

Patterns and Predictors of Different Youth Responses to Attachment-Based Parent Intervention

Dave S. Pasalich¹, Stephanie G. Craig², Natalie Goulter³, Katherine A. O'Donnell³, Carlos Sierra Hernandez³, and Marlene M. Moretti³

¹Research School of Psychology, Australian National University

²Department of Psychology, York University

³Department of Psychology, Simon Fraser University

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Correspondence regarding this article should be addressed to Dave S. Pasalich, Research School of Psychology, The Australian National University, Canberra, ACT 2601, Australia. dave.pasalich@anu.edu.au

Abstract

Objective: Few studies have evaluated attachment-based parent interventions for pre-teens and teens, and in particular, differential adolescent trajectories of response. This study examined distinct patterns, and multi-level predictors, of intervention response among youth with serious behavioral and mental health problems whose parents participated in *Connect*, an attachment- and trauma-informed parent program.

Method: Participants included 682 parents ($M_{\text{age}} = 42.83$, 86% mothers) and 487 youth ($M_{\text{age}} = 13.95$, 53% female, 28.1% ethnic minority) enrolled in a community-based evaluation of *Connect*. Parents and youth reported on youth externalizing and internalizing problems (EXT and INT) at six time points from baseline through 18-months post-intervention. Demographic and youth and family level predictors were assessed at baseline.

Results: Growth mixture modelling revealed three distinct trajectory classes in both the parent and youth models based on different patterns of co-occurring EXT and INT and degree of improvement over time. Youth with severe EXT showed the largest and fastest improvement, and, interestingly, were characterized by higher callous-unemotional traits and risk-taking at program entry. Youth with comorbid EXT/INT demonstrated a partial or moderate response to intervention in the parent and youth model, respectively, and were characterized by more attachment anxiety at baseline. Most youth showed relatively moderate/low levels of EXT/INT at baseline which gradually improved. Caregiver strain also predicted trajectory classes.

Conclusions: These results have significance for tailoring and personalizing interventions for high-risk youth and provide new understanding regarding the profiles of subgroups of youth who show different responses to an attachment-based parent intervention.

Keywords: family-based intervention; externalizing; internalizing; callous-unemotional; comorbidity

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The transition to and through adolescence involves significant neurobiological, cognitive, and social changes (Crone et al., 2016). Adapting to these changes leads to personal and relational growth, while also presenting new risk for mental health problems (Cicchetti & Rogosch, 2002). For instance, autonomy increases during adolescence; however, some youth may be driven to gain more social maturity and autonomy through engaging in delinquent and other externalizing behaviors (e.g. rule-breaking and severe substance use) (Moffitt, 2018). Moreover, adolescents experience heightened emotional reactivity and continue to grow in their self-regulatory abilities; however, some use maladaptive strategies to modulate negative affect and develop internalizing problems (e.g. withdrawal, depression, and anxiety) (Schäfer et al., 2017). Left unchecked, externalizing and internalizing problems (EXT and INT) can derail healthy development in childhood and adolescence and affect quality of life into adulthood (Copeland et al., 2015). Families provide a key context in which these behavior problems may first emerge and then escalate, or alternatively, be prevented or mitigated. Despite adolescents' growing autonomy and desire for more peer affiliation and less parental control, they still require considerable support and guidance from parents to effectively navigate developmental and life stressors. Thus, the quality of the parent-teen relationship, including the renegotiation of changing parent and child roles in adolescence, is central to promoting youth wellbeing (Smetana & Rote, 2019).

In this light, there is a pressing need for parent interventions that target important parent-adolescent processes known to underpin youth mental health. Parent-child attachment is considered to confer both risk and protection to developmental outcomes from early childhood through adolescence. Sensitive caregiving that promotes attachment security enables youth to seek emotional support from their parents when they feel stressed or

distressed, while also feeling safe and confident to explore new avenues for independence (Bowlby, 1973). There is strong evidence demonstrating the importance of parent-child attachment for behavioral and emotional adjustment in childhood and adolescence (Madigan et al., 2016), even above the contribution made by parenting behaviors proximal to youth behavior, such as parental monitoring (Scott et al., 2011). Notwithstanding this, little research has translated core attachment concepts into intervention strategies to bolster mental health in older children and adolescents (Kobak et al., 2015). With the goal of improving tailored interventions for youth and their families, this study aimed to develop new understanding on how youth respond to an attachment-based parent program.

Connect: An Attachment-Based Parent Intervention

Connect is a 10-session group-format program which aims to support parents of youth, aged 8-18, with significant behavioral and emotional problems (Moretti, 2020; Moretti et al., 2018). It targets key drivers of secure attachment, including parental reflective functioning (capacity to reflect on own and child's mental states), sensitive responsiveness, dyadic affect regulation, and "shared partnership" within the parent-teen relationship. Each session introduces a new principle relating to parenting and attachment using reflection and emotion-based learning exercises and role plays of familiar parent-teen scenarios. The principles cover common relational issues such as recognizing and responding to attachment needs (e.g. connection and independence) underlying teens' challenging behavior, understanding and navigating conflict from an attachment perspective, and strengthening empathy.

The effects of *Connect* on improving youth mental health and family outcomes have been demonstrated in various independent trials implemented in several countries. For instance, results from a large community-based trial in Canada involving 309 families of youth ($M_{\text{age}} = 13.63$) revealed benefits of *Connect* in reducing youth EXT and INT and

negative parent-adolescent relationship outcomes (e.g. verbal and physical aggression, caregiver strain) (Moretti & Obsuth, 2009). These preliminary findings regarding improved youth problem behavior were replicated in several randomized controlled trials (RCT), including studies conducted with Swedish, Somali-born, and Italian parents (Högström et al., 2017; Osman et al., 2017; Ozturk et al., 2019). Moreover, Högström et al. (2017) found reductions in serious behavioral problems at 2-years post-treatment were significant and of the same magnitude for *Connect* as observed for other behavioral parent interventions. Past findings also suggest that shifting internal parent-child representations in parents, and reducing teens' attachment insecurity and emotion dysregulation, might partly account for the effects of *Connect* on improving EXT and INT (Moretti et al., 2015; Moretti et al., 2012).

Thus, there is good evidence for overall—or group-level—effects of *Connect* for reducing mental health problems in older children and teens. However, it is not clear that all parents completing this intervention, and their youth, respond similarly to treatment. Variability in intervention responsiveness is widely recognized by clinicians and researchers, as outcomes may differ as a function of pre-intervention chronicity, severity, and comorbidity of youth and family problems. Understanding distinct trajectories in intervention responsiveness can assist clinicians in selecting interventions that are best suited to unique client profiles and needs. Additionally, such research elucidates our understanding of complex intervention by client interactions, providing much needed evidence for refinement and new development of intervention modalities.

