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Final Evaluation Report: A Randomized Controlled Trial of the Effectiveness of a Responsible Fatherhood Program: The Case of TYRO Dads

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Executive Summary

Despite the growing number of responsible fatherhood programs, only a few of them have been evaluated based on a randomized controlled trial. To fill this gap in evaluation research on fatherhood programs, we conducted a single-blind, randomized, controlled trial to assess the effectiveness of an Ohio-based fatherhood program called "TYRO Dads" in improving the father-child relationship among low-income, primarily unmarried, nonresidential fathers.

We collected data from 252 fathers who participated in the study at 17 research sites in eight cities in Ohio by conducting a survey three times between February 2015 and September 2016: before the intervention (pre-test), immediately after the intervention (post-test), and three months after the intervention (follow-up). Study participants were randomly assigned to two groups: 137 in the intervention or treatment group who took "TYRO Dads," a five-week fatherhood course (which consists of 10 sessions of 20 hours in total; i.e., two two-hour sessions per week) and 115 in the control group who only were offered the opportunity to attend an informational session about employment resources and other resources available to help them achieve their goals.

TYRO Dads participants and staff.

The primary outcomes of interest include fathers' reports of satisfaction with parenting their child and the frequency of father-child activities. Also measured were secondary outcomes of intervention: fathers' parenting efficacy, role identity, coparenting relationship with their child's mother, and perceived challenges in parenting.

First, linear latent trajectory analysis showed that the treatment group improved in fathers' parenting satisfaction, parenting efficacy, coparenting relationship, and, to a lesser extent, role identity over the 18-month period. Second, subsequent analysis to test the secondary outcomes' mediation of the relationships between the treatment and the primary outcomes revealed that all three mediators partly explained the treatment effects—that is, the TYRO Dads program increased the fathers' parenting satisfaction by enhancing their coparenting relationship with their child's mother, parenting efficacy, and role identity. The program was also found to increase the frequency of father-child activities by improving the fathers' perceived role identity and, to a lesser extent, coparenting relationship with the child's mother. Finally, we found that the program's positive effect on fathers' satisfaction with parenting, parenting efficacy, role identity, and coparenting relationship tended to be greater among fathers who participated more often—that is, the more sessions attended, the greater the treatment effect. Particularly, fathers who attended eight or more sessions (which is the minimum requirement for participating fathers to be certified as a TYRO Dad) were the primary beneficiaries of the TYRO Dads program. On the other hand, the treatment effect tended not to be affected by the levels of fathers' perceived challenges in parenting, while there was some indication that the effect might be greater among fathers who did not live with their child than those who did.

A. Background

The past three decades have witnessed a growing cultural consensus on fathers' role in families: fathers are increasingly expected to provide support for their children not only financially but also emotionally (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Many low-income fathers, particularly those who are not married to their child's mother, have difficulty in meeting these expectations. Besides economic burden, these fathers tend to lack confidence in their ability to care for children and to have poor relationships with the child's mother, which has been identified as a major barrier to their active involvement in their children's lives (Coley, 2001).

To help low-income fathers enhance their employment prospects, the coparenting relationship, and the father-child relationship, the U.S. Department of Health and Human Services (HHS) has funded many responsible fatherhood programs. In the newest round of grants, the Office of Family Assistance (OFA) funded 91 organizations in 27 states to conduct projects to promote healthy and responsible fatherhood among low-income fathers (Office of Family Assistance, 2015). Despite the growing number of responsible fatherhood programs, only a few of them have been evaluated based on experimental design—that is, most past evaluations of fatherhood programs were conducted without a control group, leaving the validity of those evaluations questionable (Osborne et al., 2014). Therefore, it remains unanswered whether those programs improve fathers' relationships with their children, and if they do, what factors contribute to the improvement.

Only recently have researchers turned their attention to a randomized controlled trial (RCT) design to determine if the fatherhood program per se makes a difference in father and family outcomes. For example, Cowan, Cowan, Pruett, Pruett, and Wong (2009) analyzed the effectiveness of a California-based, 16-week fatherhood program and found that fathers who attended the program, whether with their partners or alone, reported greater involvement and better quality of relationship with children than couples who only took one three-hour informational session. Similarly, Rienks, Wadsworth, Markman, Einhorn, and Etter (2011) evaluated a two-week (14-hour) relationship workshop in Denver and found that fathers who attended the workshop with their partners reported greater involvement in children's lives than those who attended the workshop alone or did not attend.

The present study intends to contribute to RCT research on fatherhood programs in several ways. First, we assess whether participation in a fatherhood program increases the frequency of participating father's interactions with their children and improves the fathers' satisfaction in parenting. Second, we investigate what explains differences in the relational outcomes between treatment and control groups using measures of the father's parenting efficacy, parenting role identity, perceived challenges in parenting, and coparenting relationship. To the best of our knowledge, no RCT study to date has identified factors that make a difference in fathering outcomes between treatment and control groups. Third, we study exclusively low-income fathers, whose household income is below 200 percent of the 2014 federal poverty level ($47,700 household income for a family of four). Previous studies have included middle- to high-income, as well as low-income, fathers (e.g., Cowan et al., 2009). Finally, we conduct a three-wave panel study of pre-test, post-test, and three-month follow-up surveys to track changes in the outcomes of interest over four months, unlike previous studies that have relied only on pre- and post-tests (e.g., Rienks et al., 2011). This study's longitudinal research design enables us to examine treatment effects on the trajectory of parenting outcomes over time.

B. Intervention

TYRO Dads is a 20-hour course delivered in 10 two-hour sessions over a five-week period. Ron and Catherine Tijerina, co-founders and Co-Executive Directors of the RIDGE Project, created the curriculum based on their personal experience with Ron's 15-year incarceration. The RIDGE Project has been implementing TYRO Dads since 2006. Before facilitating the TYRO Dads curriculum, all class facilitators are required to complete a 16-hour training to learn how to deliver workshops effectively to participants and to be observed by a supervisor highly experienced in facilitating the TYRO Dads curriculum.

Class facilitators use a detailed instructional manual to present the lessons and activities in each workshop. Participants complete a workbook, with key points and questions to be answered for each workshop, space for notes, workshop exercises, and a list of homework assignments.

TYRO is a Latin word meaning novice, apprentice, or someone learning something new. One of the primary goals of the program is for fathers who complete the program to assume a new identity as a "TYRO"—a man of honor and integrity who accepts responsibility for his decisions and embraces his role as father as his highest calling in life. The program is built on the premise that when a father embraces the importance of his fatherhood role, he is motivated to change and do what is right for his children and family. The program is designed to awaken fathers to the harmful impact of their past behaviors on their children and families and to help fathers recognize and change the underlying thinking patterns that have contributed to their decisions and behaviors that have negatively impacted their relationships with their children. While encouraging fathers to accept responsibility for their poor choices in the past, it also provides new ways of thinking that provide hope for a successful future.

All workshops include the following activities:

- Recitation of the TYRO Declaration at the beginning of the workshop: This declaration begins by stating, "I (name) am a TYRO," and then goes on to include numerous other statements beginning with the words "I am." Examples of these statements include the following: "I am a man of good character. I do not embarrass my family nor do I cause them pain and suffering." "I protect those I love and defend those who are weaker than I." "I love my family." The Declaration concludes by stating, "I am a leader. I am a man worth following. I AM A TYRO!"
- Personal check-in: In 30 seconds or less, each participant is asked to share a "high" and (if they desire) a "low" since the previous class session (or, for class session #1, during the previous week). The class facilitator also shares his own "high" and "low."
- A review of the previous workshop.
- A DVD introducing the current workshop.
- Implementation of the current workshop activities: each workshop is highly interactive, with guided group discussion and exercises and minimal lecture. Some examples of activities include identifying virtues and vices, defining what it means to be a man, and identifying one's strengths. In one exercise, participants develop a "Me Board" in which they create a collage of pictures representing their dreams for themselves and their families.
- A review/summary of key lessons learned from the current workshop.
- A homework assignment (e.g., writing a letter to their children, writing an autobiography).
- Recitation of the TYRO Pledge, an abbreviated version of the TYRO Declaration, at the end of the workshop.

TYRO Dads culminates with a completion ceremony that recognizes and affirms the father's progress in terms of changed attitude by conferring the title TYRO and giving the father a TYRO pin. This ceremony reinforces the father's new identity as a man of honor and integrity who embraces his role as father and is committed to doing what is right

for his children and family. TYROs are further encouraged to join the TYRO Alumni Community (TAC) for ongoing support, encouragement, and accountability.

One attraction of the TYRO program is the employment boost it affords to participants. For example, fathers who complete eight of the 10 TYRO Dads sessions receive a certificate of completion that often enables them to access Workforce Innovation and Opportunity Act (WIOA) funding for Commercial Driver's License (CDL) training. Those who completed the TYRO Dads program also received case management services to connect them to community services (e.g., legal aid, substance abuse counseling, etc.) needed to help them overcome challenges to employment and develop healthy and stable family relationships.

C. Hypothesis

The current study assessed the effectiveness of TYRO Dads, designed to improve both qualitative and quantitative aspects of the father's relationship with his children, by focusing on two primary outcomes: fathers' satisfaction with parenting their children (or, in short, parenting satisfaction) and the frequency of fathers doing things together with their children (or, in short, father-child activities). The former is a qualitative aspect of the father-child relationship, whereas the latter is a quantitative one.

To the extent that TYRO Dads is effective in having fathers accept their responsibility as parent and embrace the father's role in parenting as their highest calling in life, fathers who participate in the program are expected to pursue a high-quality relationship with their children and thus feel more satisfied with their parenting than those who do not. In addition, participating fathers are more likely to do things together with their children than their non-participating counterparts. Therefore, it is hypothesized that fathers who took the TYRO Dads course (i.e., treatment group) show increasing trends of satisfaction in their parenting and frequency of interactions or doing things together with the child, compared to those who only were offered the opportunity to attend an informational session (i.e., control group). This hypothesis is stated formally as follows:

> *Hypothesis 1a: Relative to the control group, the treatment group is more likely to show trajectories of increasing parenting satisfaction and frequency of doing things with the child over the four-month period of evaluation.*

The effectiveness of TYRO Dads is also evaluated in terms of improvement in four secondary outcomes of the program: the father's perception of coparenting relationship with the child's mother (Dyer, Fagan, Kaufman, Pearson, & Cabrera, 2017), parenting efficacy (Freeman, Newland, & Coyl, 2008), parenting role identity (Rane & McBride, 2000), and perceived challenges in parenting (Fagan & Kaufman, 2015). It is important to examine these outcomes not only because they are other key products besides the primary outcomes, but also because they potentially help explain why participation in TYRO Dads is expected to increase the primary outcomes, fathers' parenting satisfaction, and the frequency of father-child activities (see Hypothesis 2 below).

The TYRO Dads program is designed to increase self-awareness and expand participants' view of what is possible for themselves and their families. As a result, fathers who participate in the program are likely to learn the importance of various roles they ought to play as father (e.g., meeting emotional as well as physical and financial needs) and parenting skills, which would enhance their confidence as father. TYRO Dads also emphasizes the importance of communication and conflict management skills that would enhance the probability of working cooperatively together with the mother of their children as parents (i.e., coparenting). Because of the expanded view of what is possible for themselves, participating fathers are also expected to be resilient when they face difficulties or obstacles in parenting.

In sum, fathers who took the course (treatment group) are likely to report improving their coparenting relationship with the child's mother, increasing confidence in parenting skills (i.e., parenting efficacy), growing perception of the role of the father to be important (father identity), and decreasing perceived challenges in their parenting the child, compared to those who only were offered the opportunity to attended informational session (control group). These predictions are stated formally in the following hypothesis:

Hypothesis 1b: The treatment group is more likely than the control group to show trajectories of increasing coparenting relationship with the child's mother, parenting efficacy, and parenting role identity and decreasing perceived challenges in parenting the child over the evaluation period of four months.

Once we examine the program's effectiveness by comparing outcomes between the treatment and control group, we conduct an alternative test of Hypotheses 1a and 1b by first examining treatment effects in terms of number of sessions attended and then "dosage effect" to see whether treatment group fathers who attended at least eight sessions (a minimum required to attend a completion ceremony and receive a TYRO pin) were different from those who attended fewer than eight. We not only expect the effect of TYRO Dads on the primary and secondary outcomes to be greater among fathers who attended more sessions than those who attended less or not at all but also test whether the RIDGE-required minimum is a key threshold for reaping the benefit of the program.

Next, we explore whether any of the secondary outcomes account for differences in the primary outcomes between the control and treatment groups. According to the family systems theory, a father's relationship with his child's mother affects the father-child interactions. Positing interdependence of subsystems of the family (i.e., the father-child, mother-child, and father-mother relationships), this theory emphasizes the significance of the father-mother relationship, especially coparenting relationship, in improving the father-child relationship (Cox, Paley, & Harter, 2001; Stevenson et al., 2014). Thus, we expect that attending TYRO Dads will improve fathers' coparenting skills, which in turn will improve their relationship with their child as well.

In addition, we expect the TYRO Dads program to improve fathers' sense of control or efficacy in parenting and their role as a father, as it encourages them to reflect on what it means to be a father and to make a commitment to their role as father. To the extent that TYRO is effective in leading participants to perceive father-as-nurturer to be central to their identity, the program is expected to increase participants' interactions with their children and parenting satisfaction (Ihinger-Tallman, Pasley, & Buehler, 1993). Furthermore, the TYRO Dads program helps fathers reduce perceived challenges in parenting by empowering them with parenting methods and skills, which in turn are likely to enhance father-child relationships, particularly the frequency of father-child activities. These predictions lead to the following hypothesis:

Hypothesis 2: Treatment group fathers are likely to show trajectories of increasing parenting satisfaction and father-child activities compared to their control counterparts in part because those fathers are expected to improve in coparenting relationship, parenting efficacy, and parenting role identity, while experiencing a reduction in perceived challenges.

Lastly, we examine whether the treatment effects were different between participants who were living with their child and those who were not. We expect residential fathers to have a structural advantage in spending time with their child over nonresidential fathers. Therefore, the intervention effects may be stronger among residential fathers (Fagan & Iglesias, 1999). In addition, fathers' personal challenges may moderate—that is, weaken—the effects of the intervention on parenting outcomes (Fagan & Kaufman, 2015). Specifically, the TYRO Dads program might be more effective among fathers who perceive lower levels of challenges and obstacles in parenting their child compared to those who perceive higher levels. These predictions are stated as follows:

Hypothesis 3a: The treatment effects on the primary and secondary outcomes are more likely to be observed among residential than nonresidential fathers.

Hypothesis 3b: The treatment effects are likely to be greater among fathers who perceived low levels of challenges in parenting their child than those who perceived high levels.

D. Method

D.1 Research Design

As noted above, we utilized a randomized, controlled trial design to evaluate the effectiveness of TYRO Dads in improving the father-child relationship outcomes among economically disadvantaged fathers in Ohio by comparing fathers who participated in the program with those who only were given the opportunity to attend an informational session. The effects of the program on the father-child relationship outcomes were examined using survey data collected at three time points: baseline (pre-test), immediately after the intervention (post-test), and three months after the intervention (follow-up). Informed consent was obtained before baseline data collection. After being exempted from review by Baylor University's Institutional Review Board (IRB Reference #: 679364) in January 2015, the study was conducted between February 2015 and September 2016.

TYRO Dads participants and staff.

D.2 Participants

Eligibility criteria for study participants included being a male who was 18 years old or older, a father of at least one biological child under the age of 19, and having a household income at or below 200 percent of the federal poverty level. The study participants were recruited from a variety of settings, including child support enforcement agencies, job and family services, organizations serving individuals with mental/behavioral health needs, organizations serving individuals with drug and/or alcohol addiction, probation and parole, courts, reentry coalitions, Head Start, and one-stop employment agencies.[1] At these organizations, flyers and sign-up forms for this study were posted along with TYRO applications, and the facilitator of TYRO Dads actively recruited at the locations where the classes were held. Individuals interested in participating in this study sent their completed application and sign-up form to the RIDGE headquarters office. At the initial screening stage, staff at RIDGE regional offices screened applicants and emailed a list of those eligible for this study to the principal investigator.

D.3 Sites

Data for the present study were collected at 17 sites across eight Ohio cities (Canton, Cincinnati, Cleveland, Dayton, Lima, Mansfield, Toledo, and Wooster). Some cities had multiple sites (e.g., Cleveland), while others had one (e.g., Canton), as Figure 1 shows. Besides these 17 sites, four more sites had no data collected because no applicants were present at the baseline assessment. A total of six class facilitators were involved in this study, and each 20-hour course was facilitated by a single instructor except at the Dayton-Job Corps site. The RIDGE headquarters trained class facilitators of all sites for data collection and research procedures.

