



Impact of Incredible Years® on teacher perceptions of parental involvement: A latent transition analysis☆



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ARTICLE INFO

Article history:

Received 16 July 2015

Received in revised form 12 May 2016

Accepted 15 March 2017

Available online 9 April 2017

Keywords:

Parental involvement

Incredible Years

Latent transition analysis

Parent-teacher relations

ABSTRACT

The purpose of the present study was to examine the impact of the Incredible Years® Teacher Classroom Management (IY TCM) training on teacher perceptions of parental involvement. A cluster randomized design was used to assign 42 classroom teachers to either an IY TCM training ($n = 19$) or a control condition ($n = 23$). Teachers rated parental involvement (i.e., bonding with teacher, parental involvement at school) for the families of 805 low income students (IY TCM = 504, control = 301). A latent profile transition analysis framework was used to model the effect of IY TCM on teacher perceptions of parental involvement from pre to post-test. Four profiles consisting of various patterns of high, medium, and low teacher perceptions of bonding with and involvement of parents emerged. Analyses of teacher profiles at baseline revealed teachers who felt parental involvement and bonding was low were also likely to rate students as having more externalizing behaviors, fewer social competencies, more attention deficit symptoms, and disruptive behaviors towards adults and peers compared to teachers with more adaptive profiles. Further analysis revealed that parents of teachers randomly assigned to IY TCM were more likely to transition to a more adaptive view of parental involvement at follow-up compared to teachers in the control condition. Because teacher perceptions of parental involvement may adversely impact teacher attitudes towards difficult students, findings from the present study support the promise of teacher training as an avenue for conferring protections for struggling students.

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☆ The study was supported in part by a National Institutes of Health National Center for Nursing Research grant 5 R01NR01075-11 and a National Institute of Drug Abuse grant # 5 R01 DA 12881 awarded to Carolyn Webster-Stratton.

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Action Editor: Andy Garbacz

¹ Conflict of interest statement: The fifth author of this paper has disclosed a potential financial conflict of interest because she developed and disseminates the Incredible Years interventions and stands to gain from a favorable report. Because of this, she has voluntarily agreed to distance herself from certain critical research, evaluation, and reporting activities (i.e., recruiting, consenting, primary data handling, analysis, and sole control over reporting findings) and the University of Washington has approved these arrangements.

1. Introduction

Parental involvement in education has been the focus of much policy and debate. For example, the Every Student Succeeds Act (ESSA) initiative encourages school personnel to promote parental involvement as a means to improve student achievement. Specifically, ESSA sets aside funding for parent and family engagement, where ESSA (2015) explicitly states that districts “shall” reserve at least 1% of Title I funds to carry out parent and family engagement practices (ESSA, SEC. 1010, p 68). The suggestions, similar to prior legislative efforts, require districts to not only reserve funds to enhance parental involvement, but to also directly involve parents in decisions regarding how these funds are spent on evidence-based programs and practices to improve parental involvement (Epstein, 2005; Webster, 2004). These legislative mandates are based on an extensive body of research literature suggesting children have better outcomes when their parents are involved in their education (Barnard, 2004; Fan & Chen, 2001; Jeynes, 2003, 2005, 2007, 2010; Lee & Bowen, 2006; McWayne, Fantuzzo, Cohen, & Sekino, 2004).

Parental involvement—defined as caregiver participation in the educational processes and experiences of children (Jeynes, 2007)—is associated with increased student achievement, social emotional health, and reduced dropout and substance use (Epstein & Salinas, 2004; Epstein & Sanders, 2009). Though meta-analyses have concluded parental involvement has a mild to moderate effect on student outcomes, the summary findings are based largely on a body of correlational research. For example, a review of the literature on the topic of parental involvement by Henderson and Mapp (2002) suggested parental involvement had a small effect ($d = 0.25$ – 0.30) on student achievement. The findings were based upon prior reviews, 33 pre-experimental studies (i.e., case and within group studies) and 8 quasi-experimental or experimental studies without random assignment. These findings were followed by a series of meta-analyses conducted by Jeynes (2003, 2005, 2007) which suggested the impact of parental involvement on student outcomes was moderate ($d = 0.53$ – 0.75). Of the 114 studies included by Jeynes in the three reviews, only 2 experimental studies with randomized assignment of participants were included. Furthermore, Jeynes (2007) noted the average effect of parental involvement was moderated by the presence of statistical and design controls (e.g., covariates, multilevel modeling, matching methods)—that is, for studies with more rigorous controls, the average effect was greatly reduced ($d = 0.38$) when compared to studies without those controls ($d = 0.53$ – 0.75 ; Jeynes, 2007). These observations suggest that the rigor with which a study is executed impacts the strength of the effect between parental involvement and student outcomes. Based on the extensive review, Jeynes (2007) called for more studies using rigorous designs and methods (“randomization and hierarchical linear modeling;” p. 104). This point was recently echoed in a popular book published by Robinson and Harris (2014), who reviewed the past three decades of research on parental involvement and concluded the effect or parental involvement on student outcomes was grossly overstated (Robinson & Harris, 2014). Although the claims made by Robinson and Harris were widely criticized by parental involvement experts (cf. Mapp et al., 2014), the book revealed that much of what we base parental involvement policy, practice and program efforts on stems from cross-sectional, correlational, and nonrandomized experimental studies.

More recently, some studies of family-school partnership models have used rigorous designs, trustworthy assignment procedures, and quality measures to examine the impact of individualized child and family-systems intervention plans on child behavior and academic functioning. Some of these approaches, such as the Family Check-Up (FCU; Dishion & Stormshak, 2007; Stormshak, Connell, & Dishion, 2009) rely on motivationally oriented approaches to create a child-centered and family systems focused action plans. However, parental involvement in education is not typically a primary target of the FCU as evidenced by the lack of studies examining educational involvement outcomes in FCU trials; instead the focus is typically on promoting positive family relationships and effective behavior management systems. Another intensive family intervention for youth exhibiting challenging behaviors, Conjoint Behavior Consultation (CBC), does target parent involvement in education as a proximal outcome. For example, in a randomized study of 207 students across 82 classrooms, parents and teachers participated in a conjoint behavioral consultation process where detailed behavior intervention plans coordinated behavior support across home and school settings (Sheridan et al., 2012). Results of the study suggested teacher perceptions (but not parent perceptions) of the parent-teacher relationships partially mediated improvements in child behaviors at posttest. Indeed, findings such as these reinforce the need for interventions to target the mediating mechanism of teacher-rated parent-teacher relationships and increase opportunities for parents to be involved in their child’s education if we are to improve student outcomes. Though many of these studies use rigorous methods, both the FCU and CBC are fairly intensive interventions that only target high risk youth and families. However, classroom-based universal prevention approaches may also be useful in promoting parent involvement for all students.

Though a majority of research on parental involvement focuses on how different types of involvement are related to student outcomes—less research has examined how varying levels of teacher-reported frequency and quality of parental involvement is related to concurrent views of student behavior and academic performance. Even less rigorous research examines the impact of training and efforts to address teacher attitudes related to parental involvement. Though many factors can contribute to parental involvement, most research examines teacher perspectives of the frequency and quality of contact with parents and how those indicators are correlated with other predictors or are related to student outcomes (Henderson & Mapp, 2002; Malone, Miller-Johnson, & Maumary-Gremaud, 2000; McDermott & Rothenberg, 2000). Indeed, data from the Conduct Problems Prevention Research Group (1991) indicated that teacher perceptions of parental involvement are best represented by frequency of parent contact with teachers (e.g., frequency of interactions between teachers and parents), contact with the school (e.g., frequency of attending school meetings, conferences, volunteering), and indicators of the quality of those interactions (e.g., bonding, comfort, goal alignment).