Identifying Different Youth Responses to Family-Based Intervention

Person-centered analytic approaches can identify subgroups of participants with distinct patterns of change, and have created innovative opportunities to better understand heterogeneity in youth responses to family-based intervention (Soloski & Durtschi, 2019). For example, Abbott et al. (2019) examined changes in youth symptoms of depression and

suicidal ideation in response to family therapy (including attachment-based family therapy and family-enhanced nondirective supportive therapy). Results indicated that most youth showed significant decreases in symptoms across treatment and were good responders (57.5%), others responded partially (26.7%), and some showed no significant response (15.8%). Higher levels of symptom severity and depressogenic cognitions/attitudes at pre-treatment uniquely predicted poorer treatment response patterns over a 16-week period. A re-analysis of a trial of multisystemic therapy (MST) for antisocial adolescents, indicated six distinct trajectories of change in EXT across a 5-month treatment period (Mertens et al., 2017). Four of the trajectories were characterized by decreasing EXT, and two showed poor treatment responses, including high and stable (28.6%) or increasing (6.1%) EXT. Lower levels of parents' sense of parenting competence and less involvement with prosocial peers predicted the subgroup of youth with high and stable EXT (i.e. resistant to MST).

Furthermore, in an evaluation of family therapy for mothers with problematic substance use and their children and adolescents, Zhang and Slesnick (2018) investigated different co-occurring patterns of youth EXT and INT at pre-treatment and 18-month follow-up. Four groups were identified at both assessment points: INT only, EXT only, comorbid, and normative. Compared to a control condition, youth receiving family therapy were more likely to transition from the EXT only or comorbid class at pre-treatment, to the normative and INT only class at 18-month follow-up, respectively.

Together, results from these person-centered analyses suggest that youth show different trajectories of change in EXT and/or INT in response to family-based interventions. Moreover, youth and family factors appear to be important predictors of these distinct trajectory classes. This body of work contributes new knowledge that may help customize or personalize family-based interventions, however past research is limited in several respects. First, despite high comorbidity of mental health problems in youth receiving intervention

(e.g. Ollendick et al., 2008), most studies have not examined co-occurring trajectories of EXT and INT. Second, although there is a well-established discrepancy between parent and youth perceptions of youth behavior (De Los Reyes et al., 2015), past research has not typically included both parent and youth reports, or has not examined them separately. Third, studies with longer follow-ups of intervention responses are scarce, meaning we have limited understanding about whether improvements are sustained across distinct subgroups of youth (van Aar et al., 2017). Finally, research examining intervention outcomes of attachment-based programs for parents of at-risk youth is limited in general, and none have examined heterogeneity in youth responsiveness over intervention and follow-up periods. It is possible that certain groups of youth may benefit more than others from this relational approach to intervention.

Examining Multi-Level Predictors of Family-Based Intervention

To inform tailored family-based interventions, it is important to identify characteristics of youth and families that show different intervention responses. Past findings support the idea that interventions may produce greater gains in higher-risk youth and families that have elevated levels of the problematic functioning or processes that are specifically targeted (Leijten et al., 2018; Sandler et al., 2014). For instance, relationship-based interventions might generate larger benefits for youth in families with poorer parent-adolescent interactions at baseline (Brincks et al., 2018; Zisk et al., 2019). A similar mechanism could operate for *Connect* wherein higher gains are shown by youth in families that enter the program with more disrupted or impaired relationships. In this light, we examined youth attachment insecurity, caregiver strain, and low family satisfaction as potential predictors of intervention response, given that these factors are targeted by *Connect* (Moretti & Obsuth, 2009; Moretti et al., 2015) and reflect different aspects of negative parent-child relationships at the youth and family level.

Callous-unemotional (CU) traits (e.g. lack of guilt and empathy) mark another important feature of youth known to predict intervention outcomes. Past findings indicate that these traits are linked to severe and chronic antisocial behavior and tend to predict poorer outcomes following family-based intervention (predominantly behavioral parent interventions) (D. J. Hawes et al., 2014). However, strengthening parent-child attachment may be a better-suited strategy than improving parents' behavior management skills for reducing EXT in youth high on CU traits who are less responsive to discipline and may engage in aggressive behavior due to poor emotional awareness and responsiveness in relationships (e.g. Pasalich et al., 2011; Taubner et al., 2013). In other words, attachment-based interventions may better target the relational and emotional deficits associated with antisocial behavior in youth with high CU traits, compared with behavioral interventions. Although this theory has significant clinical implications, it remains largely untested owing to the limited research on attachment-based interventions for youth EXT. Furthermore, it is important to examine whether CU traits predict intervention response over and above other indicators of the severity and complexity of youth behavioral problems (D. J. Hawes et al., 2014), such as comorbid mental health problems and engagement in deviant risk-taking. Therefore, we examined CU traits, clinically-significant comorbidity, and risk-taking as additional youth-level predictors.

Current Study

In view of important gaps in the literature, the first aim of this study was to investigate different patterns of concurrent change in youth EXT and INT in families that participated in a large-scale evaluation of *Connect* delivered in community-based settings. We employed a person-centered approach (growth mixture modeling) to examine heterogeneity in change for both parent and youth reports of these co-occurring problem behaviors over six time points from baseline through 18-months following post-intervention.

Considering past findings, we expected to observe distinct trajectory classes of response to intervention based on initial severity of co-occurring youth EXT and INT, and the degree of improvement over time. Moreover, given meta-analytic evidence indicating better gains from parent interventions in youth with the highest-risks (Leijten et al., 2018; Sandler et al., 2014), we predicted that youth with the highest levels of baseline EXT and INT would particularly benefit from *Connect*. The second aim was to investigate unique predictors of the distinct trajectory classes. We included multiple demographic (e.g. age, parent education) and youth (clinically-significant comorbidity, CU traits, risk-taking, attachment insecurity) and family (caregiver strain, family satisfaction) level predictors. These predictors were examined because they are targeted by *Connect* and/or have been commonly tested as predictors of family-based intervention outcomes in past research. By examining multi-level predictors of distinct trajectory classes of youth responses to *Connect*, the present study expanded on prior findings by providing new insight into the characteristics of families that may differentially respond to attachment-based parent intervention.

Method

Participants

Participants were drawn from a large-scale evaluation ($N = 889$ families) of *Connect* in British Columbia, Canada, from spring 2014 – spring 2017. Parents were referred by community mental health centers, schools, and hospitals due to their youth's behavioral and emotional problems. This study did not include non-birth parents (e.g. foster/kinship and adoptive parents), given that they have a different history and type of relationship with their youth, and are a focus of other research we are conducting. The final sample comprised 682 birth parents ($M_{\text{age}} = 42.83$ years, $SD = 6.90$, range = 24.00 – 65.00) and 487 youth ($M_{\text{age}} = 13.95$ years, $SD = 2.32$, range = 7.53 – 18.33). If two parents of a youth provided reports (6.6% of cases), to avoid dependency in the data and limit variability in this study's sample,

we retained reports from mothers. Parents (86% mothers) had a median highest level of education at college/university completion (54.9%); 10.1% had not completed high school, and 35.0% completed high school. Most families were one (41%) or two (46%) parent households with a median income of \$25,000 to \$50,000 (24.3%). 52.5% of youth were female, 71.9% were White, 13.9% Indigenous, 5.2% Asian, and 9.0% were “other ethnicity”. Youth reports were available for 71% of the full sample. Youth who did ($N = 487$) vs. did not ($N = 195$) complete self-reports had a significantly higher percentage of females (56% vs. 43%; $\chi^2 [1] = 9.71$) and single caregiver households (43% vs. 34%; $\chi^2 [1] = 5.15$), and were significantly older ($M_{\text{age}} = 13.95$ vs. 12.67; $t [680] = -5.96$) (all p 's < .05). There were no other significant differences on baseline demographic or youth/family variables.