D.4 Data Collection

Data were collected three times by conducting pre-test, post-test, and three-month follow-up survey. TYRO class facilitators at each location administered both the pre-test survey and post-test survey, following a predetermined protocol/script.

Pre-test survey. Baseline survey was administered in an orientation meeting that was scheduled immediately prior to TYRO Dads class session #1 at each site. All cohort participants were notified via mail of the time and location of the baseline administration. Both treatment and control group fathers participated in the survey as a group.

Post-test survey. Post-test survey was administered to treatment group fathers as a group at the end of TYRO Dads class session #10 (the final session). Participants in the treatment group were reminded of the time and location of post-survey administration in TYRO Dads class sessions #8 and #9. Treatment group fathers who missed the last session and control group fathers participated in the survey by telephone. Participants in the control group were reminded via mail of the time and location of the post-survey administration. TYRO class facilitators at each location administered the post-survey, following a predetermined protocol/script. A trained interviewer called those who were absent and asked them to complete the post-test survey on the phone. Fathers in the control group were also called and asked to participate in the post-test.

Follow-up survey. Approximately three months after the post-test survey, fathers in both groups were asked to participate in a follow-up survey by telephone, with a trained interviewer.[2]

D.5 Sample Size

To obtain a sample that would enable us to detect a difference between treatment and control groups, we conducted power analysis that applied a small- to-medium effect size (.30) and expected attrition rate (20%) based on prior research (Cowan et al., 2009; Rienks et al., 2011) for three different correlations of outcomes between time points: low (.25), medium (.50), and high correlation (.75). Our analysis revealed that we would need 172 per group (a total of 344) at baseline after adjusting for an attrition rate of 20 percent. Our baseline sample (n=252), however, was short by 92 people. We will discuss the details of attrition below.

D.6 Randomization

The principal investigator used a computer-generated list of random numbers using Stata MP 13.1 (StataCorp, College Station, TX) and assigned recruited fathers to treatment or control group prior to fathers' completion of the informed consent and pre-test with a 1:1 allocation ratio.[3] Then, a random assignment list was emailed to the RIDGE data-entry coordinator. The class facilitators and all participants were blinded to the randomization. To ensure that the coordinator adhered to randomization, the principal investigator monitored her list of random assignment, which the coordinator used to prepare letters informing participants of their group assignment by placing the letters in sealed envelopes. For those assigned to the control group, a gift card incentive was also included in the envelope with the letter. The coordinator then gave the sealed envelopes to the facilitator so class facilitators could adhere to randomization. A total of 469 fathers eligible for our study were assigned to treatment (n = 212) and control groups (n = 257). Of the 469 randomized fathers, only 252 fathers completed the pre-test survey and informed consent. After the 252 fathers gave informed consent and completed the pre-survey, the facilitator handed out the sealed envelopes to fathers, at which time participants learned of their group assignment. Facilitators were not informed about participants' group assignments until after participants learned of their group assignments.[4]

D.7 Measurements

We constructed a composite measure of key constructs based on exploratory factor analysis (using Maximum Likelihood estimation) and inter-item reliability analysis, conducted separately for pre-test, post-test, and three-month follow-up survey. Factor loadings and Cronbach's alphas are presented in Appendix A. In the remainder of this section, names of composite measures are italicized.

We employed multiple developmentally appropriate items to measure *the frequency of father-child activities*. The items varied depending on the age of child: 19 items (12 months or younger), 26 items (older than 12 months but younger than 12 years old), and 24 items (12 years old or older). Each item was measured using a 5-point Likert scale, where 1 = *rarely or never* and 5 = *almost every day.* For each age group, we constructed a scale of father-child activities by averaging the items at pre-test, post-test, and follow-up. All factor loadings were higher than .500, and inter-item reliability was excellent (see Appendix A), ranging from .980 to .984 (the child 12 months old or younger), from .984 to .988 (the child older than 12 months but younger than 12 years old), and from .969 to .978 (the child 12 years old or older).

We measured fathers' *parenting satisfaction* using the four items about how happy and satisfied the father was with his relationship with the child, how good the relationship was, and how close the father felt with the child. These items were taken from the NRI-Relationship Qualities Version (NRI-RQV; Furman & Buhrmester, 1985). They were all measured based on a 5-point Likert scale, although the content of response options differed among the items (i.e., 1 = *not at all happy*, 5 = *extremely happy*; 1 = *not satisfied*, 5 = *extremely satisfied*; 1 = *not good*, 5 = *great*; 1 = *not at all close*, 5 = *extremely close*). All items were loaded on a single factor with high loadings, ranging from .827 to .917 (pre-test), from .780 to .890 (post-test), and from .854 to .885 (follow-up). Inter-item reliability was excellent across the three waves (α = .925, .920, and .925). We constructed a scale of parenting satisfaction by averaging the four items.

Parenting efficacy was measured by seven items adopted from the parenting self-efficacy scale developed by the Fatherhood Research and Practice Network (FRPN). The items on this scale assess father's perceived sense of control in providing parental care for child, such as, "Helping the child when he/she is upset or distressed" and "Understanding what the child wants or needs," using a 4-point Likert scale (1 = *definitely not true*, 4 = *definitely true*). Factor loadings ranged from .623 to .878 (pre-test), from .703 to .912 (post-test), and from .841 to .922 (follow-up), and internal reliability was excellent at all surveys (α = .930, .946, .958). A scale of parenting efficacy was constructed by averaging the seven items.

We also constructed our own scale of parenting *role identity*. Fathers were asked how important different parental roles—for example, "Being a good financial provider for my child," "Being always available to my child," and "Meeting my child's physical and emotional needs" (1 = *not at all important*, 4 = *extremely important*)—were to them. Factor loadings were moderate to high, ranging from .509 to .796, from .574 to .890, and from .694 to .882, whereas inter-item reliability was high to excellent (α = .872, .909, and .922).

To operationalize the father's perception of *coparenting relationship* with the child's mother, we employed eight of 11 FRPN-validated Coparenting Relationship Scale items that measure the extent to which parenting partners trust each other and have quality communications between them (Cohen & Weissman, 1984). They tap the construct's three dimensions, undermining (two items), alliance (four items), and gatekeeping (two items) (Dyer, Fagan, Kaufman, Pearson, & Cabrera, 2017), using 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

Exploratory factor analysis generated a two-factor, not three-factor, solution, with the negative items of undermining and gatekeeping being loaded on one factor and the positive items of alliance on the other across all three surveys, and their loadings were all higher than .400 (see Appendix A). Since the two-factor solution was likely to be a methodological artifact (i.e., negative and positive items clustered separately) and the items had very high internal reliability at each survey (α = .904, .915, .887), we averaged all eight items to construct a scale of coparenting relationship.

Father's *perceived challenges* in parenting his child were measured by eight items adapted from the FRPN (Fagan & Kaufman, 2015). This measure gauged the perceived impact of each of the listed challenges the father experienced in the past month prior to completing the survey (e.g., "Not having a steady place to live," "Depression," and "Unable to pay child support") on his relationship with the child (1 = *not at all*, 4 = *a great deal*). Eight of them were found to be moderately loaded on a factor with good inter-item reliability being .782, .828, and .764 and loadings ranging from .344 to .661, from .506 to .702, and from .451 to .679 at pre-test, post-test, and follow-up, respectively. We constructed a scale by averaging the eight items.

Besides these composite measures, we constructed variables to measure various characteristics of father and, to a lesser extent, mother and child. For example, our survey included items asking about father's residential status (i.e., whether the father was living with the child), visitation status (e.g., whether the father has ever had restricted visitation with the child), child support status (i.e., whether the father was supposed to pay child support for his child) and

payment (i.e., the amount of monthly payment, how much of the child support was actually paid in the last month, and whether it was the full amount, more than half, less than half, and nothing paid), employment status, and current housing or living situation. Father's sociodemographic information was drawn from the completed application form: age, race and ethnicity (i.e., Hispanic vs. non-Hispanic), education, income (both household and personal), marital status, and criminal backgrounds (i.e., prior incarceration, parole status, and conviction for sex offense).

D.8 Analytic Strategy to Assess Effects of Intervention on Outcomes

First, to test whether fathers' participation in the TYRO Dads program increased their parenting satisfaction, the frequency of father-child activities, parenting efficacy, role identity, and coparenting relationship with the child's mother and decreased perceived challenges in parenting over the four-month period of evaluation (Hypotheses 1a and 1b), we employed Mplus 8.0 to apply growth curve modeling. This modeling enables us to examine a latent (i.e., not directly observable) trajectory of an outcome variable—for example, parenting satisfaction—by estimating two growth factors, intercept and slope factor of trajectory, measured by the variable's repeated measures—that is, parenting satisfaction at the pre-test, post-test, and follow-up. We expect to find the effect of program participation on the slope factor of all the primary and secondary outcome variables to be positive (the treatment increasing the outcome over time) except perceived challenges, for which we expect the effect to be negative (the treatment decreasing perceived challenges over time).

We also conducted two alternative tests of Hypotheses 1a and 1b by examining whether the treatment effects on the primary and secondary outcomes tended to increase as class attendance increased. Specifically, we estimate modified trajectory models where the dummy variable of treatment (0 = control group, 1 = treatment group) is replaced first by the number of sessions attended (i.e., 0, 1, 2, . . . 9, 10 sessions) and then three dummy variables of low (one to four sessions), medium (five to seven sessions), and high levels of class attendance (eight to 10 sessions), with no attendance (zero sessions) being the reference category. Control group fathers were coded as having attended zero sessions.

Second, we extend growth curve modeling to test Hypothesis 2, that is, whether the treatment effect on the primary outcomes (parenting satisfaction and the frequency of father-child activities), measured by their slope factors, is explained or mediated by the slope factor of the secondary outcomes (parenting efficacy, role identity, and coparenting relationship). Stated differently, we examine whether the treatment increased the primary outcomes by enhancing the secondary outcomes, which in turn increased the primary outcomes. Statistical significance of the indirect treatment effect on the primary outcomes via the secondary outcome was directly tested since significant indirect effect is evidence for the hypothesis.

Next, we test whether the treatment effect was larger among residential than nonresidential fathers and among fathers who perceived low levels of challenges in parenting compared to those who perceived high levels (Hypothesis 3b) by conducting multi-group analysis of the linear latent trajectory model. To identify residential and nonresidential father groups, we used an item asking whether fathers were living with their child at the time of each survey, whereas the sample was split into two using the median of perceived challenges at each survey. We then compare the treatment effect between the two groups using equality constraints.

Because most of this study's measures are ordered categorical variables, the Mplus' MLR estimator (maximum likelihood estimation with robust standard errors), which generates "parameter estimates with standard errors … that are robust to non-normality and non-independence of observations," was employed (Muthén & Muthén, 1998–2012, p. 484). Further, Muthén's (1983) "general structural equation model" and its full information maximum likelihood (FIML) estimation, incorporated into Mplus, allowed us to include not only continuous (e.g., age) but also dichotomous (e.g.,

intact family) and ordered polytomous variables (e.g., parental education) in the model. To treat missing data, FIML, one of two "state of the art" methods along with multiple imputation, was applied (Schafer & Graham, 2002:147).

For data-model fit assessment, we use Hu and Bentler's (1999:1) "2-index presentation strategy," focusing on three fit indices: comparative fit index (CFI), standardized root mean squared residual (SRMR), and root mean squared error of approximation (RMSEA). They found that using a cutoff value of .96 for CFI in combination with that of .09 (or .10) for SRMR "resulted in the least sum of Type I and Type II error rates" (p. 28). The same was found when they replaced CFI with RMSEA using a cutoff value of .06. Thus, two combinational rules were used to evaluate model fit: (CFI ≥ .96 *and* SRMR ≤ .09) and (SRMR ≤ .09 *and* RMSEA ≤ .06). For statistical significance, a two-tailed test (α = .05) was conducted, while applying a one-tailed test (α = .05) as well to determine when coefficients are in the hypothesized direction.

TYRO Dads participants and staff.

E. Quantitative Findings

E.1 Participation Flow and Attendance

Figure 2 shows how the number of participants changed throughout the study. A total of 525 fathers were recruited and assessed for eligibility. Of those recruits, 469 fathers met the entry criteria and were randomly assigned to control (n = 212) and treatment groups (n = 257). Of the 469 randomized, 252 fathers completed the pre-test survey. After dropouts and loss to follow-up, 177 (90 in the control group and 87 in the treatment group) and 140 fathers (59 in the control group and 81 in the treatment group) completed the post-test and three-month follow-up survey, respectively. A total of 120 fathers (55 in the control group and 65 in the treatment group) completed all three surveys. A slightly larger number (132 fathers) participated in some but not all the assessments, and they consist of 55 fathers who completed only the pre-test, 57 who did the first two surveys (i.e., pre-test and post-test) but not the last (i.e., follow-up), and 20 who did the first and last survey but not the second (not shown in the figure).

Treatment group fathers attended, on average, about half of the 10 sessions of TYRO Dad (5.306) with a standard deviation of 3.805 sessions. Twenty-three (16.8%) of the 137 fathers in the treatment group did not attend even a single session, and, interestingly, the same number of fathers (23, 16.8%) had perfect attendance (i.e., 10 sessions). The number of fathers who attended at least one session but less than the average was 36 (26.3%), whereas those who attended five to nine sessions was 55 (40.1%) with 24 (17.5%) of them missing just one session. As an alternative

measure of class attendance, we categorized the number of sessions attended into four groups: 1 = no attendance (zero sessions), 2 = low attendance (one to four sessions), 3 = medium attendance (five to seven sessions), 4 = high attendance (eight to 10 sessions).

Finally, about four out of 10 (56, 40.9%) treatment group fathers became a TYRO and received a TYRO pin by attending at least eight sessions, which is the RIDGE-required minimum number of sessions to attend for program completion. The average age of high-attendance fathers (37.54) was older than that of the others (32.31). Using one-tailed test ($\alpha = .05$), the high attendance group was also more likely to cohabit (18%) and had higher education (2.05) compared to the other groups combined (7% and 1.78). We found no difference, however, in criminal background, race and ethnicity, marital status (other than cohabitation), household size, and income.

E.2 Attrition Analysis

Of the 252 fathers who participated in the pre-test survey, 75 (which includes 55 who completed the pre-test only and 20 who participated in the pre-test and follow-up) did not complete the post-test survey, whereas 112 did not do the follow-up survey. While the attrition between the pre-test and post-test survey (29.8%) was somewhat higher than what was initially anticipated (20%), the rate between the post-test and follow-up survey (20.9%) was practically the same as the expected rate. Given the 20 to 30 percent attrition, we conducted *t*-tests to compare the participants and non-participants of the post-test and follow-up surveys in terms of sociodemographic and criminal characteristics. The results are presented in Table 1.

First, we found that the post-test participants and non-participants were not significantly different in those characteristics except that participants were, on average, four years older than non-participants (see the "Post-Test Survey" columns). This finding indicates that the attrition between the pre-test and post-test was generally random. Next, the follow-up participants and non-participants were found to be different in marital status as well as age (see the "Follow-Up Survey" columns). Specifically, the participants were more likely to be divorced and cohabit and less likely to be never married as well as being about four years older than the non-participants. They were not different in other characteristics, including criminal characteristics as well as race and ethnicity, income, and education.

In addition, we compared fathers who completed all three surveys with those who did not (see the "Number of Surveys Completed" columns). The former fathers were found to be no different from the latter in those characteristics except race, age, and marital status—that is, fathers who completed all three surveys tended to be non-white, older, and more likely to be divorced and live with someone whom they did not marry, whereas those who never married were less likely to participate in all three surveys. While these results tend to show that survey participants and non-participants are generally similar in sociodemographic and criminal characteristics, a practically more important question concerns whether the non-participation negatively affected equivalence between the control and treatment groups. Thus, we conducted *t*-tests to compare the characteristics of participants in the control and treatment groups.

E.3 Characteristics of Participants

Table 2 shows that fathers who completed the pre-test were, on average, in their mid-30s with a standard deviation of about 11 years. In both control and treatment groups, two-thirds or more of the fathers were non-whites, with blacks being the majority, whereas less than 10 percent of the sample identified themselves as Hispanic. Also, two-thirds or more of fathers were never married, while about 10 to 15 percent of them were cohabiting when they applied to participate in the study. They typically lived with two people in the same household that had an average annual income of about $6,000 and had no high school diploma or GED. Finally, about two-thirds of participating fathers had previously been incarcerated, whereas about 5 percent were convicted sex offenders, and a quarter of the sample were on parole at the time of survey.