Most of the correlational studies on interventions to improve parental involvement target parents as program recipients (Henderson & Mapp, 2002). However, emerging evidence suggests interventions targeting teacher attitudes and biases surrounding parental involvement may confer benefits upon students (McDermott & Rothenberg, 2000). Teacher perceptions of parental involvement at school are contributing factors to the school success of students (McCoach et al., 2010). More specifically, if a student is academically or behaviorally struggling, a teacher may interact with that student in more a supportive manner if the teacher perceives the student's parents are supportive of, involved with, and committed to the teacher's efforts to assist the child (Iruka, Winn, Kingsley, & Orthodoxou, 2011; Reinke, Herman, Petras, & Jalongo, 2008; Walker, Ice, Hoover-Dempsey, & Sandler, 2011). Conversely, if a teacher perceives the parents of a challenging student are not involved with his or her efforts to assist the child, that teacher may interact subtly with that student in ways that fail to facilitate successful academic and behavioral outcomes (Stormont, Herman, Reinke, David, & Goel, 2013). Consistent with this view, Sheridan et al. (2012) found that teacher perceptions of their relationships with parents partially mediated the effects of CBC on youth outcomes. In summary, teacher perceptions of parental involvement may provide a malleable avenue for enhancing teacher classroom instructional and relational practices that are predictive of successful outcomes.

The purpose of study was to explore different profiles of teacher perceptions of parental involvement—operationalized as teacher perception of the frequency of contact with the school and teacher as well as the quality of those contacts. We sought to examine whether teachers fitting into profiles with varying levels of frequency and quality of contact were related to teacher endorsements of student behaviors. Lastly, we examined whether teachers randomized to a classroom management training program to address attitudes about parental involvement improved teacher posttest perceptions of parental involvement compared to control teachers.

1.1. Teacher perceptions of parental involvement and self-efficacy

The social cognitive concept of self-efficacy (Bandura, 1994) provides a framework to view why teacher attitudes and beliefs about parental involvement may shape classroom instructional practices (Barnyak & McNelly, 2009). When teachers receive messages from policies like ESSA (2015) and the broad literature base on the topic that parental involvement is important to school success, teachers will arguably feel more efficacious when working with a challenging student whose parents are perceived as being involved. Teachers who feel a sense of efficacy are more likely to encourage and support that student to adopt more acceptable behaviors or engage in supportive academic instructional practices predictive of successful outcomes (Barnyak & McNelly, 2009; Hoover-Dempsey et al., 2005; Stormont et al., 2013). To be sure, Hoover-Dempsey surveyed 1003 teachers to reveal that teacher efficacy (defined as teacher beliefs that they can teach and students can learn) explained over 40% of the variance in parental involvement and was the strongest correlate of supportive classroom instructional practices (Hoover-Dempsey, Bassler, & Brissie, 1987). These findings were again observed in a study of 110 elementary teachers in a large urban school setting where teacher efficacy was significantly related to parental involvement patterns ($r = 0.23$ – 0.47 ; Garcia, 2004). Lastly, in a randomized study of teachers who rated their contact and comfort with the parents of 577 kindergarten students, latent profile models revealed teachers who perceived they had low contact and comfort with parents were also more likely to rate students as having more disruptive behaviors and concentration problems and less emotion regulation and academic competencies ($d = 0.34$ – 0.79) when compared to students with parents who were perceived by teachers as having high contact and comfort (Stormont et al., 2013).

Research in area of parental involvement has conceded it is a multidimensional concept (Epstein & Salinas, 2004; Desimone, 1999; Fan & Chen, 2001; Lee & Bowen, 2006). Though a great deal of research has examined relationships between different types of parental involvement (e.g., frequency of contact, comfort or bonding) and student outcomes, little work currently differentiates how various typologies of teacher perceptions of parental involvement may contribute to student outcomes. Varying levels of teacher perceptions on the quality and frequency of contacts may suggest important insight into teacher perceptions of parental involvement patterns that promote positive student outcomes. More specifically, in studies where teacher perceptions of parent contact and comfort were monitored, findings indicate that teachers often reported low contact with parents even though parents desired more contact (Becker & Epstein, 1982; Epstein, 2001; Munk, Bursuck, Epstein, Jayanthi, & Nelson, 2001). Other studies have suggested that while parents desired increased contact—they also reported that communications with teachers were overly negative (McDermott & Rothenberg, 2000). The findings of these studies suggest that though some parents may have high levels of contact with teachers—if those contacts are negative it may adversely impact the interactions between teachers and students (Stormont et al., 2013).

In addition, few parental involvement studies focus on teacher perceptions of parental involvement despite evidence that teacher ratings of parental involvement have strong links to student outcomes (Bakker, Denessen, & Brus-Laeven, 2007; Barnard, 2004). For instance, Barnard (2004) compared teacher and parent report of parental involvement in a longitudinal study of 1165 students and found parents tended to over-rate their own involvement. Further, not only were teacher perceptions of the topic reliable, the teacher ratings of parental involvement were more predictive of future student achievement than parent ratings (Barnard, 2004).

When examining the few studies of teacher perceptions on parental involvement and student outcomes, one study suggested distinct profiles of parental involvement are related to student outcomes. Specifically, Stormont et al. (2013) used a latent profile analysis to group teachers' perceptions of parental involvement into three subtypes (i.e., high contact/high bond, low contact/high bond, and low contact/low bond). Students whose parents were rated by teachers as being in the low contact/low bond subgroup displayed significantly more academic and behavior problems and were more likely to be rated by teachers to be members of disorganized families compared to youth in the other two classes (Stormont et al., 2013).

Given the potential adverse impact that teacher perceptions of parental involvement may have for struggling students, interventions that alter those perceptions are arguably necessary. That is, training teachers to become more supportive, effective, and engaged in their relationships with parents—especially with parents of students with challenging behaviors—may elevate teacher awareness of their own biases and misperceptions which interfere with processes necessary to effectively support struggling students. Based upon these findings, targeting teacher perceptions of parental involvement may be a malleable focus of intervention efforts.

1.2. *The Incredible Years Teacher Classroom Management (IY TCM)*®

IY TCM is a group delivered, video modeling training program based on the well-established IY Parent training program that explicitly addresses teacher perceptions (i.e., attitudes and biases) of parental involvement using a comprehensive training approach. IY TCM is delivered in groups of 15–25 teachers over four to six full days and interspersed with onsite coaching. The trainings and coaching are guided by specific methods (e.g., video modeling, role plays, homework, self-reflection exercises) and guiding principles (the teaching pyramid, experiential learning, collaborative coaching) that have been described in detail elsewhere (see Webster-Stratton, Reinke, Herman, & Newcomer, 2011). Of most relevance here, each training and coaching session includes content and strategies aimed at improving relationships with parents as a fundamental aspect of effective classroom management. Teachers watch videos of actual teacher-student and teacher-parent interactions and are asked to reflect on what is being learned in the interaction and how the student or parent is feeling as a result. They also complete forms for each session in which they reflect on their skills, attitudes, and beliefs about each content area. Teachers also develop mini-behavior support plans for how they will promote greater parental involvement for students in their class with the most challenging behaviors. Teachers are not only challenged to acknowledge their own bias and attitudes regarding parental involvement, but they are also provided with strategies to improve communication and cooperation between parents and school. They practice these skills in small group role plays and as needed with the coach onsite. As such, improvements in teacher attitudes of parental involvement is a proximal outcome targeted by IY training activities—however changing attitudes is a necessary first step towards changing teacher behaviors.

A recent randomized trial with 1818 students found that IY TCM facilitated improved teacher ratings of parental involvement patterns (Herman & Reinke, 2017). Latent profile analysis at both baseline and follow-up revealed four profiles of teacher-rated parental involvement. Less adaptive profiles (lower involvement and comfort) were associated with significantly worse student performance on standardized achievement tests, teacher ratings of academic skills and behavior problems, and independent observations of disruptive and off task classroom behaviors. A subsequent latent transition analysis revealed that parents in the IY condition were more likely to progress to adaptive teacher-rated involvement patterns and less likely to digress to less adaptive patterns at the end of the year compared to those in the control condition. Notably, 80% of parents in the most adaptive teacher-rated profile at follow-up were from the IY condition; only 2% of comparison condition parents in the least adaptive profile at baseline transitioned to a more adaptive pattern compared to 25% in the IY condition. This latter finding suggested both the intransient nature of negative teacher perceptions of struggling parents as well as the promise of IY TCM for altering even these entrenched beliefs (Herman & Reinke, 2017).

The present study makes a contribution to the ongoing discussion of the effects of parental involvement in several ways. First, this study is among the few experimental designs to examine the effects of an intervention targeting teacher perceptions of parental involvement. Reflecting the important principle of replication in social science (Ioannidis, 2012), the current study seeks to reproduce or replicate prior findings of teacher perceptions of parental involvement (Herman & Reinke, 2017) using a separate sample of Kindergarten students in a different geographical area of the county. Second, we relied on latent transition analysis, an analytical approach that preserves the multidimensional nature of teacher-rated parental involvement. In this study, we tested three hypotheses.