Procedure and Measures

The University Office of Research Ethics approved the study's protocol and parental consent and youth assent were obtained. Parents were invited to attend ten 1.5hr sessions of the *Connect* program led by two trained co-facilitators (attendance rates: five or fewer sessions = 14%; six to eight sessions = 35%; nine or ten sessions = 51%). Parents and youth completed measures across six time points: pre-/mid-/post-intervention and 6-/12-/18-months after program completion. Parents and youth each received a \$25 honorarium for completing the questionnaires at each assessment.

Externalizing and internalizing problems were assessed using parent and youth report versions of a paper format of the Brief Child and Family Phone Interview (BCFPI; Cunningham et al., 2009). The BCFPI includes 39 items measuring youth EXT (regulation of attention, cooperativeness, conduct problems) and INT (separation anxiety, managing anxiety/mood). Items are scored on a 3-point scale from “Never” to “Often”. The BCFPI has excellent psychometrics (e.g. Boyle et al., 2009). Internal consistency was good for EXT (parent $\alpha = 0.88$; youth $\alpha = 0.86$) and INT (parent $\alpha = 0.88$; youth $\alpha = 0.92$) composite

scores in the current sample. T -scores ≥ 70 are within the clinical range. EXT and INT composite T scores across the six time points were used as trajectory variables and a dichotomous variable, comorbid EXT/INT (i.e. clinically elevated on both EXT and INT at pre-intervention), was included as an a priori predictor variable of the longitudinal trajectories of EXT and INT.

Callous-unemotional traits were measured using parent and youth versions of a brief/revised form of the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004). The ICU-revised scale (S. W. Hawes et al., 2014) includes 12 items measuring callousness (e.g. “Seems cold and uncaring to others”) and uncaring (e.g. “Tries not to hurt other’s feelings”; reverse scored) dimensions. Items are rated on a 4-point scale from “Not at all true” to “Definitely true”. This revised 12-item scale has shown good psychometric properties in clinical and normative samples (S. W. Hawes et al., 2014). ICU-revised total score $\alpha = 0.90$ and 0.78 for parents and youth, respectively.

Risk-taking behavior was assessed using items from the Risk-Taking and Self-Harm Inventory for Adolescents (RTSHIA; Vrouva et al., 2010). The RTSHIA is a 34-item self-report measure of the frequency of engagement in risk-taking and self-harm behaviors. Items are rated on a 4-point scale from “Never” to “Many times”. Participants reported on seven items ($\alpha = 0.89$) adapted from the 12-item risk-taking subscale that measured mild (e.g. staying out late at night without parental knowledge) to serious (e.g. participation in violence) risk-taking behaviors.

Attachment insecurity was measured using parent and youth versions of a brief form of the Adolescent Attachment Anxiety & Avoidance Inventory (AAAAI; Moretti & Obsuth, 2009). The brief AAAAI includes 16 items with the highest factor loadings from the full 56-item measure, and is composed of two scales assessing attachment anxiety (e.g. “I worry about being abandoned by my parent”) and avoidance (e.g. “My youth tries to avoid getting

too close to me”). Items are rated on a 7-point scale from “Strongly disagree” to “Strongly agree”. The scales have demonstrated excellent psychometric properties (e.g., reliability and convergent validity: McKay & Steiger, 2003; Moretti et al., 2015) in prior studies. Consistent with past research (e.g. Moretti et al., 2015), internal consistency was good for attachment anxiety (parent $\alpha = 0.84$; youth $\alpha = 0.84$) and avoidance (parent $\alpha = 0.91$; youth $\alpha = 0.90$).

Caregiver strain was assessed using the 21-item Caregiver Strain Questionnaire (CGSQ; Brannan et al., 1997). This study included the externalized strain (four items; $\alpha = 0.76$; e.g. anger, resentment, and embarrassment due to their youths’ problems) and internalized strain (six items; $\alpha = 0.85$; e.g. anxiety, fatigue, sadness, and worry about the family’s and child’s future) scales. Items are rated on a 5-point scale from “Not at all” to “Very much”.

Family satisfaction was measured using parent and youth versions of the Family Satisfaction Scale (FSS; Olson, 1995). The 10-item FSS assesses satisfaction in the family system in regard to family cohesion (e.g. quality of communication between family members) and adaptability (e.g. family’s ability to cope with stress). Items are rated on a 7-point scale from “Strongly disagree” to “Strongly agree”. Internal consistency was excellent (parent $\alpha = 0.92$; youth $\alpha = 0.93$).

Parents also completed a survey regarding *demographic* information such as age, gender, ethnicity, education, family composition, and family income.

Analysis Plan

Using Mplus 7.4 (Muthén & Muthén, 2015), we conducted parallel process growth mixture modeling (GMM) to identify distinct classes of co-occurring trajectories of EXT and INT across the six time points (i.e. pre-/mid-/post-intervention and 6-/12-/18-month follow-up). Slope loadings for intermediate time points were freely estimated based on the data to

provide a customised fit to the growth curve (Soloski & Durtschi, 2019). We compared the fit of five models (one through five classes) separately for parent- and youth-reports. Better model fit was indicated by lower Bayesian information criterion (BIC) and sample size adjusted BIC (ABIC); a significant bootstrap likelihood ratio test (BLRT) indicated a better fitting model than the model with one less class; and higher entropy values (i.e. closer to 1) indicated greater class separation (Wickrama et al., 2016). Sample sizes and theoretical/clinical interpretability of the trajectory classes were also considered (Wickrama et al., 2016).

After selecting the best fitting models, we examined predictors of GMM trajectory classes using multinomial logistic regression in Mplus 7.4. Coefficients indicate the log odds of membership in a target class relative to a reference class, for one unit increase in the predictor. We ran separate regression models for demographic (Model 1) and youth and family (Model 2) predictors assessed at baseline, and then simultaneously entered only the significant predictors from Models 1 and 2 into a combined model (Model 3) (see Table 3 and 4 for a list of the predictor variables). Again, separate models were tested for parent- and youth-reported EXT and INT.

Missing Data

The percentage of missing data for parent- and youth-reported EXT and INT ranged from 0% to 27% across pre-/mid-/post-intervention assessments, and 44% to 53% across 6-/12-/18-month follow-up assessments. Thus, the majority of missing data were due to attrition. There was support for the assumption of data missing at random (MAR); for example, missingness on EXT and INT was most consistently associated with observed covariates (e.g. age of parent and youth). Full information maximum likelihood (FIML) was used to address missing data in the GMM analysis. For the multinomial logistic regression models, rather than using listwise deletion on missing predictor scores as is default for this

analysis in Mplus, multiple imputation (MI) was employed in SPSS to retain the full sample size. FIML and MI are robust approaches to handling data MAR as they produce less biased parameter estimates (Enders & Bandalos, 2001).