E.4 Comparisons of Control and Treatment Group: *T*-Tests

The *t*-test results are presented in Table 2. We first analyzed data from 252 pre-test participants and found that 115 fathers of the control group and 137 of the treatment group were not significantly different in sociodemographic characteristics with one exception: the control group fathers were less likely to be married at the time of pre-test (7.8%) than the treatment group fathers (16.1%). This finding shows that the equivalence of the two groups at pre-test (which must have been generated by our randomization) remained intact even though 46.3 percent of the 469 fathers who were originally recruited for the study did not complete the pre-test survey (45.8 percent assigned to the control group and 46.7 percent assigned to the treatment group) (see the bottom panel of Table 2).

Next, we conducted *t*-tests for 177 post-test participants, which consisted of 90 control group fathers and 87 treatment group fathers, and found no significant difference between the two groups across all characteristics. This finding of balance between the two groups at the post-test survey is rather remarkable given that we lost a total of 75 fathers (29.8% of the baseline total of 252 fathers), 25 (21.7%) in the control group and 50 (36.5%) in the treatment group. That is, the attrition between the pre-test and post-test was found not systematic but random.

Similarly, the last five columns of Table 2 show that 59 control group and 81 treatment group fathers who participated in the follow-up survey (n = 140) were not significantly different in terms of those background variables with one exception, the number of people living in the father's household. Fathers in the treatment group tended to be from a somewhat larger household (2.346) than those in the control group (1.810). The attrition between the post-test and follow-up survey generally did not affect negatively the equivalence between the two groups.

We also conducted *t*-tests for a reduced sample of 120 fathers who completed all three surveys (55 in the control group and 65 in the treatment group) and found the two groups to remain generally equivalent with one more exception besides the status of being married. As Table 3 shows, fathers in the control group were likely to live with a smaller number of people in their household (1.815) as well as being less likely to be married (7.3%) than those in the treatment group (2.492 and 21.5%).

Control and treatment group fathers of the reduced sample (n = 120) were not significantly different in other sociodemographic characteristics, but they were slightly older and more likely to be non-whites (more blacks and less whites) than those of the total sample. In addition, fathers in the reduced sample were less likely to be never married but more likely to be divorced and cohabit than those in the total sample. Fathers in the reduced sample also had household income that was, on average, $1,000 higher and tended to have a high school diploma or GED compared to the total sample. Finally, we found no notable difference between the two groups in terms of previous incarceration, prior conviction for sex offense, and parole status.

Based on our findings of differential attrition between the control and treatment groups, we control for two variables in the subsequent analyses: being married and number of people living in the household.

E.5 Effectiveness of the Intervention

To test Hypotheses 1a and 1b (i.e., whether fathers' participation in the TYRO Dads program increased their parenting satisfaction, the frequency of father-child activities, parenting efficacy, role identity, and coparenting relationship with the child's mother, while decreasing perceived challenges in parenting, over the four-month period of evaluation), we estimated a linear latent trajectory model presented in Figure 3, separately for each of the primary and secondary outcomes. The model is a "conditional" model because it controls for the two time-invariant covariates: being married and number of people living in the household.

The figure shows that the repeated measures of a primary or secondary outcome variable (e.g., parenting satisfaction) are specified as indicators of two latent growth factors: one is the intercept, and the other is the slope. For the intercept factor, loadings from the factor to each of the repeated measures are fixed to values of 1.0, indicating that the factor equally affects all repeated measures across the surveys. For the slope factor, on the other hand, loadings are fixed to the values of 0, 1.0, and 4.0 to model a linear function of time given that the post-test and three-month follow-up were conducted one and four months after the pre-test, respectively. The endogenous growth factors of intercept and slope were regressed on the key exogenous variable of treatment (0 = control group, 1 = treatment group) and the time-invariant covariates, which were correlated with one another.

E.6 Hypothesis 1a

Table 4 reports that the linear latent trajectory model of parenting satisfaction and the frequency of father-child activities had a good fit to data with non-significant chi-square as well as CFI higher than the cutoff of .96 and SRMR smaller than the cutoff of .09, although the 90 percent confidence interval of RMSEA included values larger than the cutoff of .06. Thus, the results from estimating the unconditional and conditional model (i.e., before and after controlling for the covariates) are worth interpreting for hypothesis-testing. We found no support for the hypothesis as the effect of treatment on the slope factor of parenting satisfaction and the frequency of father-child activities was not significant in both the unconditional and conditional models. This finding means that there was **no significant difference in the slope of the primary outcomes between control and treatment groups**—that is, **no intervention effect was detected when treatment group fathers (including those who did not attend the class at all) were compared simply to control group fathers, regardless of their level of class attendance.**

When class attendance level was considered, however, we found significant treatment effect. The results are presented in Table 5. First, the top panel shows the number of sessions attended was significant in the model of parenting satisfaction (.009), while it was not in that of the frequency of father-child activities (-.005). That is, **the more sessions treatment group fathers attended, the more likely their parenting satisfaction was to increase over the 4-month period, although the number of sessions attended had no effect on how frequently the fathers did things with the child.** In other words, **what made a difference in parenting satisfaction was the number of the treatment sessions attended, not simply being in the treatment group.**

Furthermore, it was found that **there was a threshold for the treatment effect** when we examined four different levels of dosage: no (zero sessions), low (one to four sessions), medium (five to seven sessions), and high dosage (eight to 10 sessions). Using no dosage as the reference category, **we found the threshold to be eight, which coincided with the minimum requirement for the completion of TYRO Dads** (see the bottom panel). That is, the treatment effect for parenting satisfaction was observed for the high dosage (.091) but not the low or medium dosage (.048. and .044), while no effect was found for the frequency of father-child activities (-.015, -.045, and -.044).

E.7 Hypothesis 1b

For the secondary outcomes, the treatment effect was also observed among treatment group fathers, particularly, those who attended eight or more sessions. Specifically, in Table 4 we found significant improvement among the treatment group fathers in parenting efficacy (.062) and coparenting relationship with their child's mother (.052) over time in both unconditional and conditional (.055 and .058, respectively) models, though not in parenting role identity (.123 and .098) or perceived challenges in parenting (-.044 and -.050). Table 5 shows that the alternative tests using the number of sessions attended and dosage level generated the same results—that is, (1) the more sessions fathers attended, the more likely it is for parenting efficacy (.008)

and coparenting relationship (.007) to increase; and (2) attending at least eight sessions tends to be crucial for improvement in parenting efficacy (.066) and coparenting relationship (.077). As an exception, additional dosage effect was also found for role identity (.048).

> *In sum, Hypotheses 1a and 1b received empirical support for parenting satisfaction, parenting efficacy, and coparenting relationship but no support for the frequency of father-child activities, and perceived challenges in parenting.*

E.8 Hypothesis 2

This hypothesis is intended to examine whether the growth factors, especially, slope factors of the secondary outcomes' trajectories that were found to be significant in the expected direction (i.e., parenting efficacy, coparenting relationship, and, to a lesser extent, parenting role identity) explain the treatment effect on the slope factors of the primary outcomes' trajectories (parenting satisfaction and frequency of father-child activities), while controlling for the two time-invariant covariates.

Figure 4 shows the mediation model with parenting satisfaction being the primary outcome, where relationships among the three mediators' growth factors are specified as correlational (i.e., correlations via residuals, D_1, D_2, … , D_6) rather than causal because their causal relationships are not of our primary interest in this analysis. We regressed the intercept factor of parenting satisfaction only on the intercept factors of mediators, whereas the slope factor of the primary outcome was regressed only on the secondary outcomes' slope factors. This specification was chosen because model estimation failed (i.e., non-convergence) when the intercept and slope factors of parenting satisfaction were regressed on both growth factors of mediators (the same problem occurred in estimating the model of frequency of father-child activity). Besides this methodological reason, we believe that there is little substantive ground for expecting the initial level (i.e., intercept) of mediator to predict the rate of change (i.e., slope) in parenting satisfaction. Nor is there ground for hypothesizing the causal effect of mediator's slope on the parenting satisfaction's intercept. However, we regressed both intercept and slope factors of parenting satisfaction as well as mediators on the all three exogenous variables, while the figure only shows causal paths from treatment to mediators and parenting satisfaction to avoid visual clutter.

Table 6 presents results from estimating the model shown in Figure 4, which had a good fit to data in terms of SRMR (i.e., < .090), while being marginally acceptable in terms of RMSEA (i.e., < .060) and CFI (i.e., > .950). The table's first three columns present the effects of treatment and two control variables on the intercept and slope factors of mediators coparenting relationship, parenting efficacy, and role identity, whereas the last column shows the effects of not only the mediators as well as exogenous variables on the intercept and slope factors of parenting satisfaction. Parameter estimates (i.e., unstandardized coefficients) in box are covariances among the mediators' growth factors: covariances (1) between intercept and slope factors of the same mediator, (2) between intercept and slope factors of different mediators (numbers in *italic*), (3) between intercept factors of different mediators (numbers in **bold**), and between slope factors of different mediators (numbers in ***bold italic***). These results are presented in three panels, one for each measure of treatment: treatment versus control group (top panel), the number of sessions attended (middle panel), and the three dosage levels (bottom panel).

First, in the top panel we found participation in the TYRO Dads (i.e., treatment) to have significant effect on the slope factor of coparenting relationship (.067), while having no effect on the other mediators' slope factor—that is, fathers in the treatment group were more likely to increase in coparenting relationship than those in the control group. The last column shows that the growth factors of mediators had positive effects on those of parenting satisfaction with

one exception (i.e., the effect of role identity's intercept factor on the parenting satisfaction's intercept factor, -.273). The associations between slope factors of mediator and parenting satisfaction are of our key interest, and we found fathers, whose coparenting relationship, parenting efficacy, and role identity improved, tended to report increasing parenting satisfaction (.897, .889, and 1.150, respectively). The right bottom corner of top panel also shows results from testing the statistical significance of indirect effect, which confirmed treatment had significant indirect effect on the slope factor of parenting satisfaction via the slope factor of coparenting relationship (.060) and role identity (.042), though not parenting efficacy (.044).

Second, the next panel shows results from estimating the same model using number of sessions fathers attended as a measure of treatment instead of the dummy variable of being in the treatment group. We found the alternative measure of treatment had significant effect on the slope factor of parenting efficacy (.007) and role identity (.005) as well as coparenting relationship (.008), which were in turn all positively associated with the slope factor of parenting satisfaction (.911, .883, and 1.148, respectively). Two of the three indirect effects of treatment on parenting satisfaction were found significant, specifically, indirect effects via coparenting relationship (.007) and role identity (.006), as found in the top panel.

Third, when we replaced the count measure of treatment with three dummies representing different levels of dosage (one to four, five to seven, and eight or more sessions attended), overall results remained the same, with one exception of interesting difference (see the bottom panel). While it tended to be the highest level of dosage (i.e., eight or more sessions attended) that had significant effect on the slope factors of mediators (.087, .058, and .053), only one of the slope factors was found to be positively associated with the slope factor of parenting satisfaction: parenting efficacy (1.689). As a result, interestingly, the only significant mediator was parenting efficacy (.098), which we found was the only non-significant mediator in the first two models.

These results, taken together, revealed **that participation in TYRO Dads tended to increase the fathers' satisfaction in parenting because the participation enhanced their coparenting relationship with the child's mother, parenting efficacy, and perceived importance of the father's parenting role, which in turn increased parenting satisfaction. They also showed that the degree of participation, not only the number of sessions fathers attended but also the "high dosage" of treatment (i.e., the minimum of eight sessions), was more important in assessing the effectiveness of TYRO Dads than whether they participated or not.**

The mediation model was also estimated for the frequency of father-child activity, and the results are presented in Table 7. We found this model's fit was better than the parenting satisfaction model's with RMSEA being smaller than .060 (.059 and .057) with one exception (.062), as well as SRMR being less than .090 (.064, .064, .055), while CFI was still below the minimum cutoff, though close (.945, .941, and .944 < .950). Regardless of its measure, program participation was found to improve fathers' coparenting relationship (.062, .007, and .116 as well as .081), which in turn increased the frequency of father-child activity (.890, .869, and .915). While the effect of treatment on the slope factor of parenting efficacy was not significant in this model (.039, .005, and .046), in two of three models (see the middle and bottom panels) TYRO Dads increased the fathers' role identity (.005 and .052), which mediated the treatment effect on the frequency of father-child activity (.012 and .124). In sum, we found fathers who participated in TYRO Dads tended to increase the frequency of doing things with their child partly because the program enhanced the fathers' perceived role as the father and, to a lesser extent, coparenting relationship. Contrary to the hypothesized, positive indirect effect of treatment, the direct effect was in the opposite direction (-.229, -.032, .275, and -.314)—that is, the fathers who participated in TYRO Dads reported a decrease in the frequency of father-child activity over time, which is opposite to what was anticipated. The direct and indirect effects of the opposite directions might have generated non-significance effect of treatment on the frequency of father-child activity, cancelling each other out, as we found in Tables 4 and 5. While it is counterintuitive that treatment group fathers' doing things with their child decreased in

frequency over the research period, we speculate that their participation in the program might have reduced time for doing things with the child as they had not only to attend sessions but also to complete homework assignments (e.g., writing a letter to their children, writing an autobiography, etc.) during the intervention. Positively stated, this finding might reinforce the idea that attending TYRO Dads class is unlikely to increase *automatically* the frequency of father-child activities *unless* it leads to positive changes in parenting among participating fathers, as we found in the indirect effect of treatment on the frequency of activities via role identity and coparenting relationship.

> *In sum, Hypothesis 2 generally received support in that treatment group fathers, particularly those who had high levels of participation, like attending eight or more sessions, were likely to increase coparenting relationship with their child's mother, parenting efficacy, and perceived importance of role as the father (i.e., role identity), which in turn contributed to an increase in parenting satisfaction and the frequency of father-child activities over time.*

E.9 Hypotheses 3a and 3b

To test whether the treatment effects were greater among residential than nonresidential fathers (Hypothesis 3a) and among those who perceived low levels of challenges in parenting compared to those who perceived high levels (Hypothesis 3b), we conducted a series of multi-group analyses of the linear latent trajectory model. Specifically, a total of 36 models (6 parenting outcomes × 3 surveys × 2 models—with and without equality constraint) were estimated to test whether fathers' residential status moderated the treatment effect on the two primary and four secondary outcomes, whereas 30 models (5 parenting outcomes × 3 surveys × 2 models) were to test the moderation of perceived challenges. This set of analyses was repeated three times given the three measures of treatment effect, and thus a total of 198 models (66 models × 3 measures) were estimated.

We first estimated a trajectory model without equality constraints and then with a constraint on the treatment effect to see whether the constraint resulted in a significant chi-square difference of 3.841 (i.e., the critical value of chi-square distribution with one degree of freedom at the level of .05) or larger (which would indicate significant moderation) between the two models. For the test of difference in chi-square, we used Satorra-Bentler scaled chi-square because the model was estimated using MLR instead of ML. Results are presented in Table 8.

First, the top panel of Table 8 shows treatment effects and their standard error (in parenthesis) estimated using the group membership variable (0 = control group, 1 = treatment group) separately for each of the primary and secondary outcomes before and after imposing equality constraints on the treatment effect. The "Before" column presents treatment effect for each group of comparison (residential vs. nonresidential group), whereas the "After" column shows the effect estimated with equality constraints, thereby being the same for both groups. Also reported is observed chi-square difference along with whether it was significant or not (see the Δ2 test row). The bottom panel presents the same set of results from testing the moderator model for perceived challenges comparing low- and high-challenge groups.

The results show **little support for the hypothesized moderation of either variable** as only two out of 66 (3.0%) chi-square differences were found significant: one was for parenting role identity ($\Delta\chi^2 = 5.147$, $p < .05$) and the other for parenting satisfaction ($\Delta\chi^2 = 6.081$, $p < .05$). That is, **treatment group fathers who were not living with their child (i.e., nonresidential fathers) were not only found to have higher levels of parenting role identity at the time of pre-test** (.118) **but also more likely to report greater increase in parenting satisfaction at the follow-up** (.095) **compared to their residential counterparts.** While the former finding simply shows significant group difference in role identity at the baseline, the latter finding of the only significant moderation was opposite in direction to our hypothesis of the treatment effect being greater among residential than nonresidential fathers.

Although the statistically significant moderation was found only in one out of 66 (1.5%) comparisons, there was **an indication that nonresidential fathers were more likely to reap the benefit of attending TYRO Dads than residential fathers.** For example, we found the treatment effect on coparenting relationship was significant among nonresidential fathers at the post-test and follow-up (.088 and .082) but not among residential fathers (.079 and -.010). While the group difference in treatment effect was not significant ($\Delta\chi^2 = 1.649$, $p > .05$), it is still **intriguing to find that it was nonresidential fathers that tended to experience the treatment effect** (see also the group difference in parenting satisfaction, parenting efficacy, role identity, and perceived challenges at the post-test and perceived challenges at the follow-up). We speculate that **nonresidential fathers were likely beneficiaries of the TYRO Dads program perhaps because they were motivated to improve their parenting so they might overcome their structural disadvantage (i.e., fewer opportunities for parenting than residential fathers)**. When we examined moderation of treatment effect using number of sessions attended, none of 66 chi-square differences was found significant (see Table 9).