1. Using indicators of contact and comfort, will four profiles with varying levels of teacher involvement emerge from the data? It was hypothesized that the data would fit a four profile model at baseline and follow-up based upon a prior study (Herman & Reinke, 2017).
2. Will teachers with pretest profiles characterized by low perceptions of parenting involvement also be more likely to endorse child behaviors as being more problematic? It was hypothesized that teachers fitting a profile characterized by low perceptions of parental involvement are more likely to concurrently rate those students as having more behavior and academic problems compared to teachers with more adaptive views of parental involvement (Herman & Reinke, 2017; Stormont et al., 2013).
3. Will teachers randomized to IY TCM progress to more adaptive profiles compared to teachers in the control condition? It was hypothesized that teachers randomized to the IY TCM would be more likely to progress to more adaptive profiles marked by improved perceptions of parental involvement and less likely to digress to less adaptive profiles at post-intervention compared to teachers in comparison classrooms.

2. Method

2.1. Design

To examine the effect of IY TCM, a two group experimental design with cluster randomization at the classroom level was used. Specifically, 19 teachers and their 504 students were randomized to the IY TCM condition and 23 teachers and their 301 students

were assigned to a waitlist control condition. More details about the larger trial including primary outcomes focused on student behavior change can be found in Webster-Stratton, Jamila Reid, and Stoolmiller (2008).

2.2. Participants

The data used in the present study originated from a larger trial that included 120 Head Start classrooms and teachers from 14 elementary schools in low economic and multiethnic areas in the Northwest United States. Because our primary interest was on school entry, we focused the current analyses on the Kindergarten sample. All parents in participating classrooms were invited to participate in the project; 77% of the elementary sample provided parent consent. Random assignment was conducted separately for pairs of elementary schools matched on size, student demographics, and geographic location. Baseline equivalence between conditions was observed on key demographic and student behavior variables (see Webster-Stratton et al., 2008): intervention schools had 56.67% free or reduced lunch rates and a mean of 323 students enrolled compared to 58.75% and 313 for control schools.

The current study relied on data from Kindergarten teachers ($N = 42$) with an average of 19 students ($N = 805$) per classroom. The study had high rates of teacher retention (96%). Teacher participants identified as female (97%) and Caucasian American (75%) and some identified as African American (22%) or other (3%). Most students in the classrooms were male (51%) with an average age of 5.6 years and nearly all qualified for the subsidized lunch program. Students were from families that identified as Caucasian-American (39%), Asian American (20%), African-American (13%), Hispanic (17%) and other—and 24% of students lived in a home where English was not the first language. All intervention, study, and consent procedures were approved by the university and the schools where the study originated.

2.3. Measures

All assessments were conducted on the same time line in both study conditions. Baseline measures were collected in early fall and follow-up assessments were conducted in late spring. Predictably, there is some missingness in the data. However, patterns of missingness were tested and revealed no relationship between missingness and observed student or teacher characteristics or treatment assignment. As such, randomization was successful and missingness in these data were considered to meet the assumptions of missing at random (MAR). Furthermore, missingness amounted to 6.3% or less for all variables used in the analysis—a proportion often considered ignorable (Little & Rubin, 1989). Nonetheless, missing data in the analyses were replaced using a Full Information Maximum Likelihood (FIML) procedure—a well-known process that yields consistent parameter estimates and standard errors when the missing data meet MAR assumptions (Little & Rubin, 2002; Little & Rubin, 1989; Muthén, 2001).

The analytical approach here follows the specific hypotheses outlined above. First, based upon prior findings, we first sought to examine whether a four profile solution appeared to fit the data best at both pre and posttest waves of data collection (Herman & Reinke, 2017). Second, based upon prior studies suggesting teachers with low perceptions of parental involvement also tend to view student behaviors of those parents as more problematic (Barnard, 2004; Stormont et al., 2013), we examined the validity of pretest profiles using concurrent teacher ratings of child social and emotional competencies and conduct problems. Lastly, in an effort to understand the impact of IY TCM on teachers exposed to the content, we used a latent profile transition model to examine whether teachers randomized to IY TCM transitioned to more adaptable profiles compared to control teachers. All measures are described here.

2.3.1. Latent profile indicators: INVOLVE-T

Latent profile models were created using subscales from the *Teacher-Parental Involvement Questionnaire* (INVOLVE-T). The INVOLVE-T is a 26-item teacher questionnaire developed as part of the Fast Track trial (McMahon et al., 1999) with technical reports available on the Fast Track website (Malone et al., 2000) and reported in prior publications from both the present study (Webster-Stratton et al., 2008) and the Fast Track trials (Malone et al., 2000). The INVOLVE-T includes 3 subscales used in this analysis. Bonding was assessed using 7 items (sample, $\alpha = 0.76$) gauging teacher perceptions of whether a teacher felt parents appeared comfortable and whether they had a good relationship with a parent. Parental involvement in education was assessed using 7 items (sample, $\alpha = 0.91$) that appraised teacher perceptions of whether parents were involved in school or classroom activities or if teachers perceived parents as being supportive of educational goals. Lastly, parental involvement with teacher was assessed using 7 items (sample, $\alpha = 0.84$) measuring teacher perceptions of whether they called, attended conferences, or visited the school. All INVOLVE-T items were measured using a 7 point Likert-type scale (1 = *never* to 7 = *always*). Negatively worded items were reverse coded so that higher scores represented more adaptable or desirable perceptions before mean centered composites were calculated.

2.3.2. Concurrent child behavior ratings

Based upon prior studies, we hypothesized that profiles containing teachers with low perceptions of parental involvement and bonding would also be more likely to rate student behaviors to be more problematic (Barnard, 2004; Barnyak & McNelly, 2009; Stormont et al., 2013). To test this assumption, pretest latent profiles were validated using concurrent teacher ratings of student behavior using the Social Competence and Behavior Evaluation (SCBE; externalizing behavior and social competency) and the Child and Adolescent Disruptive Behavior Inventory.

2.3.2.1. Social Competence and Behavior Evaluation. The Social Competence and Behavior Evaluation (SCBE) is an 80 item teacher report assessing teacher perceptions of student social competencies (sample, $\alpha = 0.80$) and externalizing behaviors (sample, $\alpha = 0.92$) on a 5 point Likert-type scale (1 = *never* to 5 = *always*; LaFreniere & Dumas, 1996). Student scores are presented as T-scores with higher scores resending more socially competent students and fewer behavior problems.

2.3.2.2. Child and Adolescent Disruptive Behavior Inventory. The Child and Adolescent Disruptive Behavior Inventory (Burns, Taylor, & Rusby, 2001; Taylor, Burns, Rusby, & Foster, 2006), version 2.3 (CADBI) was used to assess teacher perceptions of student disruptive behaviors towards peers (sample, $\alpha = 0.97$) and adults (sample, $\alpha = 0.96$). The CADBI is a 25 item scale with an 8-point Likert-type response set (1 = “*never in the past month*”, 2 = “*1–2 times in the past month*”, 3 = “*3–4 times in the past month*”, 4 = “*2–4 times per week*”, 5 = “*1 time per day*”, 6 = “*2–5 times per day*”, 7 = “*6–9 times per day*”, 8 = “*10 or more times per day*”). Subscales are mean centered composites with higher scores indicating more disruptive behaviors. In addition to the disruptive behavior subscales, the CADBI also includes a Hyperactivity, Attention Problems, and Impulsivity index whereby teachers endorse 10 DSM-IV attentional symptoms using a dichotomous response set (0 = *not present*, 1 = *present*; sample, $\alpha = 0.97$) and a score represents the total number of student symptoms endorsed by teachers (Burns et al., 2001; Taylor et al., 2006).

2.4. Procedures

2.4.1. IY TCM training

IY TCM teachers received 4 full day workshops (28 h) of training spread out monthly throughout the year. The training followed the text *How to Promote Social and Emotional Competence in Young Children* (Webster-Stratton, 2000). The training was broken into two complementary modules. The first training module focused on strategies to promote more effective classroom environments including proactive teaching, use of praise and encouragement, establishing discipline hierarchies. The foundation of the program is a focus on improving relationships with all students and parents—a necessary element for successful classroom management.

