy (Smith et al., 2019). Because the Q-ODM approach allows us to test fit simultaneously for models at multiple moments in the causal cascade, the power of inference about impact is increased.

Limitations of the study are primarily related to (a) measurement items that are prone to receiving very high scores, making it more difficult to detect and model change processes, (b) the absence of well-developed, valid implementation measures, and (c) having no access to a no-program control group that would help show the unique and powerful effects of the NTE PC+ home visitor program on promoting the growth of both parenting practice quality and children's SEL skills.

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