On the other hand, when we used the three dummy variables of dosage level for treatment effect, 11 of 66 (16.7%) chi-square differences were found significant, nine of which were evidence of significant moderation at the post-test and follow-up, seven for the moderator of residential status and two for that of perceived challenges (see Table 10). First, five of the seven significant chi-square differences showed **residential fathers being more likely to report treatment effect on parenting satisfaction, the frequency of father-child activities, parenting efficacy, and role identity at the follow-up than nonresidential fathers** as hypothesized. The treatment effect, however, tended to be reported by fathers of lower than higher dosage, and was observed in both residential and nonresidential fathers of different dosage (e.g., see parenting satisfaction). The two models that had significant chi-square difference at the post-test (i.e., the frequency of father-child activities and perceived challenges) had no significant treatment effect in either group of residential status. The **significant moderation of perceived challenges was found in the models of the frequency of father-child activities and parenting efficacy at the follow-up,** but the findings were not consistent.

> *In sum, based on the small number of significant moderation and inconsistent patterns of group difference, it is concluded that Hypotheses 3a and 3b failed to receive empirical support. However, we found some evidence that treatment group fathers who were not living with their child were more likely than those who were with their child to reap the benefit of participating in the TYRO Dads program. This unexpected finding was perhaps because the nonresidential fathers, being aware of the structural constraint in applying what they learned from the program to their parenting, tried to make the most of every opportunity to be with their child compared to their residential counterparts.*

F. Qualitative Findings

This section summarizes findings from phone interviews conducted with two regional directors and one facilitator of the RIDGE Project in July and August 2016. Our interview was focused on variation in class attendance rates and the benefits of TYRO Dads.

F.1 Variation in Class Attendance Rates

Class attendance, particularly attending the RIDGE-required minimum number of sessions (i.e., eight classes), is essential to achieving success in TYRO Dads, as the supplemental finding indicates. Our results showed, however, that only half of the fathers attended class at least five times out of 10. Therefore, we asked if the interviewees could help us understand why some fathers attended the class well while others did not.

Variation in individual motivation and needs. Some individuals come into the program more "ready" to complete TYRO Dads than others, in terms of their motivation and commitment levels. One interviewee pointed out the importance of maturity.

> *I think the biggest challenge is the things that the individuals . . . are dealing with . . . in order to complete, in their personal lives. Once they make it to my classroom, maturity level is the biggest challenge that I deal with because if a person is not mature enough, he's not going to be committed. And I work hard trying to spend extra time working with those people as I notice. Sometimes they're just not ready and they've got personal things that they're dealing with and to be honest with you a lot of them need some life counseling, to deal with some mental health issues.*

Another interviewee also observed varying degrees of motivation.

> *One of the things that I've noticed is that . . . anybody that wants it is going to make it happen . . . . Something about how bad do you want it. So I've seen guys in an extraordinary difficult situation [complete TYRO Dads] because they . . . make it happen and they excel and thrive . . . . Anybody that wants it, really wants it always [will] make it happen . . . . You can notice the significant difference [between those who completed and those who did not complete]. . . in terms of wanting a deeper relationship with their children and wanting to be better for their children . . . . There's a percentage of people in the population that already have some the skills, commitment, hard work, and you see that a little bit in older generation . . . . They still call you "sir," [say] "good morning," [are] very polite and they are committed . . . . But there's a significant percentage of the population that don't even have [goals when they] wake up in the morning. So you're dealing with a very large spectrum of [motivation].*

The timing of when the enrollment and class sessions were scheduled. Some fathers did not attend even one class although they had applied for the study. Our interview results suggest that there were some structural reasons beyond the issues of individual motivation and social support characteristics to explain attendance. TYRO classes were held during the day, and many eligible fathers were not available to attend sessions during the daytime and were only available in the evenings. Those at both halfway house and non-halfway house locations were often out looking for jobs during the day. Those not living in halfway houses were also more likely to have found a job and be working during the daytime. There was a site in Dayton in which classes were held in the morning. The regional director stated:

> *It's 10 a.m. to 12 p.m., and that period might not be convenient for them. We have no manpower to offer evening classes. So those who are committed to work responsibilities per [morning] shift, that takes them totally out. Or they may have signed up and between the times they've signed up, they got a job. Or if they're at the [halfway house], they're trying to find a place to live and they're going on interviews and things like that so it conflicts [with daytime sessions].*

Halfway house versus non-halfway house. Another interesting finding was that there were more challenges in getting fathers to attend TYRO Dads classes in non-halfway house locations. Fathers in the community, for example, may have had transportation barriers to attending and were more likely to have started a job after being found eligible for services. Also, those living in halfway houses were much more accessible to RIDGE staff, and staff encouraged fathers to attend scheduled sessions. In some halfway houses, RIDGE staff were able to have some face-

to-face contact with eligible fathers before or between scheduled sessions. This contact was not possible for those who did not live in halfway houses.

One interviewer said:

> *What's different is of course that [for] those that are in a structured environment, it's easier for me to get their attention. Even those who have mental health or maturity issues, if they don't have anything going on in that time frame, there's not a whole lot of distractions. It's easier for me to get their attention versus those that are . . . out in the community and you got a lot of other [things pulling] at you, things that distract you and temptations and things like that. And of course transportation and job . . . a lot more challenges for those [outside of halfway houses] than those on the inside.*

Another stated this way:

> *If you have the class in . . . a halfway house and the guys have 90 days [to go home], there will more retention there because there's a little bit more restriction. But . . . outside [of halfway houses], there's a lot of the guys getting jobs . . . or they [may] move within those 6 weeks . . . . So now you have to call guys that apply, and they have to wait 6 weeks or 5 weeks or 4 weeks before they get into a class . . . and there's nothing you can do to even find a way to track them . . . . The population is really unstable.*

F.2 Benefits of TYRO Dads

Despite the fathers' circumstances, some fathers reaped the benefits of the TYRO program because if they complete TYRO Dads they become eligible to receive an "intent to hire" letter from a trucking company who hires TYROs. The letter then helps the participant access Workforce Innovation and Opportunity Act (WIOA) funding for Commercial Driver License (CDL) school. In the following, we briefly introduce those cases.

One interviewee said:

> *. . . For those who have completed the class . . . they've become more successful in reaching their goals. They might have [become] a truck driver and [completed] CDL training . . . . Stronger relationships with their family . . . is the most rewarding thing that I hear. Stronger relationships with their family and their children. That just really makes my day.*

Another stated this way:

> *I [hear this] over and over. [Guys who finish the class say] "This is the best class I've ever taken and . . . that's why I keep coming here." It's kind of like therapeutic. It's somewhere they can be real; they can talk and they deal with their issues and be motivated and feel like they can overcome. [They feel] value and purpose.*

G. Discussion

G.1 Key Findings

This study tends to provide empirical evidence that the TYRO Dads program is effective in making a difference in the lives of low-income fathers in several ways. First, TYRO Dads improved the parenting satisfaction of fathers who participated in the program regularly, attending most sessions, specifically, 80 percent or more of them. The fatherhood program was successful in helping those fathers enhance their perceived relationship with their child not only during and immediately after the intervention, but also three months after the intervention ended.

Second, TYRO Dads tended to help fathers enhance their parenting efficacy, perception of coparenting relationship with the child's mother, and, to a lesser extent, perceived importance of role as parent over the course of the study. In addition, we found that treatment group fathers who attended at least eight of 10 sessions reported a significant increase in parenting efficacy over the four-month period. This finding makes sense as the more sessions fathers attended, the more parenting principles and skills they learned and practiced, and, as a result, the more sense of self-efficacy in parenting they ended up having. On the other hand, how did their participation in the TYRO Dads program enhance fathers' perception of coparenting relationship with the child's mother? We speculate that fathers may have made every effort to improve their relationship with their child's mother for the sake of becoming a good father, as they were encouraged to do so while taking the TYRO Dads. Or possibly, the child's mother may have observed genuine changes in the father's character, behavior, and attitude over the study period. As a result, the child's mother might have become more open to cooperating with fathers, which could boost their perception of coparenting relationship. By interviewing the child's mother, future research may shed light on the process by which fathers perceive their relationship with the child's mother positively.

Third, we found that TYRO Dads improved fathers' parenting satisfaction because it helped enhance their perception of coparenting relationship with the child's mother, parenting efficacy, and parenting role identity. That is, the TYRO Dads program successfully improved fathers' relationship with the child's mother, parenting efficacy, and perceived importance of the father's role in parenting, which in turn helped them feel satisfied with their parenting and spend more time with the child. This finding corroborates previous findings, for example, the evidence regarding the importance of parental alliance from evaluation research. Specifically, Rienks et al. (2011), who evaluated a two-week relationship education program, found an increase in parental alliance to be associated with an increase in father involvement at post-test. Because of the relatively short intervention, however, Rienks et al. (2011) could not address whether the positive effect of parental alliance would last several months after the intervention ended. Our study addresses this question by following participants three months after the intervention.

Fourth, another noteworthy finding is that fathers who attended eight or more sessions reported an increase in parenting efficacy and perceived importance of the father role in parenting a child, which in turn led to improved parenting satisfaction and higher frequency father-child activities. A previous study found fathers' enhanced parenting efficacy reduced barriers to parenting among low-income fathers in rural Midwestern communities, which in turn increased engagement with their children (Freeman et al., 2008). Our study found the same: increased parenting efficacy among fathers committed to the program enhanced the father-child relationship in terms of the frequency of father-child activities. This finding suggests that fatherhood programs should be designed to help fathers develop a sense of self-efficacy in parenting because programs that fail to help them grow into self-confident fathers are less likely to increase the frequency of fathers doing things with their children. In addition, program staff should be mindful of the importance of being supportive of participating fathers and addressing their worries about failing to become a "good" father. For the same reason, fatherhood programs need to be designed to help fathers believe the importance of the father's role in parenting a child since we found an increase in the perception of role identity to be positively associated with an increase in parenting satisfaction and the frequency of father-child activities.

Fifth, although we failed to find the hypothesized *direct* effect of treatment on the frequency of father-child activities, our mediation analysis revealed that participation in the TYRO Dads program increased the frequency of father-child activities *indirectly* by enhancing fathers' perceived importance of the father's role in parenting and perception of coparenting relationship with their child's mother. These findings highlight the importance of identifying intervening factors that mediate the effect of treatment on ultimate outcomes so that an effective program may be developed by incorporating those factors into the program development.

Sixth, we found nonresidential fathers (those who were not living with their child) were more likely than their residential counterparts to report positive outcomes of the treatment, such as parenting satisfaction, role identity, and perception of coparenting relationship. While this finding was not consistent with what we expected, the residential status's moderation of treatment effect is a positive finding for fatherhood programs given that most fathers who participate in those programs do not live with their child.

G.2 Methodological Contributions and Limitations

We believe this study contributes methodologically to the fatherhood program literature by conducting evaluation research based on a randomized controlled trial, which has not been used often to assess the effectiveness of fatherhood program. Next, unlike previous studies based mostly on data from pre-test and post-test, we conducted three-month follow-up as well as pre-test and post-test surveys to collect three-wave panel data, which enabled us to apply growth curve modeling to estimate the slope of parenting outcomes over the four-month period of evaluation. In addition, we used full information maximum likelihood (FIML), one of two state-of-the-art methods along with multiple imputation, to treat missing data that often plague evaluation research.

Our study has several methodological limitations worth mentioning. Because our findings are based on fathers' self-reports about their relationship with the child, we cannot rule out the possibility that fathers over-reported their perception and behaviors of parenting (e.g., Hernandez & Coley, 2007). Prior research has often found some discrepancy between fathers' and mothers' reports of father engagement (Fagan, Bernd, & Whiteman, 2007), where mothers tend to report lower levels of father engagement than do fathers themselves (Coley & Morris, 2002). In anticipation of such discrepancy, we originally planned to study mothers of the child as well, but due to budget constraints, we were unable to do so. Future research needs to address this issue by comparing reports from fathers with those from mothers.

Another potential issue with our study is the large number of eligible fathers who applied but later chose not to participate in the study because they feared being assigned to the control group and, as a result, losing an employment opportunity. For example, fathers who completed TYRO Dads were eligible to receive a pre-hire letter from a company that hired truck drivers. This pre-hire letter allowed the fathers to access Workforce Innovation and Opportunity Act (WIOA) funding for Commercial Driver's License (CDL) training. Assignment to the control group meant loss of that opportunity.

While 469 applicants met the study eligibility requirements and thus were randomized, only 252 fathers completed the baseline assessment—a loss of 53 percent. Lacking information on the characteristics of the many fathers who chose not to participate in the study, we do not know how the study samples differed from the larger pool of fathers who participate in TYRO Dads.

We observed attrition at several time points: (a) from the point of randomization to the completion of the baseline assessment, (b) from the baseline assessment to the post-test assessment, and (c) from the post-test assessment to the three-month follow-up. While, fortunately, we had no evidence that the attrition negatively affected equivalence between the control and treatment group, the particularly high attrition from the randomization to pre-test compared to the attrition between subsequent surveys is worth examining in the future. To minimize the post-randomization

attrition, it may be necessary to do randomization immediately before study participants are scheduled to participate in the baseline assessment and eliminate any time lag between randomization and data collection. Some additional incentives also may help to reduce the rate of dropout among those assigned to the control group, although it is hard to imagine what would be effective given the employment help that program attendance offers to them and the urgent needs that low-income fathers face.

We also had non-trivial attrition, though to a lesser extent compared to the post-randomization one, from the completion of the intervention to the three-month follow-up. During our study, we found it difficult to track the participating fathers as they frequently moved. We tried to keep track of their addresses, email addresses, phone numbers, and the contact of their families and friends. These efforts, however, were not generally effective. It was challenging to keep our study population in the longitudinal study partly because "the population is in a survival mode," according to one regional director, and highly mobile.

Despite these limitations, we believe our study is the first to demonstrate the importance of the father's coparenting and parenting efficacy in a randomized, controlled trial. We found that the TYRO Dads program benefited its participants over an extended period in part because the program enhanced fathers' perception of his relationship with the child's mother, and perhaps more importantly, it helped them boost their confidence as a father.

H. Implications for Practice

One implication of our findings is that responsible fatherhood programs should focus on the role of the child's mother in facilitating father's engagement with the child. While observational research has consistently shown that fathers' relationship quality with the child's mother is critical in active involvement in their children's lives, it is only recently that coparenting relationship has been explored in experimental research (M. Pruett, K. Pruett, C. Cowan, & P. Cowan, 2017). Our study contributes to the literature by demonstrating that fathers in the treatment group improved their relationship with the child partly because their relationship with the child's mother also improved. Thus, programs targeting low-income, nonresidential fathers should integrate coparenting classes/services into their programs for fathers. In that regard, we suggest that the RIDGE Project continue to encourage fathers who completed TYRO Dads also to take Couples Communication I and II, both of which are eight-hour courses that teach fathers and their spouses and significant others communication and conflict management skills. From a research point of view, it will be interesting to examine the impact of Couples Communications on fatherhood outcomes beyond TYRO Dads. At the same time, practitioners will also benefit from such research as they consider how the sequence of programs may affect the outcomes of their clients.

Another implication of our findings is the potential importance of employment benefits to boost enrollment and attendance in fatherhood classes. Despite modest financial incentives associated with the three data collection efforts, more than half (53%) of eligible fathers chose not to participate in the study of TYRO Dads. According to RIDGE Project staff, these fathers did not want to risk being assigned to the control group and denied the opportunity to attend classes immediately. Upon completion of eight out of the 10 TYRO Dads classes, fathers were eligible to access WIOA funding for certain types of occupational training. This eligibility appears to be a powerful incentive to enroll in TYRO Dads. And although many enrolled fathers failed to complete eight classes and receive a certificate that led to the WIOA benefit, enrolled fathers attended an average of five out of 10 sessions, which is higher than the dosage rate observed in many fatherhood programs. The possibility of receiving WIOA funding for employment training may be a powerful incentive for enrollment and attendance at fatherhood programs that other programs should explore.

The results from our analyses underscore the importance of program dosage. While the treatment effect (i.e., difference between control and treatment groups) was significant in some models, our dosage analysis revealed that the significant effect was attributable primarily to high class attendance (i.e., eight or more of 10 sessions). Fathers who completed TYRO Dads set themselves apart from those who did not, as the former reported an increase in their parenting efficacy. Fathers in the high attendance group improved their levels of parenting satisfaction and increased the frequency of spending time with their child partly because they became confident in their parenting skills. These results are not surprising because TYRO Dads focuses their curriculum on teaching fathers to gain self-confidence.