Parental involvement, specifically, is a central target of IY TCM and every training workshop and includes strategies to assist teachers to develop better relationships with parents and create opportunities for parents to get involved in a child's education. A large portion of each training session is devoted to watching and discussing video vignettes of actual teacher interactions with students and parents. Each vignette serves to both provide a model for effective behaviors and also induce discussion and self-reflection about the teacher's beliefs, biases, and perceptions of these interactions. The training prompts reflections with Socratic questioning about the videos (“How are you feeling as the teacher in this situation?” “How is the student/parent feeling?” “What is the student/parent learning?” “How would you respond in this situation?”) and facilitates group discussion. Discussions lead to role plays and practicing interactions where teachers can serve as models themselves and/or get feedback about challenging interactions they want to improve upon with students and teachers in their classrooms. Each content area provides time for self-reflection as teachers are asked to respond to a series of questions about their current practices (e.g., what do I do to make parents feel valued and welcome, what am I doing that may lead parents to feel unvalued or unwelcome). Time is also allotted for teachers to develop plans for improving their classroom ecology and for developing specific plans for responding to challenging students and parents. These plans always include specific prompts for how the teacher will engage parents in the plan. Specific tools and strategies are providing in the handouts that each teacher receives including letters that can be sent home to facilitate home school communication.

The other 50% of the classroom management workshops focused on the IY Dinosaur Curriculum. The Dinosaur Curriculum consists of 30 social skill and problem solving lessons targeting children's social competence, emotional self-regulation, and behavioral expectations at school. The Dinosaur Curriculum is broken into 7 units: (a) learning school rules; (b) how to be successful in school; (c) emotional literacy, empathy, and perspective taking; (d) interpersonal problem solving; (e) anger management; (f) social skills; and (g) communication skills. The curriculum provides teachers with scripted lessons covering each of the 7 content areas—which are designed to be delivered twice per week in 20-min large groups followed by 20 min small group activities to practice the skills. Regarding parental involvement, the Dinosaur Curriculum also includes home notes and homework assignments to foster engagement.

2.4.2. Intervention integrity

IY TCM is a highly manualized intervention that is supported by a rigorous infrastructure to support and ensure implementation fidelity (Webster-Stratton & Herman, 2010; Webster-Stratton et al., 2011). Moreover, a detailed model for IY TCM adherence has been described in detail by Reinke, Herman, Stormont, Newcomer, and David (2013). All sessions were led by IY certified group leaders. Certification in IY requires attending a three day training given by the program developer and/or by certified IY mentors who have delivered and been supervised by the developer in both the delivery of the program and the training (Webster-Stratton & Herman, 2010). Further, certification requires submitting video of actual IY trainings to the program developer for review and feedback. Certification occurs after leading several groups and receiving feedback that their delivery meets threshold for adherence to IY principle. In this trial, all IY TCM sessions were videotaped and reviewed by the program developer for adherence. No significant departures from protocol or principles (using Webster-Stratton et al., 2011 framework) were noted. A research co-leader was also present for each session and rated adherence checklists, and mentors observed and completed process and content evaluations. These strategies provided a high degree of confidence of adherence to the protocol and quality of content as well as exposure (or dose). Engagement is measured after each session by teacher ratings of their learning and their

perceptions of the training. On average, teachers received 3.73 days of training with only 4 teachers attending less than the full four days of training. Checklists completed by the research co-leaders indicated that, on average, teachers and students were exposed to 87% of all planned IY TCM intervention elements. Teachers, students, and families in control condition (CC) classrooms continued their regular elementary school curriculum. Finally, as noted by Reinke et al. (2013), teacher implementation skill is also another facet of IY TCM fidelity. As reported in the original paper (Webster-Stratton et al., 2008), independent observations of both global classroom ratings and discrete frequency counts indicated significant improvements in IY TCM teachers relative to the control condition providing both evidence of implementation skill and differentiation.

2.5. Analysis plan

Our analytical plan follows our research questions outlined above. First, a latent class profile model was used to group teachers into discrete profiles at both pre and posttest based upon their perceptions of parental involvement. Second, we examined whether baseline profile membership was associated with teacher ratings of student behaviors. Lastly, we examined whether profile membership changed from pre to posttest as a function of treatment assignment (IY or CC).

All models were estimated using Mplus 7.0 (Muthén & Muthén, 2013)—which uses a FIML procedure to handle missing data and includes a cluster to produce robust variance-covariance matrices adjusting for intraclass correlations (Asparouhov & Muthén, 2013; Huber, 1967; White, 1980). Before estimating the latent profile transition analysis (LPTA) models, we examined treatment and control group equivalency at baseline on all indicators. Once LPTA models were estimated, the profiles were validated using a three step model procedure—described here in more detail.

2.5.1. Three step model estimation

To identify the optimal LPTA solution, we followed recommendations for a manual three step approach to estimate the LPTA (Asparouhov & Muthén, 2013). In step 1, latent profile models were fit at each cross-sectional wave (i.e., pretest and posttest). In step 2, profile membership at pretest was regressed on concurrent teacher ratings of student behavioral scores to validate the model. That is, we theorized a model with a profile of teachers characterized by low perceptions of parental involvement and bonding were hypothesized to be comprised of teachers who were also more likely to rate student behaviors as problematic (Barnard, 2004; Stormont et al., 2013). Following validation, step 3 integrated the best fitting baseline and follow-up models together in the LPTA framework—along with treatment assignment—to examine whether transitions of teacher perceptions of parental involvement from pre to posttest were related to their participation in IY TCM.

2.5.2. Model fit indices and selection

Several statistical indices and substantive criteria were used to select the best fitting solution that characterized profiles of teacher ratings of parental involvement in our sample. Specifically—the Bayesian Information Criteria (BIC), a sample size adjusted BIC (BIC_{adj}), the Lo Mendall Rubin (LMR), and entropy statistics were used to compare models (Akaike, 1981; Nylund, Asparouhov, & Muthén, 2007). The BIC is a summary index reflecting the degree of fit between the covariance matrices of a predicted model versus a model generated using the observed data while accounting for model complexity, and recent studies have suggested the BIC performs well when measures are reliable, models are parsimonious, and sample sizes are large (Swanson, Lindenberg, Bauer, & Crosby, 2012; Vrieze, 2012). Lower BIC estimates are preferred, and we calculated the change in BIC (BIC Δ) between each successive model to identify the best fitting model (Fraley & Raftery, 1998). The BIC_{adj} is similar to the BIC but estimates also account for large sample sizes (i.e. >300; Nylund et al., 2007). The LMR—available only as fit index for cross-sectional models in step 2—is a chi-square likelihood ratio test comparing a model with k profiles against a model with $k-1$ profiles. When the LMR p value exceeds 0.05, the lesser k -profile solution is considered to have better fit (Lo, Mendell, & Rubin, 2001). Lastly, entropy is a summary statistic communicating the degree to which profiles are clearly separated from each other. Entropy values approaching 1 indicate more distinctly separated profiles (Celeux & Soromenho, 1996).

Models were originally selected based upon comparing the fit of successive cross-sectional models at pretest and posttest. However, final model selection relies on (a) comparative model fit and alignment of indices as well as level and shape of the profiles, (b) efforts to validate the class profiles, (c) prior research and theory (i.e., construct validity), and (d) model parsimony (Hagenaars & McCutcheon, 2002; McCutcheon, 2002; Morin & Marsh, 2015; Muthén & Muthén, 2000). That is, because model fit selection is relative—the selection should follow a sequential process whereby substantive meaning, theory and model simplicity are used alongside statistical proof of fit (Kline, 2011).

3. Results

We present the results in a manner that matches our research questions and in the same stepwise fashion that models were estimated as described above. First, we present information on baseline equivalency of treatment and comparison groups on the indicators used to create latent profiles. The baseline and follow-up cross sectional models and comparative fit indices for each model tested is also presented. Second, we examined the relationship between teacher profile membership and variables capturing teacher perceptions of student behavior. Lastly, we include both pre and posttest teacher ratings of parental involvement together in the LPTA framework to examine whether the transition of teacher-rated parental involvement profiles were related to treatment assignment.