Results

Identifying Distinct Trajectory Classes

Parent-Reported EXT and INT

Table 1 shows fit indices for one through five classes using parent- and youth-reported EXT and INT. Results from the parent-report one-class baseline model indicated a significant overall decrease for both EXT (slope = -6.36, $SE = 0.58$, $p < .001$) and INT (slope = -6.61, $SE = 0.60$, $p < .001$) across time. Although the ABIC decreased with greater classes, the three-class model was selected because it showed better fit (lower ABIC and significant BLRT) than the two-class solution, had satisfactory entropy, and the trajectory classes included adequate sample sizes (the four- and five-class solutions resulted in a class with $n = 5$) and were conceptually plausible. Parameter estimates for the three-class model are shown in Table 2, and estimated T scores across time points are displayed in Figure 1. Class 1 (*high EXT-rapid improvement*; 6.8%) identified a subgroup with initially very elevated but rapidly decreasing EXT across intervention, which rebounded somewhat at 6-month follow-up but then dropped again before stabilizing at final assessments. Class 2 (*high EXT/INT-partial improvement*; 14.6%) captured youth with initially elevated but significantly decreasing EXT and INT, though INT remained clinically elevated at 18-month follow-up. The largest subgroup was Class 3 (*moderate EXT/INT-gradual improvement*; 78.7%), which showed moderate levels of EXT and INT at pre-intervention that gradually decreased over time.

Youth-Reported EXT and INT

Results from the youth-report one-class baseline model indicated a significant overall decrease for both EXT (slope = -3.35, $SE = 0.61$, $p < .001$) and INT (slope = -3.38, $SE =$

0.76, $p < .001$) across time. To promote model convergence and parsimony, in testing the two through five class models, the non-significant variance for EXT slope was fixed to zero within class, but allowed to vary across classes (Berlin et al., 2014). The three-class model demonstrated better fit than the two-class model (lower ABIC and significant BLRT), and it was selected over the four- and five-class models because they had non-significant BLRTs and incorporated classes with small sample sizes (i.e. n 's ≤ 10). Parameter estimates for the three-class model are shown in Table 2, and estimated T scores across time points are displayed in Figure 2. Class 1 (*high EXT–rapid improvement*; 4.0%) included youth with clinically elevated EXT that rapidly decreased across intervention, and then slightly increased at 6-month follow-up before stabilising across follow-up assessments. Youth in Class 2 (*moderate EXT/INT–gradual improvement*; 38.5%) showed moderate levels of comorbid EXT and INT that gradually decreased over time, with more change for INT vs. EXT. Class 3 (*low EXT/INT–gradual improvement*; 57.5%) captured youth with relatively low levels of EXT and INT (T scores < 60 at pre-intervention) that overall decreased significantly. The trajectory patterns in the three-class model for youth- and parent-reports were very similar, however there were consistently lower levels of EXT/INT for the comparative classes in youth- vs. parent-report.

Examining Predictors of Trajectory Classes

Parent-Reported EXT and INT

In a series of multinomial logistic regression analyses, we examined baseline predictors of the three-class GMM trajectories for parent-reported EXT and INT. We report on significant predictors from the final regression model (Model 3) that simultaneously entered a selected set of demographic and parent-reported youth/family variables (see Table 3 for the full results). Youth elevated on CU traits at baseline were significantly more likely to belong to Class 1 (*high EXT–rapid improvement*) and Class 3 (*moderate EXT/INT–gradual*

improvement) compared to Class 2 (*high EXT/INT–partial improvement*). Comorbid EXT/INT (i.e. clinically elevated on both EXT and INT) significantly predicted being in Class 2 (*high EXT/INT–partial improvement*) relative to Class 1 (*high EXT–rapid improvement*) and Class 3 (*moderate EXT/INT–gradual improvement*). This confirmed the high level of comorbidity characterizing youth belonging to Class 2. Similarly, youth with higher attachment anxiety were significantly more likely to be in Class 2 than Class 1 and Class 3. Higher caregiver internalized strain significantly predicted membership in Class 1 (*high EXT–rapid improvement*) and Class 2 (*high EXT/INT–partial improvement*) versus Class 3 (*moderate EXT/INT–gradual improvement*). However, higher caregiver externalized strain significantly predicted membership in Class 3 (*moderate EXT/INT–gradual improvement*) versus Class 2 (*high EXT/INT–partial improvement*). Finally, White race/ethnicity significantly predicted being in Class 3 relative to Class 2.

Youth-Reported EXT and INT

Table 4 shows results from the multinomial logistic regression analyses examining baseline predictors of the three-class GMM trajectories for youth-reported EXT and INT. Youth-reports were used for all the youth/family predictor variables, except for (parent-reported) caregiver strain. As above, we report on significant predictors from the combined model (Model 3). First, risk-taking, CU traits, and clinically-significant comorbidity all emerged as significant predictors. Youth with higher risk-taking scores at baseline were significantly more likely to be in Class 1 (*high EXT–rapid improvement*) compared to Class 2 (*moderate EXT/INT–gradual improvement*) and Class 3 (*low EXT/INT–gradual improvement*). Youth with elevated CU traits were significantly more likely to belong to Class 1 (*high EXT–rapid improvement*) and Class 3 (*low EXT/INT–gradual improvement*) relative to Class 2 (*moderate EXT/INT–gradual improvement*). Youth with comorbid EXT/INT were significantly more likely to be in Class 2 (*moderate EXT/INT–gradual*

improvement) than Class 1 (*high EXT–rapid improvement*) and Class 3 (*low EXT/INT–gradual improvement*). Furthermore, comorbid EXT/INT significantly predicted being in Class 1 versus Class 3. Thus, CU traits and comorbid EXT/INT predicted similar trajectory classes for youth- and parent-report.

With regard to measures of relationship quality, akin to the results for parent-report, youth with higher attachment anxiety were significantly more likely to belong to Class 2 (*moderate EXT/INT–gradual improvement*) compared to Class 3 (*low EXT/INT–gradual improvement*). Higher caregiver internalized strain significantly predicted membership in Class 2 (*moderate EXT/INT–gradual improvement*) than Class 1 (*high EXT–rapid improvement*), contrasting the finding from parent-report. However, higher caregiver externalized strain significantly predicted membership in Class 3 (*low EXT/INT–gradual improvement*) versus Class 2 (*moderate EXT/INT–gradual improvement*), which was consistent with results from parent-report. Finally, older youth were significantly more likely to be in Class 2 than Class 1 and Class 3.

Discussion

Utilizing a person-centered methodology, this study aimed to identify unique trajectories of youth responses to an attachment-based parent intervention, and investigated demographic and youth and family level predictors of these trajectories. Findings from the GMM analysis revealed three distinct trajectory classes of youth co-occurring change in EXT and INT for both parent- and youth-reports. Class 1 in both models identified a small yet clinically meaningful subgroup of youth who started with very high EXT, which rapidly decreased during the intervention, then slightly rebounded in the early phase of follow-up, and ended up below the clinical cut-off at 18-month follow-up. We refer to this group as *rapid improvers* because they showed a remarkable and fast change in EXT. Class 2 in both models was the second largest subgroup and was characterized by high (parent) or moderate

(youth) levels of EXT/INT at baseline. In the youth model, this pattern of co-occurring EXT/INT gradually decreased (with relatively greater reductions for INT). In the parent model, although EXT/INT significantly decreased, INT remained in the clinically-significant range at 18-month follow-up. Thus, in the parent model, we refer to Class 2 as *partial improvers*. Class 3 identified the most common trajectory response in both models, involving relatively moderate (parent) or low (youth) levels of EXT/INT at program entry, that on average gradually decreased over time.