For example, two of the lessons, "The Great I Ams" and "Family Crest" emphasizes helping fathers develop a sense of empowerment, self-esteem, and a positive vision for their family future. TYROs often say, "I know that I want to be a man of honor," and "This program shows me how to be a 'man' and how to survive in negative situations." Unfortunately, only about a third of participants in the intervention group reaped the benefits of being a TYRO. RIDGE staff, especially working for clients at non-halfway house locations, may want to reach out to those fathers who find it difficult to make it to the workshop. Providing transportation, using aggressive reminder strategies, having face-to-face contact, and offering peer support could help the fathers attend workshops. Another strategy worth considering may be to provide make-up sessions for those who miss a class, if the program has adequate resources for this. The bottom line is that encouraging class attendance and providing more opportunities to receive a TYRO pin remain essential for the success of the program.

I. Conclusion

TYRO Dads participants and staff.

We conducted a randomized controlled trial of the effectiveness of the RIDGE's TYRO Dads program to test whether low-income fathers' participation in the five-week program that consists of 10 sessions generated positive outcomes of parenting over a four-month period of observation. Results from analyzing three-wave panel data from pre-test, post-test, and three-month follow-up surveys showed that program participants (treatment group) were likely to report an increase in the sense of parenting efficacy, perception of coparenting relationship with their child's mother, perceived importance of their father's role in parenting (role identity), and parenting satisfaction compared to non-participants (control group). The treatment effect was found to be a function of number of sessions attended, with dosage analysis revealing that the effect was observed primarily among fathers who attended at least eight sessions, which coincided with the minimum required attendance for fathers to complete the program and become a "TYRO." The effects of program participation on fathers' parenting satisfaction and the frequency of father-child activities were found to be indirect via fathers' perceived parenting efficacy and role identity as well as coparenting relationship with the child's mother. It is thus concluded that TYRO Dads is a generally effective program that would help low-income fathers become a good parent if they attend 80 percent of sessions or more.

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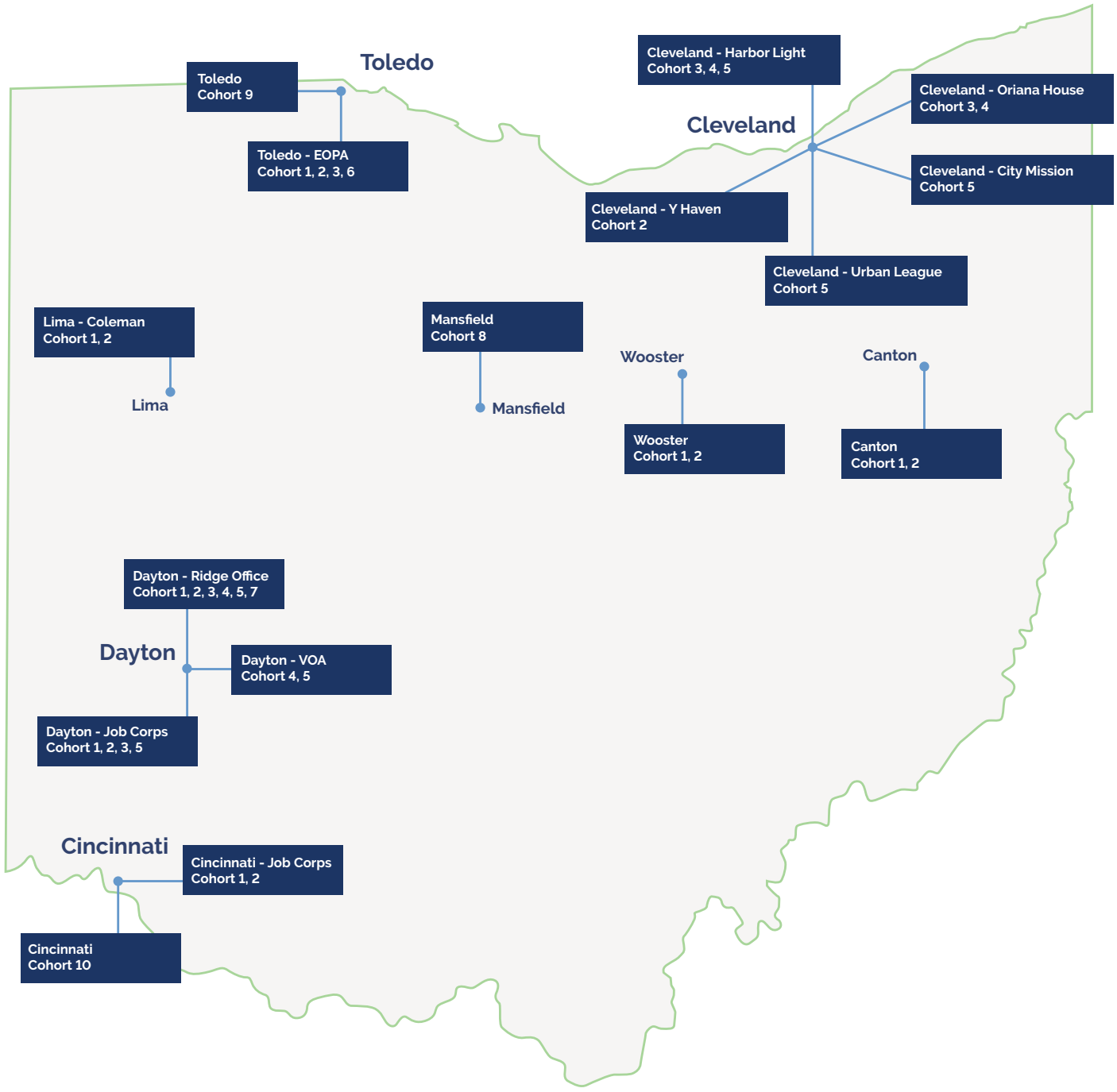
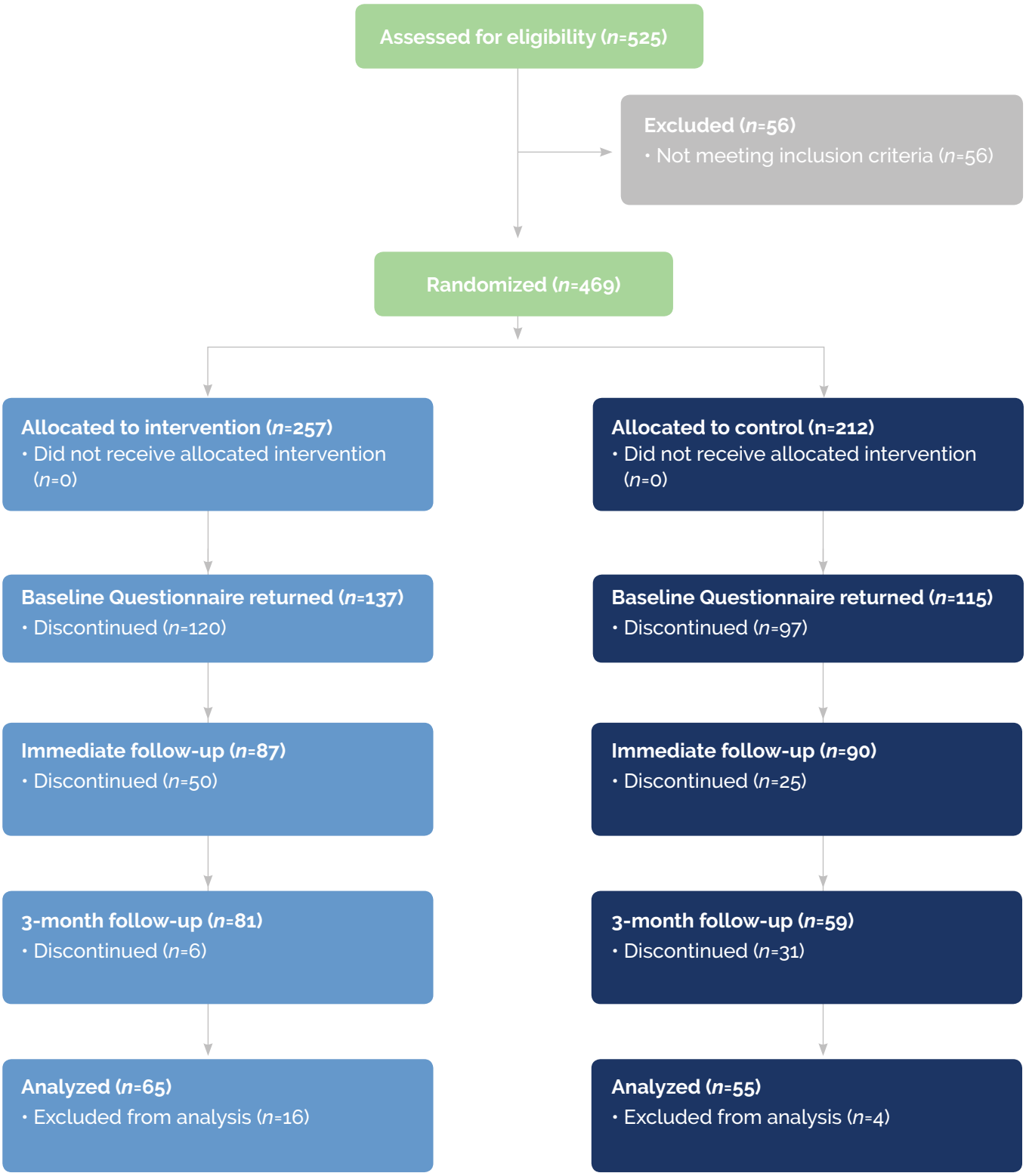
K. Supporting Figures And Tables

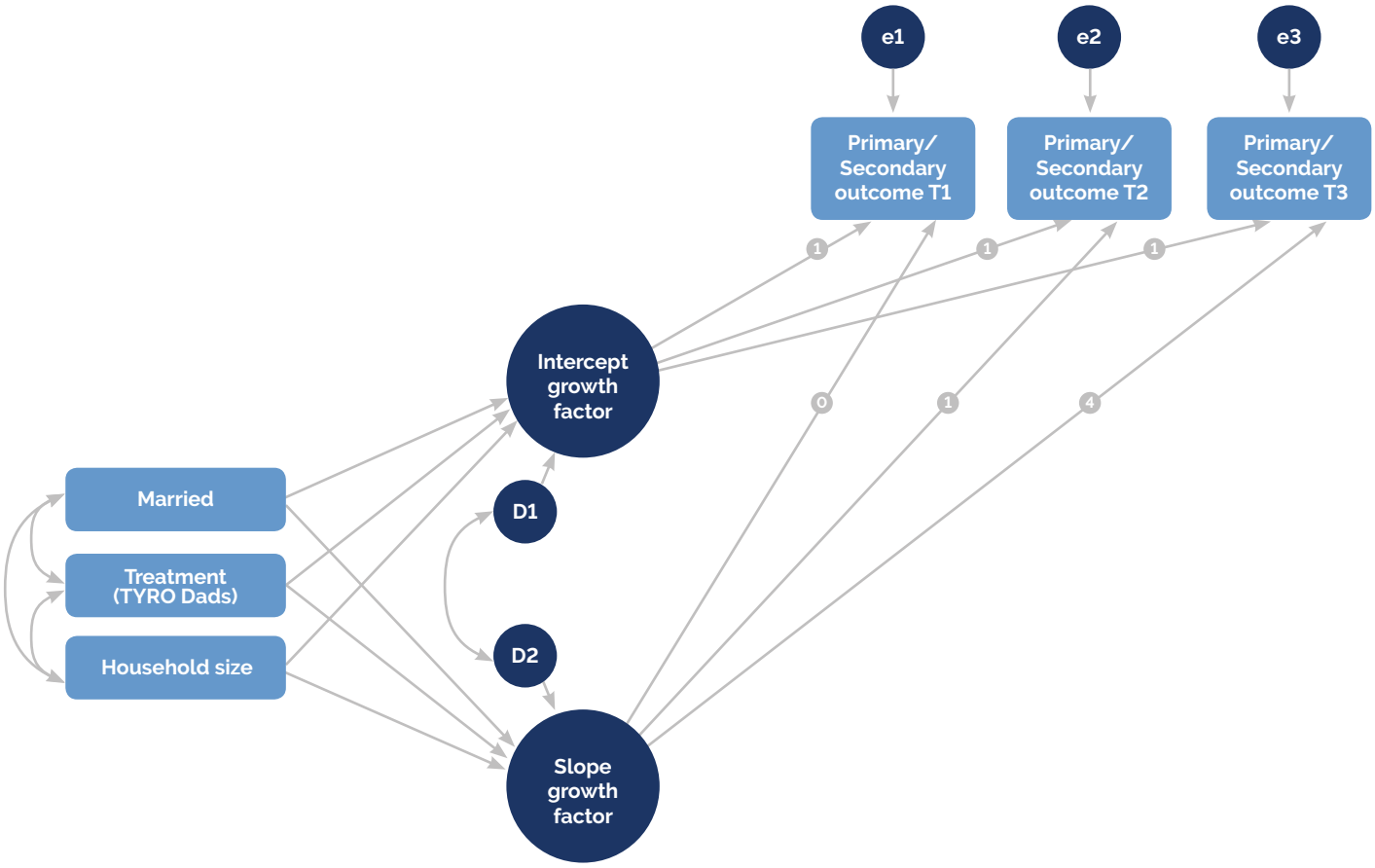
K.1 Figure 1. Research Sites



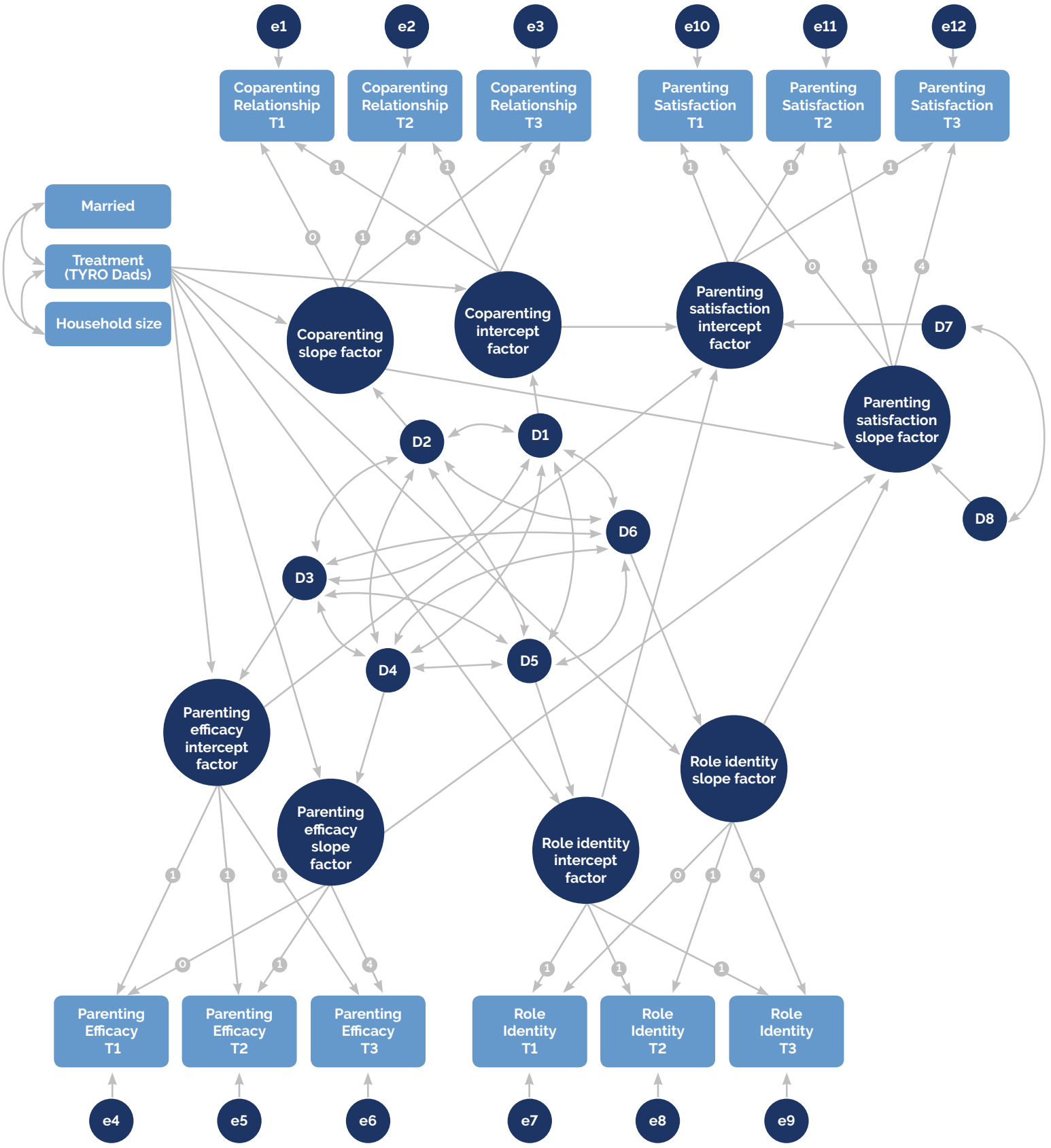
K.2 Figure 2. Flow Diagram



K.3 Figure 3. Linear Latent Trajectory Model of the Treatment Effect of TYRO Dads on Primary (Parenting Satisfaction and Frequency of Father-Child Activities) and Secondary Outcome (Parenting Efficacy, Role Identity, Coparenting Relationship, and Perceived Challenges) with Two Time-Invariant Covariates (Married and Household Size)