3.1. Baseline equivalency

The IY TCM treatment and CC classrooms did not differ at baseline on two out of three indicators used to model the profiles. At pretest, two-tailed independent tests revealed IY teachers and those in the CC classrooms had similar ratings of general parental involvement (IY = 3.76, CC = 3.77, $t(728) = 0.497$, $p < 0.619$) and bonding with parents (IY = 2.63, CC = 2.61, $t(728) = 0.667$, $p < 0.505$). Test results of baseline teacher ratings of teacher–parent bonding suggested teachers in the CC reported having better relationships with parents compared to IY teachers (IY = 1.86, CC = 1.96, $t(728) = 2.116$, $p < 0.035$). Not only did the test results actually favor the control teachers over the IY teachers, the profiles absorb these baseline differences between CC and IY teachers as the profiles are estimated unconditionally using the responses from both CC and IY teachers. That is to say—the profile means and standard errors reflect these scores from all participants in both conditions—irrespective of treatment assignment (Thompson, Macy, & Fraser, 2011).

3.2. Model fit and selection

Shown in Table 1, the BIC and BICadj declined from a 1 to a 6 profile model at both pretest and posttest time points. However, and shown by the BICΔ, the magnitude of difference between each successive model is minimal after the 4 profile model. As the BIC is a summary statistic accounting for both sample size and the number of parameters required to estimate a model (Swanson et al., 2012; Vrieze, 2012), the BICΔ provides statistical indication that the most parsimonious and best fitting model is the four profile solution at both time points (Fraley & Raftery, 1998). Furthermore, the LMR—a strong test statistic suggesting the best fitting model contains 4 classes—aligning with all other fit indices. Lastly, entropy is above 0.7 for all models suggesting adequate delineation between profiles for each of the models (Celeux & Soromenho, 1996). Upon closer examination, a five profile model siphoned only 8 cases at baseline and 10 cases at follow-up from the most adaptive class—effectively creating an artificial profile that did not differ in level or shape from the most adaptive class.

Using the pretest means, profile counts, and proportions of the four class solution at pretest, we see that teachers in each of the four profiles differ in their propensity to endorse the items of general parental involvement in education and at school as well as bonding with parents (see Figs. 1 and 2). When determining the most optimal model—Fig. 1 reveals that each profile has a distinct level, consisting of various high, medium, or low estimates across each profile indicator. Similarly, Fig. 2 reveals that each profile consists of a distinctive pattern of endorsements for the indicators on which they are high, medium, or low (Morin & Marsh, 2015).

Among the four profiles, we see (a) a small profile of parents who are low on all three indicators (LLL; $n = 51$, 16.8%), (b) a large group of parents who are in the medium range on general involvement but low on involvement at school and bonding (MLL; $n = 274$, 37.4%), an equally large group of parents with a high degree of general involvement in education but with moderate degrees of involvement at school and low bond (HML; $n = 274$, 37.4%), and a smaller fourth profile consisting of parents with high general involvement but with moderate school involvement and bonding (HMM, 62, 8.5%).

To further validate that the four class model was the best fitting model, we examined each successive model using concurrent teacher ratings of student behavior. In Table 2, examining the profile means and the results of the overall model tests suggest the profiles significantly differed on teacher ratings of child behaviors. Specifically, the profiles differed significantly on teacher ratings of student externalizing and social competence scores, average number of student attentional symptoms endorsed by teachers in each profile, and the severity of disruptive behaviors rated by teachers in each profile. The LLL profile—where teachers rated parents as being less involved and having low bonds with them—had students with significantly more behavior problems compared to the other three profiles; substantive evidence in favor of the four profile solution which also aligns with findings from prior studies (Barnard, 2004; Stormont et al., 2013). These patterns were not observed in any other models. In summary, sufficient statistical, theoretical, and substantive evidence was present to determine a 4 class profile solution was optimal at both baseline and follow-up data collection waves. In addition, these models align with prior studies observing 4 class solutions with conceptually similar LPTA indicators in a separate sample of teachers (Herman & Reinke, 2017).

Table 1

Comparative fit statistics of cross-sectional pretest and posttest latent profile models.

Pretest (Fall)						Posttest (Spring)					
LPA model fit by number of profiles						LPA model fit by number of profiles					
#LP	BIC	BICadj	BICΔ	LMR	Ent	#LP	BIC	BICadj	BICΔ	LMR (p -v)	Ent
1	4286.10	4267.05	–	–	–	1	4630.05	4611.04	–	–	–
2	3754.19	3722.43	531.91	537.914	0.74	2	4014.49	3982.73	615.56	618.69*	0.77
3	3559.58	3515.13	194.61	212.928	0.77	3	3777.63	3733.18	236.86	253.76*	0.79
4	3489.22	3432.07	70.36	93.215****	0.77	4	3739.39	3682.23	38.25	62.36*	0.79
5	3479.38	3409.52	9.84	34.909	0.78	5	3728.02	3658.16	11.37	36.50	0.83
6	3475.77	3393.21	3.61	41.438	0.78	6	3721.03	3638.47	6.99	26.83	0.84

Note. #LP = number of latent profiles; BIC = Bayesian Information Criteria; BICadj = sample size adjusted BIC; BICΔ = difference in BIC from model with k profiles to a model with $k + 1$ profiles; LMR = Lo Mendall Rubin Test; * = p -v < 0.001; Ent = entropy.

Bold text for latent profile #4 indicates the final class model fit indices.

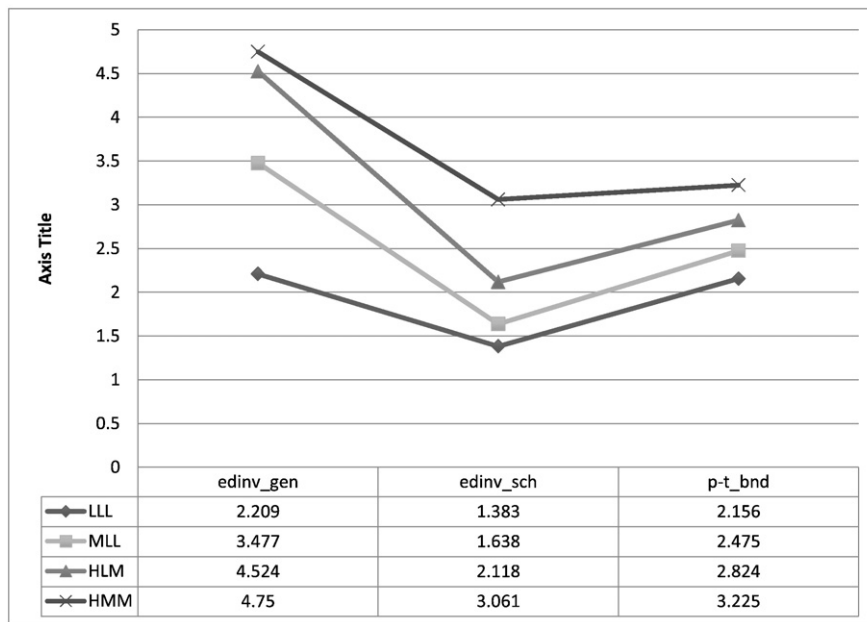


Fig. 1. Pretest means, profile counts, and proportions of the four profile solution. This figure represents LLL = low parent involvement at home and school and low teacher-parent bond; MLL = moderate parent involvement, low contact at school and low teacher-parent bond; HLM = high parent involvement, and low contact at school and moderate teacher-parent bond; HMM = high parent involvement, moderate contact at school and moderate teacher-parent bond; edinv_gen = teacher rated parent education involvement in general; edinv_sch = teacher-rated parent contact at school; p-t_bnd = teacher-rated parent-teacher bonding.