These results are somewhat consistent with our hypothesis that youth with the most severe problem behavior would particularly benefit from *Connect*, as Class 1 (high EXT) in both models showed the largest improvement in EXT. Similarly, in the parent model, Class 2 (high EXT/INT) demonstrated significant decreases in both EXT and INT, but improvement in INT was limited given that these behavior problems remained clinically elevated. Interestingly, this finding is consistent with past results from a person-centered analysis of a family therapy trial, in which youth in a co-occurring EXT/INT class (based on parent report at baseline) were more likely to transition to an INT only class at 18-month follow-up compared to a control condition (Zhang & Slesnick, 2018). In other words, among youth with comorbid EXT/INT, intervention was linked to clinically meaningful improvements in EXT but not in INT. These findings speak to the importance of evaluating change in co-occurring problem behaviors to gain a more comprehensive and fine-grained understanding of youths' patterns of response to family-based interventions.

Our findings also highlight the significance of including both parents' and youths' perspectives of EXT and INT in evaluating youth responses. Parents reported higher levels of problem behavior than youth, as all three corresponding classes in the parent model were characterized by higher baseline EXT and INT compared to the youth model. Although youth who did (71% of families) vs. did not complete self-reports in this study differed on a few

demographic variables (e.g. they were older), they did not significantly differ on any (parent reported) youth or family level variables, including EXT and INT. Therefore, there may be reasons why parents reported more problem behaviors than youth, beyond sample-specific characteristics of the participating youth. For example, parents might have greater concerns and/or distress in regards to youths' problem behaviors than their youth, or perhaps these behaviors are manifested differently across relational or contextual settings (e.g. they are more severe at home vs. in the school/community), which may influence parents' perception of them (De Los Reyes et al., 2015). It is also possible that as parents become increasingly attuned to their youth during the *Connect* program, and begin to reframe problem behaviors in terms of youth distress, they might become more discerning of their youth's INT. Furthermore, their youth may disclose more about their INT as the parent-teen relationship improves. Although speculative, these suggestions might help account for the clinically elevated INT profile for Class 2 that was revealed in the parent model, but not the youth model.

Notwithstanding this discrepancy between parent and youth reports, there was considerable overlap between the two models in regard to the patterns of the unique trajectory classes. Specifically, both models identified three classes with similar patterns of change in EXT and INT that reflected varying degrees of improvement in at least one of these problem behaviors. There was also insufficient evidence for a nonresponder class found in some recent person-centered analyses of family-based interventions (e.g. Abbott et al., 2019; Mertens et al., 2017). Our findings are encouraging considering that the sample was from an evaluation trial delivered in community-based settings, which often produce smaller effects than trials delivered by program developers/experts in controlled settings (Weisz et al., 2015). In addition, consistent with other parent interventions (van Aar et al., 2017), post-intervention reductions in EXT and INT were generally sustained across the 18-month

follow-up period. Results from a RCT of *Connect* in Swedish pre-teens, however, showed continued gains from post-treatment through follow-up over a 2-year follow-up period (Högström et al., 2017). More research is needed to evaluate patterns and mechanisms of long-term response trajectories associated with *Connect* and other attachment-based interventions for older children and adolescents, as they are thought to have enduring influences on parent-child processes beyond behavior (e.g. at the level of parenting representations; Kobak et al., 2015; Moretti et al., 2012).

Regarding our second aim, several youth and family level variables predicted membership in trajectory classes in the parent and youth models. In both models, among the two classes with the highest EXT at baseline (Class 1 and 2), CU traits predicted the trajectory that showed the largest and fastest improvement in EXT (Class 1). This finding is very noteworthy as it is inconsistent with past research suggesting that CU traits tend to predict poorer outcomes following family-based intervention (D. J. Hawes et al., 2014). For example, a family-focussed therapy, MST, was found to be more effective than treatment as usual in reducing EXT in youth with *lower* vs. higher CU traits (Manders et al., 2013). Moreover, here we found that CU traits uniquely predicted trajectory classes over and above other risk factors; namely, clinically-significant comorbidity and risk-taking. The latter finding suggests that it is important to consider both antisocial traits (CU) and behavior (risk-taking) in the prediction of intervention outcomes for EXT. Youth with clinically significant levels of co-occurring EXT/INT at baseline were more likely to be in Class 2 compared to the other classes, providing additional support that this class was characterized by more severe comorbidity at program entry, which may have impeded improvement in INT (observed in the parent model).

With respect to youths' relationship with their parents, attachment anxiety uniquely predicted membership in the high comorbidity class (Class 2); this class showed the highest

levels of co-occurring INT at baseline. This is consistent with past *Connect* findings showing a specific association between changes in attachment anxiety and INT (Moretti et al., 2015). Regarding parents' relationship with their youth, in the parent model, caregiver internalized strain (e.g. anxiety, sadness) predicted the two classes that started with the highest EXT (Class 1 and 2), whereas caregiver externalized strain (e.g. anger, resentment) only predicted the most common trajectory class (i.e. Class 3, moderate EXT/INT—gradual improvement). This pattern of findings suggests that parents of youth with greater disruptive behavior (regardless of the level of co-occurring INT) may be more likely to internalize problems in the relationship. Moreover, given that Class 1 and 2 showed distinct profiles of improvement in the parent model (rapid vs. partial improvement, respectively), internalized strain may predict multiple paths of intervention response that are characterized by initially elevated EXT. Together, these findings do not provide clear support for the suggestion that families with more disrupted relationships at program entry show greater gains from family-focused interventions (Brincks et al., 2018; Zisk et al., 2019). Further research is needed to examine how different patterns of change in the parent-teen relationship across intervention might lead to improvements in behavior problems. It is also important to investigate the reciprocal effects of our predictors (e.g. caregiver strain) and EXT/INT over time, as behavior problems in youth are known to affect parenting (e.g. Burke, Pardini, & Loeber, 2008).

Demographic variables did not generally significantly predict trajectory classes. In the youth model, older youth were more likely to be in the high comorbidity subgroup (Class 2), which might be understood in view of findings showing increasing INT through adolescence (e.g. Nivard et al., 2017). In the parent model, White race/ethnicity predicted membership in Class 3 (moderate EXT/INT—gradual improvement) vs. Class 2 only. However, these findings should be interpreted cautiously as youth who did vs. did not complete self-reports tended to be older, and youth ethnicity only predicted one class comparison in one model.

The general lack of findings regarding demographic predictors is consistent with the existing literature concerning family-based interventions (e.g. Leijten et al., 2018), and makes sense given that *Connect* has been successfully implemented in different countries involving families with varying family structures and socioeconomic and ethnic backgrounds (Moretti et al., 2018).