K.4 Figure 4. Linear Latent Trajectory Model of the Treatment Effect of TYRO Dads on Parenting Satisfaction, Mediated by Coparenting Relationship, Parenting Efficacy, and Role Identity, with Two Time-Invariant Covariates (Married and Household Size)



K.5 Table 1. Comparing Sociodemographic Characteristics in Participants and Dropouts at Post-Test Survey and Follow-Up Survey: *T*-Tests

	Post-Test Survey					Follow-Up Survey					Number of Surveys Completed				
	Participants (*n* = 177)		Non-Participants (*n* = 75)			Participants (*n* = 140)		Non-Participants (*n* = 112)			Three (*n* = 120)		One or Two (*n* = 132)		
Variable	Mean	S.D.	Mean	S.D.	*p*-value	Mean	S.D.	Mean	S.D.	*p*-value	Mean	S.D.	Mean	S.D.	*p*-value
Age	35.921	10.896	31.947	9.763	.005	36.614	10.910	32.393	10.012	.002	37.508	10.703	32.220	10.110	.000
Previous incarceration	.705	.458	.680	.470	.700	.683	.467	.714	.454	.599	.697	.461	.697	.461	.993
APA supervision	.268	.445	.267	.446	.983	.232	.424	.314	.467	.205	.253	.437	.282	.452	.648
Sex offender	.057	.233	.042	.201	.622	.058	.234	.046	.211	.696	.067	.251	.039	.195	.328
Hispanic	.079	.271	.043	.205	.279	.076	.267	.056	.232	.563	.080	.273	.056	.230	.468
Black	.678	.469	.632	.486	.512	.690	.464	.625	.487	.321	.722	.450	.604	.491	.067
White	.260	.440	.338	.477	.256	.262	.441	.318	.468	.372	.222	.418	.349	.479	.040
Other race	.014	.117	.000	.000	.335	.008	.089	.011	.107	.799	.009	.096	.009	.097	.989
Nonwhite	.748	.435	.667	.475	.227	.748	.436	.685	.467	.317	.786	.412	.657	.477	.034
Never married	.672	.471	.733	.445	.330	.621	.487	.777	.418	.007	.608	.490	.765	.426	.007
Married	.124	.331	.120	.327	.925	.143	.351	.098	.299	.277	.150	.359	.098	.299	.219
Divorced	.198	.399	.120	.327	.109	.229	.421	.107	.311	.009	.233	.425	.121	.328	.021
Widowed	.006	.075	.027	.162	.286	.007	.085	.018	.133	.438	.008	.091	.015	.123	.620
Cohabitation	.158	.366	.080	.273	.063	.186	.390	.071	.259	.006	.192	.395	.083	.277	.013
Household size	1.930	1.761	1.971	1.697	.869	1.941	1.729	1.942	1.762	.996	2.009	1.754	1.878	1.730	.562
Household income	5.424	11.979	7.121	16.468	.404	6.080	12.650	5.711	14.450	.843	6.591	13.496	5.298	13.397	.485
Personal income	3.055	7.527	3.878	7.799	.459	3.347	7.794	3.244	7.389	.920	3.574	8.218	3.057	7.027	.612
Education	1.937	.854	1.813	.672	.267	1.986	.807	1.791	.791	.058	2.000	.854	1.808	.748	.059

K.6 Table 2. Comparisons of Sociodemographic Characteristics between Control and Treatment Group at the Pre-Test, Post-Test, and Follow-Up Survey: *T*-Tests

	Pre-Test Participants (*n* = 252)					Post-Test Participants (*n* = 177)					Follow-Up Participants (*n* = 140)				
	Control Group (*n* = 115)		Treatment Group (*n* = 137)			Control Group (*n* = 90)		Treatment Group (*n* = 87)			Control Group (*n* = 59)		Treatment Group (*n* = 81)		
Variable	Mean	S.D.	Mean	S.D.	*p*-value	Mean	S.D.	Mean	S.D.	*p*-value	Mean	S.D.	Mean	S.D.	*p*-value
Age	35.087	10.865	34.445	10.606	.637	35.544	11.140	36.310	10.688	.641	38.288	11.250	35.395	10.559	.122
Previous incarceration	.722	.450	.676	.470	.439	.744	.439	.663	.476	.239	.695	.464	.675	.471	.805
APA supervision	.234	.426	.298	.460	.310	.233	.426	.308	.465	.326	.176	.385	.279	.452	.199
Sex offender	.053	.225	.052	.223	.976	.045	.208	.070	.256	.482	.052	.223	.062	.242	.805
Hispanic	.063	.243	.072	.260	.782	.083	.278	.076	.267	.868	.107	.312	.053	.226	.277
Black	.710	.456	.628	.485	.209	.729	.448	.632	.486	.211	.722	.452	.667	.475	.508
White	.237	.427	.322	.469	.165	.200	.403	.316	.468	.111	.204	.407	.306	.464	.193
Other race	.011	.104	.008	.091	.852	.014	.120	.013	.115	.954	.000	.000	.014	.118	.389
Nonwhite	.768	.424	.688	.465	.183	.806	.399	.696	.463	.121	.804	.401	.707	.458	.201
Never married	.730	.446	.657	.476	.208	.722	.450	.621	.488	.153	.678	.471	.580	.497	.238
Married	.078	.270	.161	.368	.042	.078	.269	.172	.380	.058	.085	.281	.185	.391	.079
Divorced	.191	.395	.161	.368	.524	.200	.402	.195	.399	.939	.237	.429	.222	.418	.835
Widowed	.000	.000	.022	.147	.083	.000	.000	.011	.107	.320	.000	.000	.012	.111	.395
Cohabitation	.157	.365	.117	.322	.360	.167	.375	.149	.359	.755	.220	.418	.160	.369	.372
Household size	1.809	1.651	2.054	1.810	.275	1.931	1.539	2.274	1.667	.164	1.810	1.249	2.346	1.735	.038
Household income	5.905	15.778	5.934	10.936	.988	4.557	12.660	6.441	11.132	.339	5.959	14.616	6.184	10.829	.923
Personal income	2.764	6.863	3.767	8.187	.326	1.990	5.814	4.250	8.965	.067	2.359	5.784	4.149	9.070	.184
Education	1.911	.789	1.891	.820	.844	1.908	.830	1.966	.882	.659	2.017	.888	1.963	.749	.697

	Randomized	Pre-test	Lost	%Lost	Post-Test	Lost	%Lost	Follow-Up	Lost	%Lost
Total	469	252	217	46.3%	177	75	29.8%	140	37	20.9%
Control group	212	115	97	45.8%	90	25	21.7%	59	31	34.4%
Treatment group	257	137	120	46.7%	87	50	36.5%	81	6	6.9%

K.7 Table 3. Comparisons of Sociodemographic Characteristics between Control and Experimental Group: *T*-Tests

	Control Group (*n* = 55)		Experimental Group (*n* = 65)		
Variable	Mean	S.D.	Mean	S.D.	*p*-value
Age	38.691	11.159	36.523	10.253	.270
Previous incarceration	.709	.458	.688	.467	.800
On parole	.188	.394	.319	.471	.144
Ever convicted of sex offense	.056	.231	.077	.269	.646
Hispanic	.115	.323	.050	.220	.220
Black	.740	.443	.707	.459	.705
White	.180	.388	.259	.442	.327
Other race	.000	.000	.017	.131	.356
Nonwhite	.827	.382	.750	.437	.322
Never married	.673	.474	.554	.501	.185
Married	.073	.262	.215	.414	.024
Divorced	.255	.440	.215	.414	.617
Widowed	.000	.000	.015	.124	.360
Cohabitation	.236	.429	.154	.364	.263
# people in the household	1.815	1.275	2.492	1.768	.018
Household income (in $1,000)	6.083	15.154	7.099	11.738	.706
Personal income (in $1,000)	7.099	11.738	4.733	9.830	.137
Education	2.037	.910	1.969	.809	.668

K.8 Table 4. Unconditional and Conditional Liner Latent Trajectory Model of Parenting Variables Regressed on Treatment and Covariates (*n* = 252)

	Endogenous Growth Factors											
	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Exogenous Variables	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**
Unconditional model												
Treatment	.063	.054	.126	-.043	.035	.062*	-.028	.032	.084	.052**	.046	-.044
	(.157)	(.039)	(.170)	(.051)	(.088)	(.032)	(.049)	(.025)	(.097)	(.025)	(.092)	(.031)
	-.033		-.108**		-.014		-.350**		-.036**		-.071**	
	(.032)		(.046)		(.018)		(.114)		(.015)		(.017)	
Model Fit Index												
χ^2 [*d.f.*, *p*-value]	7.228 [2, .027]		1.305 [2, .520]		.150 [2, .927]		1.731 [2, .420]		2.165 [2, .270]		5.935 [2, .051]	
RMSEA [90% C.I.]	.102 [.029, .186]		.000 [.000, .110]		.000 [.000, .039]		.000 [.000, .120]		.035 [.000, .135]		.089 [.000, .175]	
CFI	.965		1.000		1.000		1.000		.996		.952	
SRMR	.027		.014		.005		.018		.021		.029	
Conditional model												
Treatment	.010	.057	.038	-.035	.024	.055*	-.021	.026	.047	.058**	.078	-.050
	(.154)	(.041)	(.161)	(.052)	(.090)	(.033)	(.051)	(.025)	(.094)	(.027)	(.093)	(.032)
	-.032		-.078*		-.043		-.371**		-.031**		-.068**	
	(.031)		(.047)		(.055)		(.107)		(.014)		(.017)	
Married	.097	-.032	.407	-.062	.007	.000	-.179**	.049	.205	-.036	-.149	.081**
	(.214)	(.064)	(.251)	(.072)	(.103)	(.053)	(.090)	(.077)	(.156)	(.045)	(.136)	(.034)
Household size	.178**	-.004	.230**	-.017	.051**	.013*	.199**	.062	.083**	-.011	-.073**	.003
	(.042)	(.009)	(.050)	(.014)	(.022)	(.007)	(.070)	(.073)	(.027)	(.006)	(.027)	(.009)
Model Fit Index												
χ^2 [*d.f.*, *p*-value]	7.946 [4, .093]		2.860 [4, .581]		1.939 [4, .747]		2.552 [4, .635]		3.289 [4, .510]		6.218 [4, .183]	
RMSEA [90% C.I.]	.063 [.000, .126]		.000 [.000, .082]		.000 [.000, .067]		.000 [.000, .077]		.000 [.000, .087]		.047 [.000, .114]	
CFI	.981		1.000		1.000		1.000		1.000		.978	
SRMR	.019		.018		.011		.011		.017		.023	

Note. Parameter estimates and their standard error (in parentheses) are presented, and coefficients in the box are correlations between intercept and slope factors of each parenting variable; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Residual.

**p < .05 (one-tailed test), **p < .05 (two-tailed test).*

K.8 Table 5. Conditional Liner Latent Trajectory Models of Parenting Variables Regressed on Class Attendance and Covariates (*n* = 252)

	Endogenous Growth Factors											
	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Exogenous Variables	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**	**Intercept**	**Slope**
# sessions attended	-.017	.009**	-.005	-.005	-.004	.008**	-.006	.005	-.003	.007**	.004	-.001
	(.020)	(.004)	(.021)	(.006)	(.011)	(.003)	(.007)	(.003)	(.012)	(.003)	(.012)	(.004)
	-.356		-.077*		-.017		-.016**		-.032**		-.211**	
	(.426)		(.046)		(.018)		(.007)		(.015)		(.052)	
Married	.099	-.024	.412	-.066	.010	.008	-.188**	.024	.213	-.028	-.136	.073**
	(.209)	(.062)	(.251)	(.071)	(.101)	(.052)	(.092)	(.031)	(.154)	(.044)	(.135)	(.033)
Household size	.176**	-.003	.230**	-.018	.051**	.014*	.038**	.005	.083**	-.009	-.071**	.002
	(.042)	(.009)	(.050)	(.013)	(.022)	(.008)	(.014)	(.006)	(.027)	(.006)	(.027)	(.009)
Model Fit Index												
χ^2 [*d.f.*, *p*-value]	5.458 [4, .243]		3.418 [4, .490]		2.422 [4, .658]		4.191 [4, .380]		3.705 [4, .447]		6.613 [4, .157]	
RMSEA [90% C.I.]	.038 [.000, .108]		.000 [.000, .089]		.000 [.000, .075]		.014 [.000, .097]		.000 [.000, .092]		.051 [.000, .117]	
CFI	.993		1.000		1.000		.997		1.000		.974	
SRMR	.015		.019		.012		.018		.015		.026	
1–4 sessions attended	-.240	.048	-.293	-.015	-.064	.051	.006	.025	-.220	.101**	.127	-.044
	(.220)	(.057)	(.243)	(.083)	(.147)	(.047)	(.073)	(.028)	(.138)	(.046)	(.146)	(.045)
5–7 sessions attended	.113	.044	.247	-.045	-.135	.042	-.014	.011	.228	.048	.035	-.065
	(.268)	(.054)	(.298)	(.107)	(.181)	(.045)	(.093)	(.042)	(.159)	(.035)	(.183)	(.064)
8–10 sessions attended	-.236	.091**	-.107	-.044	-.045	.066**	-.075	.048*	-.095	.077**	.051	-.007
	(.189)	(.042)	(.201)	(.061)	(.102)	(.032)	(.067)	(.028)	(.120)	(.031)	(.111)	(.036)
	-.102		-.076		-.016		-.016**		-.030**		-.214**	
	(.090)		(.047)		(.017)		(.007)		(.014)		(.052)	
Married	.129	-.027	.457*	-.070	.018	.005	-.191**	.023	.244	-.035	-.151	.076**
	(.210)	(.061)	(.245)	(.071)	(.103)	(.052)	(.094)	(.031)	(.149)	(.042)	(.135)	(.032)
Household size	.181**	-.004	.235**	-.016	.051**	.013	.039**	.004	.088**	-.011	-.073**	.002
	(.041)	(.009)	(.049)	(.014)	(.022)	(.008)	(.014)	(.006)	(.027)	(.007)	(.027)	(.009)
Model Fit Index												
χ^2 [*d.f.*, *p*-value]	6.947 [6, .325]		3.687 [6, .719]		2.557 [6, .862]		4.307 [6, .635]		8.729 [6, .189]		20.519 [6, .002]	
RMSEA [90% C.I.]	.025 [.000, .088]		.000 [.000, .061]		.000 [.000, .043]		.000 [.000, .067]		.042 [.000, .099]		.098 [.054, .146]	
CFI	.996		1.000		1.000		1.000		.987		.873	
SRMR	.012		.015		.011		.017		.019		.041	

Note. Parameter estimates and their standard error (in parentheses) are presented, and coefficients in the box are correlations between intercept and slope factors of each parenting variable; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Residual.