3.3. LPTA: impact of IY on changes in teacher perspectives of parental involvement

Shown in Table 3, the association between treatment condition and transition patterns was significant, $\chi^2 (2, N = 805) = 16.46, p < 0.003$, though the effect was small, Cramer's $V = 0.143$ (Cohen, 1988). On balance, 59 teacher-rated parental involvement profiles (10%) transitioned or progressed to a more adaptive state as defined by improved perceptions of bonding and

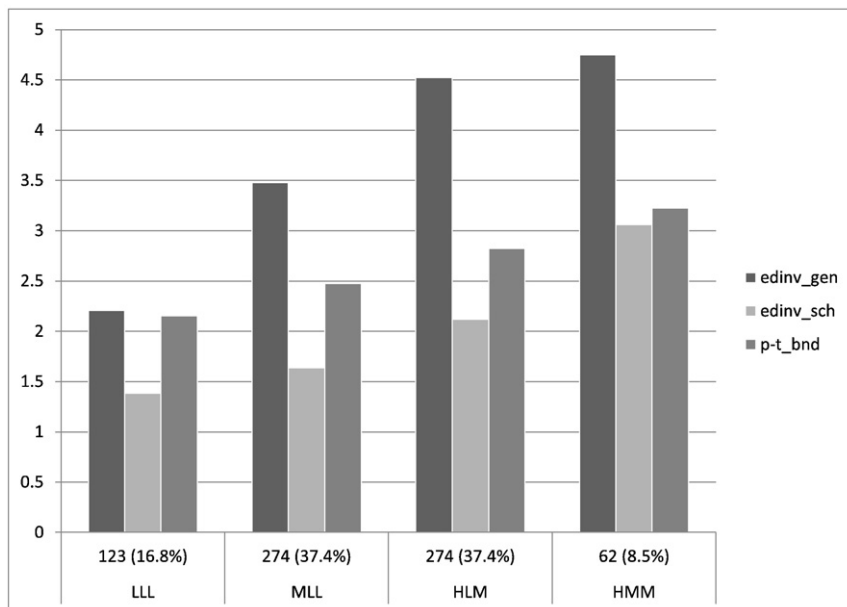


Fig. 2. Four profile pretest model of teacher endorsement of parent involvement in education at home, at school, and parent-teacher bonding. This figure represents subsample size and whole sample proportions listed in parentheses in the profile legend. LLL = low parent involvement at home and school and low teacher-parent bond; MLL = moderate parent involvement, low contact at school and low teacher-parent bond; HLM = high parent involvement, and low contact at school and moderate teacher-parent bond; HMM = high parent involvement, moderate contact at school and moderate teacher-parent bond; edinv_gen = teacher rated parent education involvement in general; edinv_sch = teacher-rated parent contact at school; p-t_bnd = teacher-rated parent-teacher bonding.

Table 2

Teacher-rated pretest auxiliary variable means and standard deviations by condition, total sample, and test results by profile.

SCBE rating	IY (<i>n</i> = 504) <i>x</i> (<i>sd</i>)	CC (<i>n</i> = 301) <i>x</i> (<i>sd</i>)	Total (<i>N</i> = 805) <i>x</i> (<i>sd</i>)	LLL <i>x</i> (<i>sd</i>)	MLL <i>x</i> (<i>sd</i>)	HML <i>x</i> (<i>sd</i>)	HMM <i>x</i> (<i>sd</i>)	χ^2 (<i>p</i>)
Ext. T-score	56.53 (10.48)	55.16 (11.29)	56.02 (10.80)	51.04 (11.25)	53.56 (10.49)	57.25 (10.51)	57.95 (11.73)	28.54 (0.001)
SoCo T-score	49.51 (11.26)	48.58 (11.89)	49.17 (11.51)	43.37 (10.59)	47.36 (10.61)	55.81 (10.66)	56.25 (10.88)	115.58 (0.001)
ADHD Sx	7.14 (6.16)	7.03 (6.49)	7.09 (6.28)	9.06 (6.11)	7.35 (6.15)	5.03 (5.88)	5.09 (6.54)	31.80 (0.001)
Disrupt-Adults	0.44 (0.97)	0.57 (1.24)	0.49 (1.07)	1.04 (0.77)	0.55 (1.12)	0.44 (0.89)	0.36 (0.96)	7.71 (0.020)
Disrupt-Peers	0.63 (1.09)	0.83 (1.31)	0.70 (1.18)	1.61 (1.48)	0.97 (1.09)	0.81 (1.09)	0.71 (1.19)	9.84 (0.013)

Note. SCBE = Social Competence and Behavior Evaluation; IY = Incredible Years; CC = control condition; Total = whole sample; Ext. = externalizing; SoCo = social competence; Sx = symptoms; Disrupt-Adults = disruptive behavior towards adults; Disrupt-Peers = disruptive behavior towards peers; LLL = low parent involvement at home and school and low teacher-parent bond; MLL = moderate parent involvement, low contact at school and low teacher-parent bond; HML = high parent involvement, and low contact at school and moderate teacher-parent bond; HMM = high parent involvement, moderate contact at school and moderate teacher-parent bond.

involvement of parents at home and school. Of those 59 who improved, 51 (86%) were randomized to the IY TCM condition and only 8 (14%) were in the CC. Among the 34 teacher-rated parental involvement profiles who digressed to a less adaptive profile marked by declining perceptions of parental involvement and bonding, 18 (53%) were randomized to the IY TCM program and 16 (47%) were in the CC. Lastly, among teacher-rated parental involvement profiles who did not change their perceptions of parent bonding and involvement—435 (61%) were randomized to the IY condition and 277 (39%) were randomized to the CC. In short, among teacher-rated parental involvement profiles transitioning from one profile to another—a significantly higher proportion randomly exposed to the IY TCM program progressed to a more adaptive state marked by improved perceptions of parental involvement and bonding.

To examine the transition patterns of teacher profiles marked by their ratings of parental involvement by treatment condition in greater detail, we plotted each transition. As shown in Fig. 3, each teacher-rated parental involvement profile fit into one of 16 patterns. Represented by the arrows on the top and moving to the right—there are six progressing patterns revealing profiles transitioning from a less to more adaptive views of parental bonding and involvement in education. Conversely, shown by the arrows on the bottom and pointing left—the figure shows six digressing patterns of profiles transitioning from a more to a less adaptive view of parental bonding and involvement. The cylinders in Fig. 3 represent profiles that did not progress or digress—but instead remained static from baseline to follow-up. The 715 values in the cylinders represent teacher-rated perspectives of bonding and parental involvement that did not change from pretest to posttest. On balance, a greater proportion of parents in the IY condition progressed or improved in their endorsement of bonding and parental involvement. And—an artifact not typically examined in intervention research—a greater proportion (61%; IY = 437) of parents in the IY condition stayed the same or did not digress or worsen compared to those in the control condition (39%; CC = 278), χ^2 (2, *N* = 715) = 6.03, *p* < 0.008, Cramer's *V* = 0.09. That said, because a few of the cell sizes are small, we hesitate to make profile-specific interpretations.

4. Discussion

In this study, four profiles of teacher-rated parental involvement patterns were found at baseline and follow-up waves of data collection from a randomized control study. These profiles consisted of teacher-rated parental involvement patterns characterized by varying levels of involvement with teachers, at school, and teacher perceptions of bonding with parents. We hypothesized that, based upon findings from similar studies (Herman & Reinke, 2017), we would find a four profile solution from data using the INVOLVE-T subscales (i.e., involvement with teacher, involvement at school, and bonding with parents) to assess teacher perceptions of parental involvement. The data in the current study fit a four profile solution as previously observed. Next, we hypothesized that teachers fitting a profile characterized by low perceptions of parental involvement are more likely to concurrently rate those students as having more behavior and academic problems compared to teachers in profiles with more adaptive views of parental involvement (Herman & Reinke, 2017). Overall tests presented in Table 2 suggested that teachers who reported

Table 3Transitions of teachers (*N* = 805) between profiles from pretest to posttest by treatment and control condition (%).

	LLL		MLL		HML		HMM			
	Stayer	Progressor	Digressor	Stayer	Progressor	Digressor	Stayer	Progressor	Digressor	Stayer
IY <i>n</i> (%)	58 (79)	15 (21)	6 (3)	149 (85)	21 (12)	6 (3)	171 (89)	15 (8)	6 (10)	57 (90)
CC <i>n</i> (%)	50 (96)	2 (4)	4 (4)	93 (93)	3 (3)	8 (7)	88 (88)	3 (3)	4 (8)	46 (92)
χ^2	4.23	4.87	0.06	0.03	5.1	5.72	2.02	6.76	0.10	3.72
<i>p</i>	0.03	0.02	0.55	0.46	0.01	0.02	0.09	0.01	0.49	0.04
ϕ	0.07	0.08	–	–	0.01	0.08	0.05	0.09	–	0.07

Note. IY = Incredible Years Teacher Classroom Management; CC = control condition; rows may not sum to 1 due to rounding; *p* = *p*-value; ϕ = effect size. LLL = low parent involvement at home and school and low teacher-parent bond; MLL = moderate parent involvement, low contact at school and low teacher-parent bond; HML = high parent involvement, and low contact at school and moderate teacher-parent bond; HMM = high parent involvement, moderate contact at school and moderate teacher-parent bond; edinv_gen = teacher rated parent involvement in general; edinv_sch = teacher-rated parent contact at school; p-t_bnd = teacher-rated parent-teacher bonding.