Key strengths of this study include the large sample of high-risk families that participated in a community-based evaluation of *Connect* in real-world conditions, thereby enhancing the generalizability of the results. Furthermore, examination of both parent and youth reports of baseline predictors and simultaneous change in EXT and INT across six intervention/follow-up time points, facilitated a rigorous and comprehensive analysis of intervention response. Our findings should also be interpreted in light of several limitations. First, all variables were measured using questionnaire reports. Future studies should try and incorporate observational assessments; this method of assessing family relationship quality may improve prediction of intervention outcomes over questionnaires (Zisk et al., 2019). Second, most youth were White and half were living in families with college/university-educated parents; thus, although our sample is representative of Canadian families, our results may not generalize to more diverse or disadvantaged populations. Third, like many other intervention studies with long follow-ups, although we employed FIML in the GMM analysis, our results are limited by missing data at follow-up time points. Finally, this study did not examine other important parent factors that may also influence trajectory outcomes in attachment-based interventions, such as parents' attachment status and history of adverse childhood experiences (Cassidy et al., 2011; Pasalich et al., 2019).

Implications for Clinical Practice

Our results have significant implications for tailoring and personalizing interventions for youth and their families. Identification of the *rapid improvers* (Class 1) in both the parent

and youth models provides initial evidence that youth presenting with severe EXT may actually benefit the most from *Connect*. Furthermore, these youth are more likely to have elevated levels of CU traits and risk-taking at program entry. These findings are in contrast to the existing body of research showing that youth with high CU traits tend to show poorer gains from family-based intervention – predominantly involving treatments targeting parents’ behavior management practices (D. J. Hawes et al., 2014). Why might *Connect* be a well-matched intervention for this subgroup of youth? Arguably, an attachment-focused approach to intervention may help promote emotional responsiveness, empathy, and compliance with family norms in high CU youth who are less responsive to parental discipline and behavioral control (Muñoz et al., 2011; Pasalich et al., 2011; Taubner et al., 2013). *Connect* supports parents in sensitively responding to their youth’s attachment needs (e.g. autonomy and connection), rather than reacting to their behavior, which reduces coercive conflict and promotes partnership and bonding in the relationship, thereby enhancing parental socialization efforts. *Connect* is also very suitable for trauma-impacted youth, including those who may have developed CU traits and antisocial behavior through exposure to maltreatment and other serious ruptures in the caregiver-child relationship (Craig et al., in press; Kimonis et al., 2013). For instance, the attachment-based principles in *Connect* help parents reframe challenging and aggressive behaviors in terms of youth distress and the need for parental support. Attachment-based approaches to parenting largely differ from behavioural approaches in their focus on helping parents reflect on and better understand the meaning or underlying needs of their youth’s behavior, which can increase emotionally attuned and synchronous communication in the parent-child relationship (Kobak et al., 2015).

Although *Connect* may be well-suited to youth with severe EXT, identification of the *partial responders* (Class 2) in the parent model raises the question of whether youth presenting with elevated levels of co-occurring EXT and INT may benefit from an adjunctive

youth-focused intervention (e.g. cognitive-behavioral therapy) targeting their INT, given that these problems remained clinically elevated. However, as discussed above, it is difficult to determine the meaning and implications of the discrepancy in parent and youth reports of INT, as Class 2 in the youth vs. parent model showed a considerably lower level of INT across the time points. It might be the case that during *Connect* parents become more aware of and attuned to youths' internal experiences, and/or youth disclose more about them as the relationship strengthens, which could possibly obscure meaningful improvements in youth INT based on parents' reports. In line with other attachment-based interventions, prior studies suggest that *Connect* is effective in improving both EXT and INT (e.g. Moretti & Obsuth, 2009; Osman et al., 2017), thus future research is needed to better understand discordance in parent and youth reports of intervention outcomes. Overall, our findings buttress clinical wisdom regarding assessing comorbid behavior problems and gathering both parents' and youths' reports, particularly concerning INT that are covert and often harder for parents to evaluate (De Los Reyes et al., 2015).

Conclusion

In sum, our findings provide first evidence that youth differ in their response to attachment-based parent intervention in terms of showing unique patterns of co-occurring EXT and INT trajectories. These different patterns of response are predicted by several youth and family level variables at baseline. Importantly, youth with the most severe EXT showed the fastest and largest intervention response and were characterized by high levels of CU traits and risk-taking at program entry. Results from the parent model suggest that youth with clinically-significant comorbidity are more likely to show a mixed response to *Connect* and might require more intensive support for their INT. These findings contribute new knowledge to help guide clinicians in customizing and personalizing interventions for high-risk youth

and their families, and support the promise of attachment-based parent intervention for youth with mental health problems, particularly those with severe antisocial behavior.

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Table 1

Fit Indices for Growth Mixture Models for Parent-Reported and Youth-Reported EXT and INT

Report (sample size)	# Classes	BIC	ABIC	Entropy	BLRT test	Class sample size
Parent	1	41160.33	41014.27			682
	2	41148.03	40986.10	.73	44.93***	100, 582
	3	41154.51	40976.71	.72	26.14***	46, 99, 537
	4	41156.79	40963.11	.77	26.50*	5, 56, 110, 511
	5	41155.77	40946.21	.66	33.65***	5, 57, 133, 166, 321
Youth	1	28422.49	28263.79			487
	2	28414.18	28252.31	.58	29.07***	200, 287
	3	28426.28	28248.53	.69	18.85*	20, 187, 280
	4	28441.12	28247.51	.72	16.10	1, 35, 188, 263
	5 ⁺	28453.15	28243.66	.79	18.18	1, 9, 60, 185, 232

Note. EXT = externalizing problems; INT = internalizing problems. Bolded line indicates best model. BIC = Bayesian information criterion;

ABIC = sample size adjusted BIC; BLRT = bootstrap likelihood ratio test. ⁺ Local maxima problem. * $p < .05$; *** $p < .001$

Table 2

Parameter Estimates for Trajectory Classes for Parent-Reported and Youth-Reported EXT and INT

Class (n, %)	Externalizing problems (SE)		Internalizing problems (SE)	
	Intercept	Slope	Intercept	Slope
<i>Parent-report</i>				
1. High EXT–rapid improvement (46, 6.8%)	84.98 (8.10)***	-19.79 (7.14)**	60.92 (6.58)***	-5.74 (6.92)
2. High EXT/INT–partial improvement (99, 14.6%)	74.32 (1.65)***	-6.47 (1.27)***	83.67 (1.84)***	-4.68 (1.93)*
3. Moderate EXT/INT–gradual improvement (537, 78.7%)	70.26 (1.52)***	-5.12 (1.46)***	65.63 (1.00)***	-6.96 (0.71)***
<i>Youth-report</i>				
1. High EXT–rapid improvement (20, 4.0%)	75.73 (3.39)***	-13.52 (2.09)***	53.41 (3.96)***	-0.55 (4.70)
2. Moderate EXT/INT–gradual improvement (187, 38.5%)	62.39 (1.24)***	-1.68 (0.63)**	68.98 (1.06)***	-5.05 (1.73)**
3. Low EXT/INT–gradual improvement (280, 57.5%)	59.57 (1.10)***	-3.62 (0.73)***	52.61 (1.03)***	-2.75 (0.81)**

Note. SE = standard error. EXT = externalizing problems; INT = internalizing problems. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3

Predictors of Trajectory Classes for Parent-Reported EXT and INT: Multinomial Logistic Regression Coefficients (SE)