** p < .05 (one-tailed test), ** p < .05 (two-tailed test).*

K.8 Table 6. Conditional Liner Latent Trajectory Models of Participation in TYRO Dads, Mediator (Coparenting Relationship, Parenting Efficacy, and Role Identity), and Parenting Satisfaction (*n* = 240)

	Coparenting Relation.		Parenting Efficacy		Role Identity		Parenting Satisfaction	
Variable	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope
Married	.211	-.035	.011	.005	-.177	.016	-.105	-.016
Household size	.087**	-.011	.054**	.011	.039**	.003	.079**	-.009
Treatment	.044	.067**	.040	.050	-.017	.037	-.078	-.073
Coparenting relation.								
Intercept	.---						.608**	
Slope	-.032**	.---						.897**
Parenting efficacy								
Intercept	***.264****	*-.024***	.---				1.070**	
Slope	*-.013*	***.007****	-.033**	.---				.889**
Role identity								
Intercept	**.009**	*.000*	***.090****	*-.015***	.---		-.273	
Slope	*.015**	***.006****	*.005*	***.006****	-.002	.---		1.150**
Model Fit Index								
χ^2 [*d.f.*, *p*-value]	124.359 [55, .000]				**Indirect Effects of Treatment**			
RMSEA [90% C.I.]	.072 [.056, .089]				via coparenting relation.		.027	.060*
CFI	.931				via parenting efficacy		.043	.044
SRMR	.049				via role identity		.005	.042*
Married	.220	-.026	.018	.012	-.180	.021	-.117	-.026
Household size	.086**	-.009	.054**	.012	.039**	.003	.077**	-.011
# session attended	-.004	.008**	-.002	.007*	-.004	.005*	-.014	-.008
Coparenting relation.								
Intercept	.---						.607**	
Slope	-.032**	.---						.911**
Parenting efficacy								
Intercept	***.264****	*-.024***	.---				1.069**	
Slope	*-.013*	***.009****	-.033**	.---				.883**
Role identity								
Intercept	**.009**	*.001*	***.089****	*-.015***	.---		-.271	
Slope	*.015**	***.003****	*.006*	***.006****	-.002	.---		1.148**
Model Fit Index								
χ^2 [*d.f.*, *p*-value]	126.265 [55, .000]				**Indirect Effects of # Session Attended**			
RMSEA [90% C.I.]	.073 [.057, .090]				via coparenting relation.		-.003	.007*
CFI	.930				via parenting efficacy		-.003	.006
SRMR	.048				via role identity		.001	.006*
Married	.258*	-.035	.031	.010	-.181	.019	-.110	-.008
Household size	.091**	-.011	.054**	.010	.039**	.004	.072**	-.016
1–4 sessions attended	-.255	.113**	-.087	.061	-.013	.050	-.012	-.088
5–7 sessions attended	.224	.054	-.120	.043	-.008	.017	.104	-.057
8+ sessions attended	-.111	.087**	-.036	.058*	-.067	.053*	-.160	-.022
Coparenting relation.								
Intercept	.---						.614**	
Slope	-.026**	.---						.621
Parenting efficacy								
Intercept	***.248****	*-.016*	.---				1.132**	
Slope	*-.002*	***.008****	-.021*	.---				1.689**
Role identity								
Intercept	**.010**	*.001*	***.087****	*-.016**	.---		-.210	
Slope	*.016**	***.004****	*.006*	***.007****	-.014**	.---		-.312
					Indirect Effects of 1-4 Session Attended			
					via coparenting relation.		-.157	.070
					via parenting efficacy		-.099	.103
					via role identity		.003	-.016
					Indirect Effects of 5-7 Session Attended			
					via coparenting relation.		.138	.033
					via parenting efficacy		-.136	.072
Model Fit Index					via role identity		.002	-.005
χ^2 [*d.f.*, *p*-value]	123.382 [63, .000]				**Indirect Effects of 8+ Session Attended**			
RMSEA [90% C.I.]	.063 [.046, .080]				via coparenting relation.		-.068	.054
CFI	.942				via parenting efficacy		-.041	.098*
SRMR	.043				via role identity		.014	-.017

*Note. Parameter estimates in box are covariances (1) between intercept and slope factors of the same mediator (numbers in regular font), (2) between intercept and slope factors of different mediators (numbers in **italic**), (3) between intercept factors of different mediators (numbers in **bold**), and (4) between slope factors of different mediators (numbers in **bold italic**).*

** p < .05 (one-tailed test), ** p < .05 (two-tailed test).*

K.9 Table 7. Conditional Liner Latent Trajectory Models of Participation in TYRO Dads, Mediator (Coparenting Relationship, Parenting Efficacy, and Role Identity), and Frequency of Father-Child Activity (*n* = 240)

	Coparenting Relation.		Parenting Efficacy		Role Identity		Frequency of Father-Child Activity	
Variable	Intercept	Slope	Intercept	Slope	Intercept	Slope	Intercept	Slope
Married	.211	-.031	.019	.010	-.177	.017	.260	-.081
Household size	.086**	-.010	.050**	.011	.039**	.003	.176**	-.026
Treatment	.048	.062**	.045	.039	-.017	.035	.014	-.229+
Coparenting relation.								
Intercept	.---						.146	
Slope	-.025*	.---						.890*
Parenting efficacy								
Intercept	**.253****	*-.019***	.---				1.250**	
Slope	*-.012*	***.009****	-.010	.---				.986**
Role identity								
Intercept	**.007**	*.002*	**.081****	*-.011***	.---		-.402	
Slope	*.016**	***.004****	*.013**	***.005***	.003	.---		2.476**
Model Fit Index								
χ^2 [*d.f.*, *p*-value]	101.687 [55, .000]				Indirect Effects of Treatment			
RMSEA [90% C.I.]	.059 [.041, .077]				via coparenting relation.		.007	.055*
CFI	.945				via parenting efficacy		.056	.038
SRMR	.064				via role identity		.007	.087
Married	.220	-.023	.027	.015	-.180	.022	.264	-.111
Household size	.086**	-.009	.050**	.012	.038**	.004	.176**	-.031
# session attended	-.003	.007**	-.002	.005	-.004	.005*	.002	-.032+
Coparenting relation.								
Intercept	.---						.157	
Slope	-.025**	.---						.869*
Parenting efficacy								
Intercept	**.253****	*-.019**	.---				1.238**	
Slope	*-.012*	***.009****	-.010	.---				.945**
Role identity								
Intercept	**.007**	*.002*	**.080****	*-.011***	.---		-.378	
Slope	*.016**	***.004****	*.013**	***.005***	.002	.---		2.440**
Model Fit Index								
χ^2 [*d.f.*, *p*-value]	105.223 [55, .000]				Indirect Effects of # Session Attended			
RMSEA [90% C.I.]	.062 [.044, .079]				via coparenting relation.		-.001	.006
CFI	.941				via parenting efficacy		-.003	.005
SRMR	.064				via role identity		.002	.012*
Married	.257*	-.031	.037	.013	-.179	.020	.296	-.096
Household size	.091**	-.011	.050**	.011	.039**	.002	.185**	-.023
1–4 sessions attended	-.249	.116**	-.068	.056	-.017	.054*	-.168	-.275+
5–7 sessions attended	.226	.050	-.105	.033	-.015	.018	.381	-.168
8+ sessions attended	-.099	.081**	-.034	.046	-.059	.052*	-.023	-.314+
Coparenting relation.								
Intercept	.---						.081	
Slope	-.024*	.---						.915*
Parenting efficacy								
Intercept	**.253****	*-.016*	.---				1.305**	
Slope	*-.010*	***.009****	-.010	.---				.998**
Role identity								
Intercept	**.007**	*.003*	**.081****	*-.011***	.---		-.426	
Slope	*.017**	***.004****	*.014**	***.005***	.002	.---		2.281**
					Indirect Effects of 1-4 Session Attended			
					via coparenting relation.		-.020	.107
					via parenting efficacy		-.089	.056
					via role identity		.007	.124*
					Indirect Effects of 5-7 Session Attended			
					via coparenting relation.		.018	.045
					via parenting efficacy		-.136	.033
Model Fit Index					via role identity		.006	.041
χ^2 [*d.f.*, *p*-value]	112.232 [63, .000]				Indirect Effects of 8+ Session Attended			
RMSEA [90% C.I.]	.057 [.039, .074]				via coparenting relation.		-.008	.074
CFI	.944				via parenting efficacy		-.045	.045
SRMR	.055				via role identity		.025	.120*

*Note. Parameter estimates in box are covariances (1) between intercept and slope factors of the same mediator (numbers in regular font), (2) between intercept and slope factors of different mediators (numbers in **italic**), (3) between intercept factors of different mediators (numbers in **bold**), and (4) between slope factors of different mediators (numbers in **bold italic**).*

** p < .05 (one-tailed test), ** p < .05 (two-tailed test).*

K.10 Table 8. Conditional Linear Latent Growth Models Before and After Constraining the Effect of Treatment on Parenting Variables: Multigroup Analysis

	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Moderation Variable	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Residential status Time 1												
Residential group (*n* = 64)	-.018	.047	-.105	-.059	.034	.048	-.102	.037	.046	.058**	-.068	-.059*
	(.073)	(.047)	(.094)	(.055)	(.059)	(.033)	(.071)	(.042)	(.056)	(.027)	(.068)	(.032)
Nonresidential group (*n* = 169)	.091*	.047	-.031	-.059	.055	.048	.118**	.037	.062**	.058**	-.057	-.059*
	(.049)	(.047)	(.065)	(.055)	(.038)	(.033)	(.056)	(.042)	(.031)	(.027)	(.036)	(.032)
$\Delta\chi^2$ test[a]		1.160		.379		.083		5.147**		.053		.022
Residential status Time 2												
Residential group (*n* = 42)	.002	.065	-.048	-.040	.012	.066*	.058	.102**	.079	.085**	-.058	-.070*
	(.062)	(.048)	(.082)	(.056)	(.062)	(.037)	(.079)	(.050)	(.063)	(.032)	(.059)	(.036)
Nonresidential group (*n* = 120)	.124**	.065	-.033	-.040	.095**	.066*	.125*	.102**	.088**	.085**	-.079*	-.070*
	(.055)	(.048)	(.078)	(.056)	(.042)	(.037)	(.065)	(.050)	(.036)	(.032)	(.046)	(.036)
$\Delta\chi^2$ test		1.436		.017		.916		.032		.015		.073
Residential status Time 3												
Residential group (*n* = 34)	-.061	.010	-.152	-.089	.032	.039	.010	.041	-.010	.058*	.014	-.063*
	(.043)	(.039)	(.101)	(.056)	(.037)	(.027)	(.082)	(.046)	(.048)	(.030)	(.067)	(.036)
Nonresidential group (*n* = 99)	.095*	.010	-.055	-.089	.048	.039	.055	.041	.082**	.058*	-.098*	-.063*
	(.054)	(.039)	(.068)	(.056)	(.043)	(.027)	(.058)	(.046)	(.035)	(.030)	(.044)	(.036)
Δ2 test		6.081**		.725		.074		.163		1.649		1.529
Perceived challenges Time 1												
Low-challenge group (*n* = 123)	.053	.064	.093	.094**	.043	.047	.040	.034	.097**	.061**		
	(.049)	(.040)	(.058)	(.045)	(.044)	(.034)	(.032)	(.025)	(.041)	(.027)		
High-challenge group (*n* = 114)	.078	.064	.095	.094**	.053	.047	.026	.034	.022	.061**		
	(.064)	(.040)	(.073)	(.045)	(.051)	(.034)	(.040)	(.025)	(.035)	(.027)		
$\Delta\chi^2$ test		.093		.082		.025		.075		2.210		
Perceived challenges Time 2												
Low-challenge group (*n* = 89)	.093	.094**	.008	-.011	.057	.064*	.039	.038	.122**	.104**		
	(.058)	(.045)	(.073)	(.058)	(.047)	(.036)	(.030)	(.025)	(.048)	(.033)		
High-challenge group (*n* = 79)	.095	.094**	-.042	-.011	.074	.064*	.037	.038	.078*	.104**		
	(.073)	(.045)	(.092)	(.058)	(.055)	(.036)	(.047)	(.025)	(.045)	(.033)		
$\Delta\chi^2$ test		.001		.181		.047		.002		.475		
Perceived challenges Time 3												
Low-challenge group (*n* = 68)	.022	.049	-.028	-.097	.047	.047	-.005	.017	.051	.061**		
	(.056)	(.039)	(.091)	(.054)	(.033)	(.029)	(.029)	(.023)	(.035)	(.027)		
High-challenge group (*n* = 68)	.076	.049	-.133	-.097	.048	.047	.062	.017	.076	.061**		
	(.059)	(.039)	(.063)	(.054)	(.054)	(.029)	(.040)	(.023)	(.045)	(.027)		
$\Delta\chi^2$ test		.472		.834		.000		2.202		.209		

Note.
[a] *Satorra-Bentler scaled chi-square test.*
** p < .05 (one-tailed test), ** p < .05 (two-tailed test).*

K.11 Table 9. Conditional Linear Latent Growth Models Before and After Constraining the Effect of Number of Sessions Attended on Parenting Variables: Multigroup Analysis

	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Moderation Variable	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Residential status Time 1												
Residential group (*n* = 64)	.006	.009**	.007	.008*	.006	.007**	-.002	.004	.006	.008**	-.005	.000
	(.006)	(.004)	(.006)	(.005)	(.005)	(.003)	(.005)	(.003)	(.006)	(.003)	(.007)	(.004)
Nonresidential group (*n* = 169)	.011*	.009**	.010*	.008*	.007	.007**	.008**	.004	.008**	.008**	.002	.000
	(.006)	(.004)	(.006)	(.005)	(.004)	(.003)	(.004)	(.004)	(.004)	(.003)	(.005)	(.004)
$\Delta\chi^2$ test[a]		.321		.206		.064		3.096		.070		.677
Residential status Time 2												
Residential group (*n* = 42)	.006	.008*	.002	-.006	.006	.006*	.003	.006*	.006	.008**	.002	.000
	(.008)	(.005)	(.010)	(.007)	(.005)	(.004)	(.005)	(.003)	(.008)	(.004)	(.007)	(.004)
Nonresidential group (*n* = 120)	.008**	.008*	-.013	-.006	.007	.006*	.007*	.006*	.006	.008**	-.004	.000
	(.004)	(.004)	(.009)	(.007)	(.004)	(.004)	(.004)	(.003)	(.008)	(.004)	(.005)	(.004)
$\Delta\chi^2$ test		.141		1.166		.182		.371		.090		1.115
Residential status Time 3												
Residential group (*n* = 34)	-.004	.002	-.019**	-.012*	.002	.004	-.002	.003	-.006	.005	.011	.000
	(.006)	(.005)	(.010)	(.006)	(.004)	(.003)	(.005)	(.003)	(.006)	(.004)	(.007)	(.004)
Nonresidential group (*n* = 99)	.011*	.002	-.007	-.012*	.002	.004	.008**	.003	.009**	.005	-.006	.000
	(.006)	(.005)	(.009)	(.006)	(.004)	(.003)	(.004)	(.003)	(.004)	(.004)	(.005)	(.004)
Δ2 test		.2.647		.945		.739		.057		2.855		3.573
Perceived challenges Time 1												
Low-challenge group (*n* = 123)	.009*	.010**	-.007	-.007	.007	.007	.009**	.006**	.009*	.007*		
	(.005)	(.004)	(.009)	(.006)	(.004)	(.003)	(.004)	(.003)	(.005)	(.004)		
High-challenge group (*n* = 114)	.011	.010**	-.007	-.007	.006	.007	.002	.006**	.004	.007*		
	(.007)	(.004)	(.009)	(.006)	(.005)	(.003)	(.004)	(.003)	(.004)	(.004)		
$\Delta\chi^2$ test		.067		.001		.000		1.547		.571		
Perceived challenges Time 2												
Low-challenge group (*n* = 89)	.009	.009*	-.004	-.006	-.004	-.006	.005	.004	.010**	.009**		
	(.006)	(.005)	(.009)	(.007)	(.009)	(.007)	(.004)	(.003)	(.005)	(.004)		
High-challenge group (*n* = 79)	.008	.009*	-.009	-.006	-.009	-.006	.004	.004	.006	.009**		
	(.008)	(.005)	(.009)	(.007)	(.009)	(.007)	(.005)	(.003)	(.005)	(.004)		
$\Delta\chi^2$ test		.007		.181		.103		.004		.296		
Perceived challenges Time 3												
Low-challenge group (*n* = 68)	.006	.007*	-.006	-.008	.005	.006*	.002	.003	.002	.005		
	(.006)	(.004)	(.010)	(.006)	(.004)	(.004)	(.003)	(.003)	(.005)	(.004)		
High-challenge group (*n* = 68)	.010	.007*	-.009	-.008	.008	.006*	.006	.003	.011**	.005		
	(.007)	(.004)	(.008)	(.006)	(.006)	(.004)	(.005)	(.003)	(.005)	(.004)		
$\Delta\chi^2$ test		.196		.053		.102		.370		1.716		

Note. Parameter estimates and their standard error (in parentheses) are presented.
[a] *Satorra-Bentler scaled chi-square test.*
* $p < .05$ *(one-tailed test),* ** $p < .05$ *(two-tailed test).*

K.12 Table 10. Conditional Linear Latent Growth Models Before and After Constraining the Effect of Dosage on Parenting Variables: Multigroup Analysis