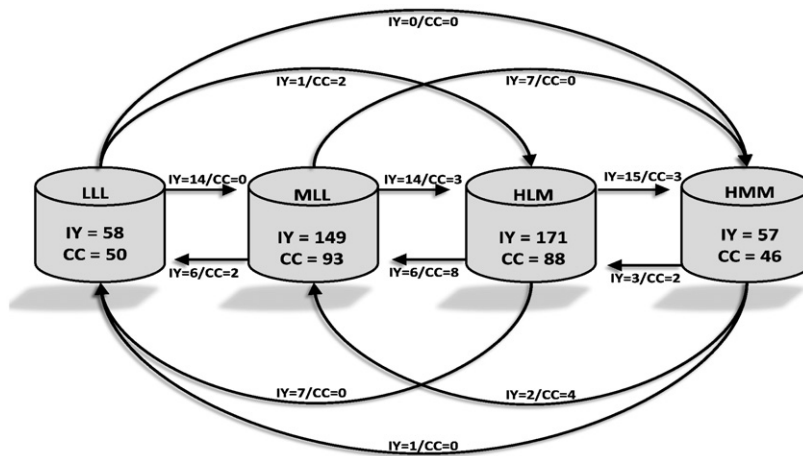


Fig. 3. Transition patterns of teacher-rated parent involvement profiles in IY ($n = 504$) and CC ($n = 301$). This figure represents LLL = low parent involvement and contact at school and low teacher-parent bond; MLL = moderate parent involvement, low contact at school and low teacher-parent bond; HLM = high parent involvement and low contact at school and moderate teacher-parent bond; HMM = high parent involvement, moderate contact at school and moderate teacher-parent bond.

low perceptions of bonding with parents and low involvement at school and with teachers were also more likely to concurrently rate student behaviors as more problematic. The findings here echo previous studies that have examined the relationship between teacher perceptions of parental involvement and teaching practices (McCoach et al., 2010; McDermott & Rothenberg, 2000) as well as perceptions of student behaviors (Barnard, 2004). Lastly, we hypothesized that teachers randomized to the IY TCM condition, compared to teachers randomized to the control group, would develop more adaptable posttest views of parental involvement. Our findings here suggested that teachers randomized to the IY TCM condition did develop more adaptable views of parental involvement at posttest compared to control condition teachers.

Findings from the present study support the premise that targeting teacher perspectives of parental involvement is a malleable mechanism of change. To be sure, the present study is not only mindful of the core principle of replication in social sciences (Ioannidis, 2012), the present study adds rigor to the idea of addressing teacher perceptions of parental involvement as a malleable intervention mechanism that may confer benefits to struggling students (Herman & Reinke, 2017). Though the effects observed in this study were small (Cramer's $V = 0.09$ – 0.14) the results here were gathered from a randomized study. Similar to Jaynes (2003, 2005, 2007) observations that for studies using enhanced statistical controls and research design rigor showed less effect. Such observations alone support the case that more work is to be done in the area of parental involvement—but if we are to understand the true effect of parental involvement we must commit to using rigorous methods.

In the current study, teachers randomly assigned to IY TCM were more likely to develop favorable perspectives of parental involvement—and these findings map onto prior effectiveness studies of IY on an array of outcomes (Webster-Stratton et al., 2008). Not only does IY TCM training provide teachers with feasible strategies aimed at increasing parental involvement, it actively addresses attitudes and biases rooted in negative stereotypes held by teachers and projected onto parents who are not “visibly” involved in their child's education. Because our analyses here, as well as prior work (Barnard, 2004), have suggested that negative teacher perspectives of parental involvement may have adverse consequences for teacher perspectives of student behavior (Henderson & Mapp, 2002; McDermott & Rothenberg, 2000), we argue it is important to address this issue via a teacher training pathway.

To be sure, it seems logical that if a child is struggling academically and that child has behavior problems—when a teacher perceives that a child's family is not actively engaged in his or her education—then it is plausible that teacher may be vulnerable to biases and subtle, unintended actions which make it more difficult for a struggling student to succeed (Malone et al., 2000). Some support for this concern is presented by the findings in this study as well as prior studies (Herman & Reinke, 2017) where it is revealed that teachers who rate low levels of involvement and bonding also concurrently rated student behaviors as more problematic. For this reason alone, intervening on behalf of students by addressing teacher biases surrounding the concept of parental involvement may not only equip teachers with skills for encouraging increased parental involvement—but in cases where parents may not be involved, there may be some protective benefits conferred upon students who may otherwise be at increased risk for failure (McDermott & Rothenberg, 2000). However, more research using rigorous designs and quality measures are needed in order to fully understand the impact of the teacher training module of IY TCM.

Although the findings largely replicated the profile structure and findings observed in prior studies (Herman & Reinke, 2017), there were some notable differences. In the present study, the measures contributing to teacher views of parental involvement profiles all corresponded with progressively improving levels of involvement. That is, as one dimension of involvement increased for each profile, the other dimensions also increased. In the two prior studies that used a similar profile analytic approach, parental involvement dimensions varied across profile types, with low contact and high comfort profiles representing one of the most adaptive types as related to student outcomes. These inconsistencies are likely an artifact of the differing measurement

approaches used in these studies. Whereas Herman and Reinke (2017) used two indicators, contact and comfort, to define involvement profiles, here we used three including two types of contact, with school and with teacher. It is possible that this added indicator differentially weighted contact so that no low contact, high comfort profile emerged. On the other hand, we cannot rule out the possibility that profiles were different because of sample characteristics. That is, the present study largely consisted of teacher reports on high poverty, Caucasian American students and families from the Northwest while prior studies relied largely on teacher report of low income, African American students and their families in a Midwestern community. Additionally, prior studies used youth in grades K-3 compared to the focus in this study on kindergarten entry. It is possible if not likely that different parent involvement profiles emerge across development.

It is also noteworthy that teachers in the intervention condition were more likely to perceive parents of students in their classrooms as transitioning to more adaptive profiles post-intervention compared to the control condition. This finding is consistent with another randomized trial of IY TCM (Herman & Reinke, 2017). Thus, two randomized studies of IY TCM support the hypothesis that the training promotes adaptive teacher perceptions of parental involvement—the first step in making lasting change in teacher behaviors. Given the established relationship between teacher perceptions of involvement and current and subsequent student academic outcomes (Barnard, 2001), these findings provide some evidence of the promise of IY TCM as an avenue to potentially improve not only teacher and parent relations—but also student achievement. The present study adds to this statement as both studies observed similar outcomes in separately implemented randomized trials conducted by different investigators, using similar measures, and drawing from ethnically dissimilar kindergarten samples in two geographically separate locations. Thus, prevention efforts to target and improve teacher perceptions of parental involvement may cultivate enhanced proximal child level processes that buffer the cascade of events leading to poor distal outcomes.

4.1. Strengths and limitations

The study used a rigorous design with a large sample of kindergarten students and teachers and minimal attrition between baseline and follow-up assessment. Further, the analytical strategies used in the current study retains the profile structure. We also controlled for clustering in the current analyses through a robust Huber-White correction. Measurement wise, parental involvement was modeled using a multidimensional approach and methods that allowed adaptive and less adaptive profile types to remain intact so we could examine their response to the intervention. In short, teachers randomly assigned to receive IY TCM were significantly more likely to develop more adaptive perceptions of parents and less likely to transition to less adaptive profiles; findings that replicate and extend prior studies.