Predictors	Class 1 vs. Class 2		Class 1 vs. Class 3		Class 2 vs. Class 3	
	Model 1:	Model 3:	Model 1:	Model 3:	Model 1:	Model 3:
	Demographics	Combined model ⁺	Demographics	Combined model ⁺	Demographics	Combined model ⁺
<i>Demographics</i>						
Youth age	0.18 (0.17)		0.19 (0.15)		0.01 (0.10)	
Youth gender (0=Male)	-0.59 (0.64)	0.26 (0.66)	0.27 (0.57)	0.57 (0.54)	0.86 (0.38)*	0.31 (0.52)
Youth ethnicity (0=Minority)	0.80 (0.79)	1.25 (0.75)	0.10 (0.78)	0.10 (0.66)	-0.70 (0.36)*	-1.15 (0.52)*
Parent age	-0.07 (0.04)		-0.04 (0.04)		0.03 (0.03)	
Parent gender (0=Male)	-0.30 (0.92)		-0.11 (0.85)		0.18 (0.56)	
Parent education	0.31 (0.20)		0.15 (0.17)		-0.16 (0.15)	
Family income	0.23 (0.41)		-0.06 (0.42)		-0.30 (0.17)	
Single parent (0=No)	-0.05 (0.66)		-0.43 (0.60)		-0.38 (0.39)	
	Model 2:		Model 2:		Model 2:	
<i>Youth and family factors</i>	Youth/family		Youth/family		Youth/family	
Comorbid EXT/INT-P	-1.91 (0.96)*	-2.37 (0.87)**	0.54 (0.97)	0.15 (0.74)	2.45 (0.65)***	2.52 (0.65)***
Youth CU traits-P	0.22 (0.10)*	0.24 (0.07)**	0.08 (0.10)	0.09 (0.07)	-0.14 (0.05)**	-0.15 (0.05)**
Youth attachment anxiety-P	-0.71 (0.32)*	-0.70 (0.28)*	-0.14 (0.34)	-0.12 (0.23)	0.58 (0.22)**	0.58 (0.24)*
Youth attachment avoidance-P	0.51 (0.31)		0.30 (0.27)		-0.22 (0.23)	
Caregiver externalized strain-P	0.24 (0.72)	0.52 (0.49)	-0.82 (0.85)	-0.50 (0.48)	-1.07 (0.44)*	-1.01 (0.37)**

Caregiver internalized strain-P	-0.13 (0.64)	-0.08 (0.57)	0.95 (0.62)	1.09 (0.51)*	1.09 (0.44)*	1.16 (0.40)**
Family satisfaction-P	-0.03 (0.08)		-0.08 (0.08)		-0.06 (0.04)	

Note. $N = 680$. OR = odds ratio. ⁺ Significant variables from Model 1 and 2 were simultaneously entered into Model 3. Youth ethnicity coded as “Non-White/Other” = 0; “White” = 1. Class 1 = High EXT–rapid improvement; Class 2 = High EXT/INT–partial improvement; Class 3 = Moderate EXT/INT–gradual improvement. EXT = externalizing problems; INT = internalizing problems; P = parent-report; CU = callous-unemotional. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 4

Predictors of Trajectory Classes for Youth-Reported EXT and INT: Multinomial Logistic Regression Coefficients (SE)

Predictors	Class 1 vs. Class 2		Class 1 vs. Class 3		Class 2 vs. Class 3	
	Model 1:	Model 3:	Model 1:	Model 3:	Model 1:	Model 3:
	Demographics	Combined model ⁺	Demographics	Combined model ⁺	Demographics	Combined model ⁺
<i>Demographics</i>						
Youth age	-0.03 (0.14)	-0.76 (0.35)*	0.33 (0.15)*	-0.36 (0.35)	0.36 (0.09)***	0.41 (0.12)***
Youth gender (0=Male)	-1.27 (0.74)		-0.78 (0.79)		0.49 (0.32)	
Youth ethnicity (0=Minority)	-0.31 (0.73)		-0.95 (0.80)		-0.64 (0.38)	
Parent age	-0.03 (0.07)		-0.02 (0.07)		0.01 (0.02)	
Parent gender (0=Male)	-0.60 (0.79)		-1.09 (0.86)		-0.49 (0.42)	
Parent education	0.23 (0.27)		0.16 (0.29)		-0.08 (0.12)	
Family income	-0.28 (0.47)		-0.15 (0.49)		0.13 (0.16)	
Single parent (0=No)	0.03 (0.87)		0.53 (0.94)		0.50 (0.36)	
	Model 2:		Model 2:		Model 2:	
<i>Youth and family factors</i>	Youth/family		Youth/family		Youth/family	

Comorbid EXT/INT-Y	-3.58 (1.70)*	-3.92 (1.68)*	25.46 (0.00)***	25.25 (0.00)***	29.03 (1.70)***	29.18 (1.68)***
Youth CU traits-Y	0.40 (0.12)**	0.36 (0.14)*	0.18 (0.12)	0.14 (0.14)	-0.23 (0.05)***	-0.22 (0.06)***
Youth risk-taking-Y	0.23 (0.10)*	0.35 (0.14)**	0.32 (0.11)**	0.38 (0.15)*	0.09 (0.04)*	0.03 (0.04)
Youth attachment anxiety-Y	-0.12 (0.70)	-0.13 (0.42)	0.47 (0.73)	0.56 (0.45)	0.59 (0.17)**	0.70 (0.20)***
Youth attachment avoidance-Y	-0.84 (0.62)		-0.67 (0.64)		0.17 (0.20)	
Caregiver externalized strain-P	0.51 (0.70)	-0.02 (0.91)	-0.30 (0.73)	-0.71 (0.94)	-0.81 (0.34)*	-0.70 (0.32)*
Caregiver internalized strain-P	-1.53 (0.66)*	-1.13 (0.51)*	-1.14 (0.65)	-0.86 (0.49)	0.38 (0.23)	0.27 (0.26)
Family satisfaction-Y	-0.09 (0.08)	-0.05 (0.06)	-0.16 (0.08)	-0.11 (0.06)	-0.06 (0.03)*	-0.06 (0.03)

Note. $N = 487$. OR = odds ratio. ⁺ Significant variables from Model 1 and 2 were simultaneously entered into Model 3. Youth ethnicity coded as “Non-White/Other” = 0; “White” = 1. Class 1 = High EXT–rapid improvement; Class 2 = Moderate EXT/INT–gradual improvement; Class 3 = Low EXT/INT–gradual improvement. EXT = externalizing problems; INT = internalizing problems; Y = youth-report; P = parent-report; CU = callous-unemotional. * $p < .05$;