	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Moderation Variable	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Residential status Time 1												
Residential group (*n* = 64)												
1–4 sessions attended	-.009	.017	-.144	-.058	-.089	.014	-.044	.011	.056	.093*	-.110	-.085*
5–7 sessions attended	.014	.040	-.149	-.052	.049	.027	.006	.013	.004	.038	-.054	-.079
8–10 sessions attended	.052	.086**	-.097	-.069	.021	.052	-.036	.035	.082	.085**	-.062	-.007
Nonresidential group (*n* = 169)												
1–4 sessions attended	.035	.017	-.003	-.058	.068	.014	.046	.011	.107	.093*	-.081	-.085*
5–7 sessions attended	.062	.040	.024	-.052	.004	.027	.013	.013	.054	.038	-.091	-.079
8–10 sessions attended	.113**	.086**	-.052	-.069	.069*	.052	.085**	.035	.085**	.085**	.012	-.007
$\Delta\chi^2$ test[a]		.575		1.204		4.083**		4.991**		.551		1.221
Residential status Time 2												
Residential group (*n* = 42)												
1–4 sessions attended	.043	.073	-.146	-.025	-.062	.060	.134**	.071*	.130	.165*	-.110	-.146**
5–7 sessions attended	.049	.089	-.312	-.157	.016	.085	.051	.062	-.005	.105**	-.054	-.076
8–10 sessions attended	.050	.077	.032	-.043	.019	.051	.029	.055*	.074	.085**	-.062	-.009
Nonresidential group (*n* = 120)												
1–4 sessions attended	.105	.073	.081	-.025	.117	.060	.040	.071*	.180**	.165*	-.081	-.146**
5–7 sessions attended	.133	.089	.048	-.157	.128	.085	.071	.062	.145**	.105**	-.091	-.076
8–10 sessions attended	.105*	.077	-.121	-.043	.072	.051	.071*	.055*	.094**	.085**	.012	-.009
$\Delta\chi^2$ test		1.002		6.389**		3.416*		1.367		1.616		5.831**
Residential status Time 3												
Residential group (*n* = 34)												
1–4 sessions attended	.162**	.081	.313**	.018	.088**	.062	.113**	.053*	.222	.053*	-.256**	-.146**
5–7 sessions attended	-.055	-.005	-.354**	-.133	.090*	.060	.092*	.034	-.020	.034	.045	-.076
8–10 sessions attended	-.019	.031	-.094	-.091	.012	.030	.021	.034	-.020	.034	.065	-.009
Nonresidential group (*n* = 99)												
1–4 sessions attended	.049	.081	-.070	.018	.047	.062	.036	.053*	.138**	.053*	-.127**	-.146**
5–7 sessions attended	.095	-.005	.108	-.133	-.016	.060	-.016	.034	.075	.034	-.149	-.076
8–10 sessions attended	.107*	.031	-.094	-.091	.065	.030	.044	.034	.102**	.034	-.050	-.009
$\Delta\chi^2$ test		6.949**		10.625**		5.325**		6.564**		2.563		6.654**

Continued on next page

K.12 Table 10. Conditional Linear Latent Growth Models Before and After Constraining the Effect of Dosage on Parenting Variables: Multigroup Analysis *(Continued)*

	Parenting satisfaction		Frequency of father-child activities		Parenting efficacy		Role identity		Coparenting relationship		Perceived challenges	
Moderation Variable	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Perceived challenges Time 1												
Low-challenge group (*n* = 123)												
1–4 sessions attended	.131	.065	.063	-.027	.102	.048	.045	.047*	.138**	.110**		
5–7 sessions attended	.033	.047	-.037	-.054	.014	.023	.044	.010	.045	.046		
8–10 sessions attended	.091**	.100**	-.070	-.067	.063	.058*	.081*	.064**	.102*	.077**		
High-challenge group (*n* = 114)												
1–4 sessions attended	.004	.065	.063	-.027	-.004	.048	.041	.047*	.087	.110**		
5–7 sessions attended	.078	.047	-.037	-.054	.044	.023	-.069	.010	.051	.046		
8–10 sessions attended	.110	.100**	-.070	-.067	.050	.058*	.038	.064**	.052	.077**		
$\Delta\chi^2$ test[a]		1.727		.668		.348		3.134		.745		
Perceived challenges Time 2												
Low-challenge group (*n* = 89)												
1–4 sessions attended	.168*	.127*	.138	.065	.088	.082	.012	.035	.172**	.183**		
5–7 sessions attended	.121	.060	-.071	-.072	.198**	.071	.312**	.106	.093	.080		
8–10 sessions attended	.090	.094**	-.027	-.041	.023	.044	.027	.037	.105**	.099**		
High-challenge group (*n* = 79)												
1–4 sessions attended	.075	.127*	-.038	.065	.071	.082	.059	.035	.194**	.183**		
5–7 sessions attended	.026	.060	-.100	-.072	.016	.071	-.016	.106	.073	.080		
8–10 sessions attended	.100	.094**	-.068	-.041	.077	.044	.057	.037	.088*	.105**		
$\Delta\chi^2$ test		.864		.348		2.801		3.186		.132		
Perceived challenges Time 3												
Low-challenge group (*n* = 68)												
1–4 sessions attended	.049	.061	.214	-.077	.133*	.095*	.012	.038	.130*	.138**		
5–7 sessions attended	.041	.044	-.001	-.082	.062	.044	-.002	.004	.065*	.056*		
8–10 sessions attended	.070	.083**	-.040	-.075	.036	.049	.020	.035	.038	.068*		
High-challenge group (*n* = 68)												
1–4 sessions attended	.070	.061	-.192**	-.077	.036	.095*	.082**	.038	.148**	.138**		
5–7 sessions attended	.045	.044	-.142	-.082	-.031	.044	.012	.004	.016	.056*		
8–10 sessions attended	.098	.083**	-.087	-.075	.082	.049	.069	.035	.118**	.068*		
$\Delta\chi^2$ test		.183		5.086**		3.920**		1.358		1.924		

Note. Parameter estimates and their standard error (in parentheses) are presented.
[a] *Satorra-Bentler scaled chi-square test.*
* $p < .05$ *(one-tailed test),* ** $p < .05$ *(two-tailed test).*

K.13 Appendix A. Results from Factor and Reliability Analyses

	Pre-Test			Post-Test			Follow-Up		
Variable	**Item**	**Loading**	**α**	**Item**	**Loading**	**α**	**Item**	**Loading**	**α**
Parenting satisfaction	q37	.889	.925	s2q37	.890	.920	s3q37	.870	.925
	q38R	.849		s2q38R	.890		s3q38R	.867	
	q39R	.827		s2q39R	.780		s3q39R	.885	
	q40	.917		s2q40	.887		s3q40	.854	
Parenting efficacy	q41R	.853	.930	s2q41R	.888	.946	s3q41R	.852	.958
	q42R	.815		s2q42R	.883		s3q42R	.826	
	q43R	.863		s2q43R	.868		s3q43R	.922	
	q44R	.623		s2q44R	.703		s3q44R	.841	
	q45R	.864		s2q45R	.912		s3q45R	.887	
	q46R	.816		s2q46R	.808		s3q46R	.903	
	q47R	.878		s2q47R	.890		s3q47R	.908	
Parenting role identity	q48R	.711	.872	s2q48R	.782	.909	s3q48R	.799	.922
	q49R	.794		s2q49R	.761		s3q49R	.697	
	q50R	.796		s2q50R	.846		s3q50R	.695	
	q51R	.765		s2q51R	.844		s3q51R	.865	
	q52R	.714		s2q52R	.883		s3q52R	.938	
	q53R	.509		s2q53R	.574		s3q53R	.694	
	q54R	.785		s2q54R	.883		s3q54R	.882	
Perceived challenges	q61R	.659	.782	s2q61R	.637	.828	s3q61R	.485	.764
	q62R	.393		s2q62R	.506		s3q62R	.451	
	q63R	.344		s2q63R	.561		s3q63R	.501	
	q64R	.475		s2q64R	.604		s3q64R	.531	
	q65R	.577		s2q65R	.634		s3q65R	.580	
	q66R	.661		s2q66R	.635		s3q66R	.603	
	q68R	.660		s2q68R	.702		s3q68R	.679	
	q69R	.630		s2q69R	.634		s3q69R	.521	
Coparenting relationship[a]	q20R	.722	.904	s2q20R	.718	.915	s3q20R	.654	.887
	q23R	.778		s2q23R	.854		s3q23R	.587	
	q27	.635		s2q27	.921		s3q27	.880	
	q28	.574		s2q28	.961		s3q28	.904	
	q29	.530		s2q29	.957		s3q29	.922	
	q30	.612		s2q30	.926		s3q30	.889	
	q31R	.711		s2q31R	.789		s3q31R	.562	
	q32R	.441		s2q32R	.668		s3q32R	.445	
Activities with the child 12 months or younger	q72R	.918	.980	s2q72R	.851	.984	s3q72R	.513	.982
	q73R	.976		s2q73R	.844		s3q73R	.562	
	q74R	.764		s2q74R	.900		s3q74R	.545	
	q75R	.831		s2q75R	.904		s3q75R	.683	
	q76R	.856		s2q76R	.882		s3q76R	.712	
	q77R	.969		s2q77R	.840		s3q77R	.720	
	q78R	.899		s2q78R	.878		s3q78R	.680	
	q79R	.647		s2q79R	.922		s3q79R	.905	
	q80R	.889		s2q80R	.903		s3q80R	.903	
	q81R	.885		s2q81R	.840		s3q81R	.866	
	q82R	.864		s2q82R	.932		s3q82R	.875	
	q83R	.658		s2q83R	.890		s3q83R	.940	
	q84R	.634		s2q84R	.743		s3q84R	.926	
	q85R	.941		s2q85R	.923		s3q85R	.888	
	q86R	.857		s2q86R	.842		s3q86R	.915	
	q87R	.857		s2q87R	.823		s3q87R	.957	
	q88R	.947		s2q88R	.835		s3q88R	.917	
	q89R	.889		s2q89R	.890		s3q89R	.861	
	q90R	.898		s2q90R	.839		s3q90R	.665	

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K.13 Appendix A. Results from Factor and Reliability Analyses *(continued)*

	Pre-Test			Post-Test			Follow-Up		
Variable	**Item**	**Loading**	**α**	**Item**	**Loading**	**α**	**Item**	**Loading**	**α**
Activities with the child older than 12 months but younger than 12 years old	q72R	.854	.987	s2q72R	.862	.988	s3q72R	.897	.984
	q73R	.865		s2q73R	.889		s3q73R	.880	
	q74R	.913		s2q74R	.917		s3q74R	.888	
	q75R	.916		s2q75R	.906		s3q75R	.853	
	q76R	.887		s2q76R	.941		s3q76R	.910	
	q77R	.819		s2q77R	.812		s3q77R	.744	
	q78R	.857		s2q78R	.866		s3q78R	.785	
	q79R	.912		s2q79R	.948		s3q79R	.844	
	q80R	.874		s2q80R	.889		s3q80R	.821	
	q81R	.812		s2q81R	.871		s3q81R	.707	
	q82R	.915		s2q82R	.937		s3q82R	.877	
	q83R	.867		s2q83R	.903		s3q83R	.900	
	q84R	.783		s2q84R	.845		s3q84R	.837	
	q85R	.917		s2q85R	.930		s3q85R	.852	
	q86R	.830		s2q86R	.767		s3q86R	.653	
	q87R	.815		s2q87R	.737		s3q87R	.786	
	q88R	.828		s2q88R	.795		s3q88R	.814	
	q89R	.885		s2q89R	.863		s3q89R	.787	
	q90R	.865		s2q90R	.883		s3q90R	.873	
	q91R	.893		s2q91R	.875		s3q91R	.850	
	q92R	.894		s2q92R	.919		s3q92R	.917	
	q93R	.830		s2q93R	.824		s3q93R	.823	
	q94R	.818		s2q94R	.845		s3q94R	.778	
	q95R	.736		s2q95R	.746		s3q95R	.823	
	q96R	.917		s2q96R	.937		s3q96R	.926	
	q97R	.915		s2q97R	.908		s3q97R	.935	
Activities with the child 12 years old or older	q72R	.549	.976	s2q72R	.737	.978	s3q72R	.605	.969
	q73R	.586		s2q73R	.755		s3q73R	.674	
	q74R	.600		s2q74R	.637		s3q74R	.578	
	q75R	.700		s2q75R	.677		s3q75R	.588	
	q76R	.728		s2q76R	.565		s3q76R	.503	
	q77R	.734		s2q77R	.665		s3q77R	.560	
	q78R	.706		s2q78R	.878		s3q78R	.838	
	q79R	.894		s2q79R	.791		s3q79R	.652	
	q80R	.896		s2q80R	.785		s3q80R	.774	
	q81R	.861		s2q81R	.733		s3q81R	.754	
	q82R	.870		s2q82R	.863		s3q82R	.813	
	q83R	.928		s2q83R	.918		s3q83R	.877	
	q84R	.922		s2q84R	.931		s3q84R	.853	
	q85R	.885		s2q85R	.921		s3q85R	.815	
	q86R	.909		s2q86R	.932		s3q86R	.908	
	q87R	.954		s2q87R	.924		s3q87R	.893	
	q88R	.925		s2q88R	.908		s3q88R	.909	
	q89R	.862		s2q89R	.660		s3q89R	.677	
	q90R	.704		s2q90R	.879		s3q90R	.820	
	q1R	.682		s2q91R	.906		s3q91R	.786	
	q92R	.660		s2q92R	.679		s3q92R	.669	
	q93R	.698		s2q93R	.917		s3q93R	.809	
	q94R	.790		s2q94R	.784		s3q94R	.809	
	q95R	.813		s2q95R	.780		s3q95R	.653	

Note. [a] *Numbers in italic refer to the negative items of undermining (q20R and q23R) and gatekeeping (q31R and q32R) loaded on one factor, whereas those in regular font are the positive items of alliance loaded on the other.*

K.14 Appendix B. Independent-Samples *T*-tests Comparing Outcome Measures at Pre-test (*N* = 252; Control Group *n* = 115; Experimental Group *n* = 137)

Variable	Group	*n*	Mean	S.D.	*p*-value
Parenting satisfaction	Control	114	3.517	1.296	.816
	Experimental	136	3.479	1.249	
Frequency of father-child activities	Control	113	2.600	1.365	.400
	Experimental	135	2.750	1.424	
Parenting efficacy	Control	113	3.198	.777	.612
	Experimental	137	3.246	.700	
Role identity	Control	114	3.726	.386	.497
	Experimental	137	3.691	.421	
Co-parenting	Control	115	2.779	.804	.650
	Experimental	137	2.825	.778	
Perceived challenges	Control	114	2.044	.722	.811
	Experimental	135	2.066	.758	

L. Notes

1. Slightly more than half (53.3%, n = 104) of 195 study participants for whom we had information about whether they were on parole or living in a halfway house at the time of pre-test were neither on parole nor living in a halfway house, whereas 12.8 percent were parolees living in a halfway house, with 33.8 percent being either (i.e., 20.5% not on parole and living in a halfway house and 13.3% on parole not living in a halfway house).

2. We compiled data on the number of attempts made to conduct telephone survey with 116 fathers of Cohorts 4 to 10 (specifically, 49 fathers of Cohorts 4 and 5 for follow-up survey and 67 fathers of Cohorts 6 to 10 for post-test and follow-up survey), while no such data are available for telephone surveys conducted prior to the follow-up of Cohorts 4 and 5. About 56 percent (87, 25 post-test and 62 follow-up surveys) of 156 attempted surveys (42 post-test and 114 follow-up surveys) were completed by phone. For the 156 target surveys, on average, 10 calls were made with the standard deviation of about nine calls, while the total number of call attempts ranged from one through 57. For about 49 percent (76) of the 156 surveys attempted, the average of about seven text messages were sent as well as calls made. We found that, on average, eight or nine (8.54) calls were made for completed surveys, whereas almost twelve (11.91) calls were made for those that were eventually not completed. It turned out that less than the average number of calls made (i.e., 10) was good enough to generate completed survey. On the other hand, the number of text messages sent was a non-factor for survey completion, as no significant mean difference was found between completed surveys (7.08) and those not completed (6.61). Finally, we found no difference in survey completion across the cohorts and between post-test and follow-up survey.

3. While in most cases equal randomization (1:1 for two groups) was used, in some instances, 1:2 was used in order to obtain the equal ratio of the treatment and control group. Equal randomization was used with an allocation ratio of 1:1 for the first eight cohorts. For Cohorts 8 and 9, we used the 2:1 ratio and assigned more fathers to the treatment group due to lower pretest completion rates for the experimental group.

4. Randomization was conducted on a cohort-by-cohort basis before fathers in each cohort attended an orientation and completed the pre-test at multiple sites throughout Ohio. Because the first class of TYRO Dads occurred immediately following administration of the pretest which was conducted as part of an orientation meeting, it would have been impractical to randomize fathers to the study conditions during the orientation. This approach resulted in attrition of fathers from the time of random assignment to administration of the pretest. The experimental and control groups were equivalent on all demographic measures except for marital status (see Table 2) and there were no significant differences in parenting measures between the two groups at the time of pre-test as shown in Appendix B.