The study is not without limitations. Statistically, latent profile transition analyses and other person-centered methods are evolving. As such, the limitations of these models are not clearly understood (Asparouhov & Muthén, 2013; Hagenaars & McCutcheon, 2002; Morin & Marsh, 2015; Muthén & Muthén, 2000; Thompson et al., 2011; Vrieze, 2012). The validity of the findings—in this case, teacher profiles representing varying perspectives of parental involvement—is undeniably related to the quality of measures used in the study. To provide a degree of protection, we used the most reliable measures of teacher views of parental involvement (e.g., involvement at school, with teacher, and bonding). Future studies might consider using similarly reliable yet parallel measures to add rigor to the examination of these findings. Although these measures definitely are highly correlated, the LPTA framework allowed the profiles to retain their unique structure. In this regard, the LPTA approach provides a degree of statistical control when groups differ at baseline—as happened here in our study. That is, though IY TCM and control condition teachers were significantly different at baseline on bonding, these differences are accounted for because the analyses are conducted within profiles comprised of similarly situated teachers from both condition. As such, each profile consists of a statistical average on each of the three latent indicators used to create the profiles (i.e., involvement with teacher and at school and bonding)—and these scores are taken from teachers in both conditions.

As with many statistical procedures it is also true with LPTA approaches; consensus on model development strategies is not yet firmly established. As a result, potential errors in applying these models are not fully understood (Asparouhov & Muthén, 2013; Hagenaars & McCutcheon, 2002; Morin & Marsh, 2015; Muthén & Muthén, 2000; Thompson et al., 2011; Vrieze, 2012). To strengthen our analysis, we followed a stepwise estimation procedure that is currently supported by methodologists in the area of latent class models (Asparouhov & Muthén, 2013) and used an explicit model building strategy that includes a comparative selection process relying on both theoretical, statistical, and prior findings from other studies. As in SEM, model selection is informed by theory and prior studies (Kline, 2011) and the use of particular statistics such as the BIC may change as LPTA models evolve (see, e.g., Hagenaars & McCutcheon, 2002; Swanson et al., 2012; Vrieze, 2012). Though the analyses used here attempts to preserve the person level perspectives of important indicators of teacher perceptions of parental involvement. Nonetheless, because a few of the cell sizes in the analysis do have small sample sizes, we hesitate to make profile-specific interpretations.

Another limitation of the present study is that we relied solely on teacher perceptions of parental involvement as indicators in our analytic approach. On the other hand, available evidence favors teacher perceptions as more reliable predictors of future child outcomes compared to parent perceptions of their own involvement (Barnard, 2004). However, future studies might seek to examine and replicate prior findings by comparing teacher and parent perceptions of parental involvement and confirm which is more predictive of student outcomes. Teacher perceptions of parental involvement are best viewed as one valid and appropriate method for assessing the construct in a similar way that teacher ratings of student behaviors is a common and meaningful intervention target.

A second limitation is that we were unable to assess potential mediators of the observed effects on teacher ratings. Future studies may also collect data to examine potential mediators at intervals before and after the intervention to determine the

sequence of effects. For example, teacher efficacy, school climate, and parent comfort are important predictors of parental involvement and may provide explanation of potential malleable mechanisms that may improve intervention effects. Lastly, unlike Herman & Reinke, 2017, the intervention condition also received social skills training, so it is unclear how the training in the current study may have added improvements in parental involvement. Specifically, some of the social skills training encouraged parents to engage in educational activities at home. However, future studies may use factorial designs to determine what extent—if any—the social skills activities actually impact teacher perceptions of parental involvement.

4.2. Implications

Increasing parental involvement has been touted as a panacea to school success but claims surrounding the impact of parental involvement largely rely on findings from correlational studies. The current study contributes to the advancing this research by addressing a few of these areas—namely, we report on the effects of an intervention targeting teacher perceptions of parental involvement and bonding, we used a multi-dimensional measurement and analytical approach, we relied on data collected from teachers, and the study relied on a rigorously designed randomized control trial. Though we only examine proximal teacher perceptions here—changes in teacher bias and attitudes are key to achieving meaningful behavioral changes that may confer benefits to students (Bakker et al., 2007; Barnard, 2004). Much like teacher ratings of student behaviors are a widely used and valid measure of the student behavior construct, teacher perceptions are a meaningful indicator and relevant measure of parental involvement. As such, the findings here add rigor to the assumptions drawn by correlational studies.

Practice implications of this study provide guidance for practicing school psychologists and social workers to focus on improving pathways to address parental involvement. IY TCM is an intensive, multi-component intervention targeting a range of classroom management skills—including strategies to assist teachers to cultivate better relationships with students and parents. This can make implementing IY TCM a complex endeavor for school-based practitioners even though prior studies have documented the positive effects on teacher and student classroom behaviors (Webster-Stratton et al., 2008). Here we have replicated one prior trial indicating the program's effects on teacher perceptions of parental involvement, a proximal outcome targeted by the intervention. For practitioners, focusing on improving teacher knowledge and skills to enhance pathways for parents to be involved—particularly for high risk kids and families—is a feasible and achievable strategy that may confer benefits for students.

Regarding implications for research of these practices, unpacking program elements using a dismantling design may help determine whether the package works in concert or if subcomponents alone achieve similar effects. For instance, although parent relationships are discussed in every IY TCM workshop, parental involvement content represents only part of the overall treatment program. Extracting the parent engagement components into a subprogram might prove to be helpful in altering teacher perceptions of parental involvement and even more feasible than delivering the entire program if the primary interest is in fostering greater involvement. On the other hand, the entire package, including the extended timeframe requiring ongoing practice and reflection, may be necessary to produce these effects. The appropriate design for testing whether similar effects would be obtained would be to compare to reduced program to the full program.

Such studies would also help address the mechanisms by which IY TCM changes teacher perceptions of parental involvement. Possible mechanisms include changing teacher biases—especially for the most challenging students and families—may facilitate improved relations with these students and families which increase the likelihood of improved student engagement and learning outcomes (Herman & Reinke, 2017). Alternately, the program might work as a package, whereby changes in classroom management overall induce improvements in student behaviors leading to changes in teacher perceptions of parents. A dismantling design with more frequent assessments of each of these potential mediators would help address the sequence of change in IY TCM interventions.

Attending to and altering teacher biases about students and families is a critical area of inquiry for improving outcomes for the most disadvantaged students. Teachers receive little training that targets biases, despite the well-established literature showing the role teacher perceptions have on student development. Understanding biases related to family demands and involvement especially can influence teacher interactions with students and families in negative ways. For example, parents may have multiple demands at home (e.g., child care; Lee & Bowen, 2006) while also maintaining jobs or other responsibilities with less flexible hours. Teachers need to understand both the importance of parental involvement and also the challenges parents may face initiating and sustaining involvement. Barriers become even more pronounced for families affected by issues of poverty, and/or past negative experiences with school (Aikens & Barbarin, 2008; Dearing et al., 2006; Fantuzzo et al., 2004; Stormshak, Dishion, Light, & Yasui, 2005).

It should be noted that several programs and practices have been developed to increase parental engagement in mental health services for their children (e.g., McKay and Bannon, 2004; Nock & Kazdin, 2001), but these programs do not typically target parent participation in education. Similarly, a few intensive behavior consultation programs examine parent education involvement but these approaches focus on one parent at a time rather than on promoting parental involvement on a class- or school-wide level (e.g., Sheridan et al., 2012). Class- or school-wide programs promoting parental involvement have the potential for widespread adoption and a broader preventive influence compared to individually-delivered programs targeting single families. That is, as the findings of this study suggest—universal teacher training directly addressing teacher perspectives of parental involvement may provide efficient approaches to improving strategies to increase parental involvement while reducing the negative impact of biases for students who struggle.

4.3. Summary

IY TCM provides an innovative approach for engaging teachers in self-reflection about their relationships and teaching skills. The intervention is universally well-received by teacher participants despite the challenge it presents them with critically evaluating their current practices and beliefs. In addition to the promising findings reported here regarding the effects of IY TCM on teacher perceptions of parental involvement, the current study also suggests the need to unpack the various elements of IY TCM for training teachers and examine their disassembled effect on student outcomes. Teaching is a demanding profession and ongoing professional development will always be essential. To be sure, the cumulative evidence certainly suggests that IY TCM is a scientifically based program. Strategies embodied in IY TCM like group delivery, Socratic questioning, structured self-reflection, video modeling, role play, on-going consultation, and tight control over the adherence to the elements of the program may improve learner outcomes, particularly for those students faced by life's most challenging events.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jsp.2017.03.003>.

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