** $p < .01$; *** $p < .001$

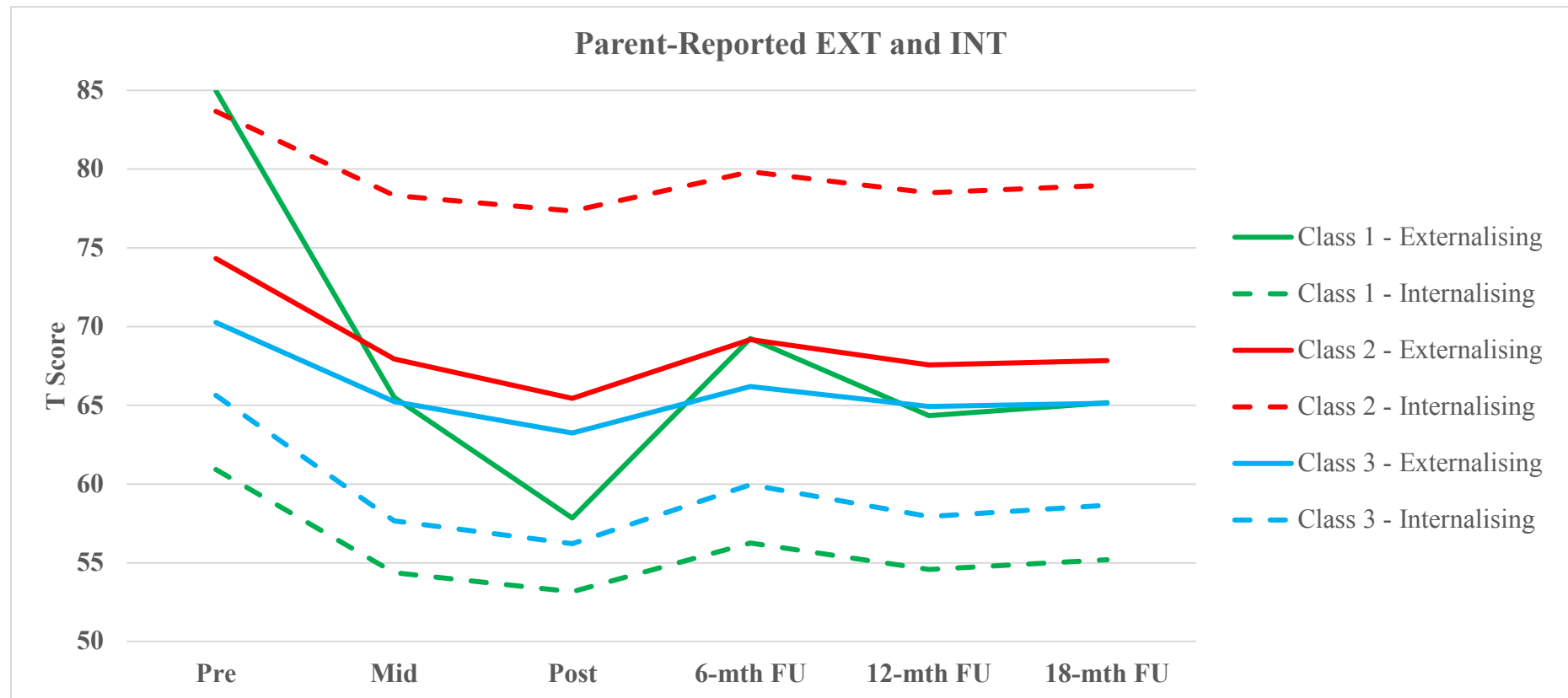


Figure 1. Estimated values for the growth mixture modeling classes of parent-report of externalizing and internalizing problems from pre-treatment to 18-month follow-up. *Note.* Class 1 = High EXT–rapid improvement; Class 2 = High EXT/INT–partial improvement; Class 3 = Moderate EXT/INT–gradual improvement. *T* scores ≥ 70 are within the clinical range. FU = follow-up; EXT = externalizing problems; INT = internalizing problems.

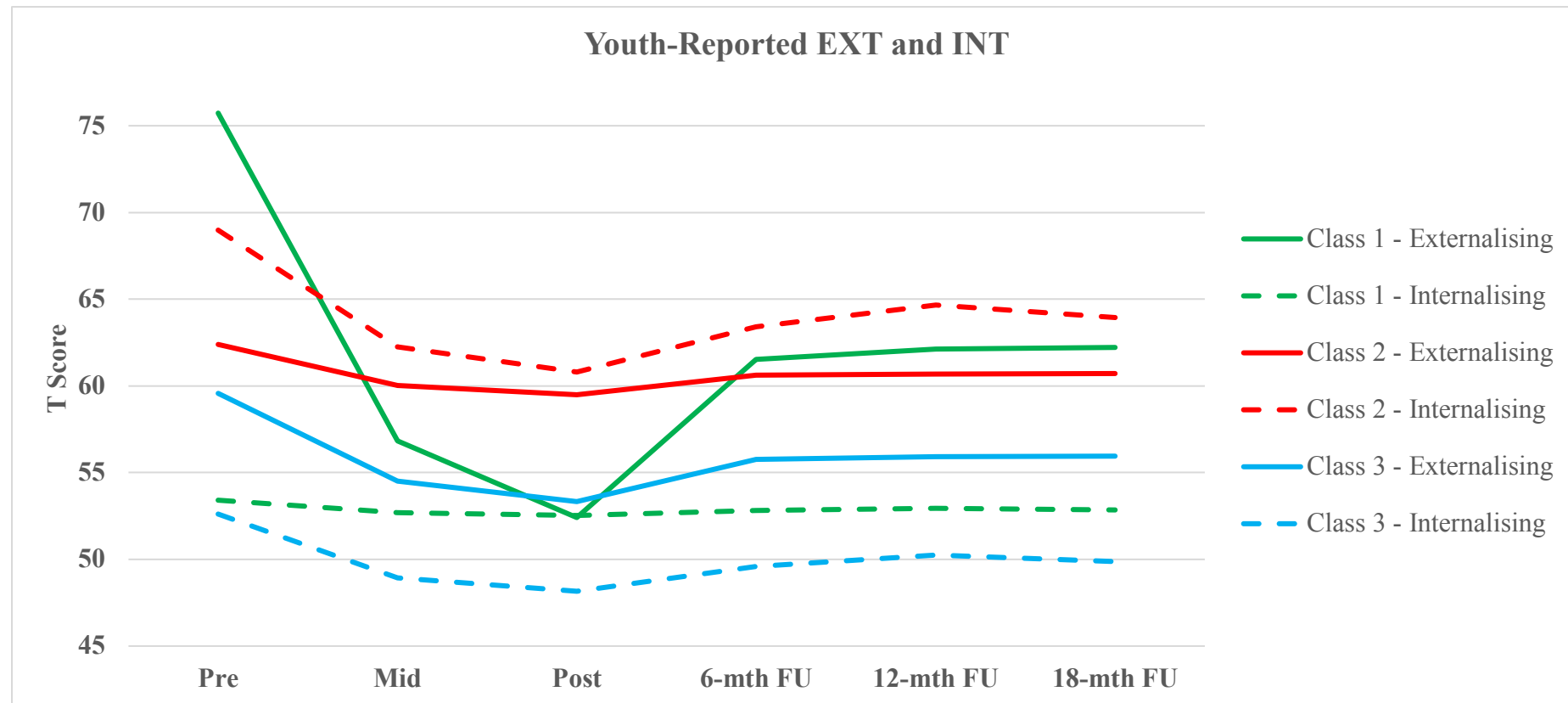


Figure 2. Estimated values for the growth mixture modeling classes of youth-report of externalizing and internalizing problems from pre-treatment to 18-month follow-up. *Note.* Class 1 = High EXT–rapid improvement; Class 2 = Moderate EXT/INT–gradual improvement; Class 3 = Low EXT/INT–gradual improvement. *T* scores ≥ 70 are within the clinical range. FU = follow-up; EXT = externalizing problems; INT = internalizing problems.