Longitudinal Discrepancy in Adolescent Aggressive Behavior Problems: Differences by Reporter and Contextual Factors

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Abstract

Little is known about the developmental course of informant discrepancies in adolescent aggressive behavior problems, though whether aggression increases or decreases over time depends on reporter. Evaluating discrepancies longitudinally can uncover patterns of agreement/disagreement between reporters across time and determine contexts that give rise to these differences. This study addresses longitudinal informant discrepancies by examining parent-report and adolescent report of adolescent aggressive behavior problems over time and further investigates possible contextual factors related to the longitudinal discrepancy. Five-waves (from age 11.5 to 15) of multi-informant data from the PROSPER project ($N = 977$; 52% female; 87% Caucasian) were used to test longitudinal change in informant discrepancies between mother-, father-, and adolescent-reported aggressive behavior problems. Results showed that parents reported more aggression than their adolescents at age 11.5 and that the discrepancy at first converged over time before diverging. By age 15, adolescents reported more aggression than their parents. Parental hostility, family status, and adolescent gender predicted change in informant discrepancies. Practical and developmental implications are discussed for assessing and determining accurate change in adolescent aggressive behavior problems.

Keywords Developmental change · Longitudinal discrepancy · Adolescent aggressive behavior · Parental hostility · Adolescent gender

Introduction

Multiple reporters of adolescent behaviors, such as parent vs. adolescent reports of aggression, present both an opportunity and a challenge for developmental scientists. On one hand, more meaningful interpretations and conclusions can be drawn from multiple sources of information (De Los Reyes, 2011; Vierhaus et al., 2018). On the other hand, different reporters rarely fully agree. Discrepancies between reporters were historically attributed to measurement error and the "true score" of a construct may lie somewhere in the

convergence between reporters (Angold et al., 1987). More recently, differences between parent and adolescent reports have shown to often be more than measurement error and reflect important information about the measured construct, behavior, and/or the reporters themselves (De Los Reyes, 2011; De Los Reyes et al., 2010). Perhaps owing to the significant implications of resolving parent versus child reports of problem behaviors in clinical settings (e.g., Achenbach et al., 1987), the literature on informant discrepancies is largely cross-sectional (De Los Reyes & Kazdin, 2005). Relatively few studies have attempted to address informant discrepancies longitudinally and even fewer have focused on adolescent aggression (Seiffge-Krenke & Kollmar, 1998). This is a significant gap in the literature given that adolescent aggression constitutes a serious public health concern. Indeed, violence among adolescents and young adults is the 3rd leading cause of death among those in this age group (Centers for Disease Control, 2020). Equally concerning is the observation that, across several studies, whether aggression increases or decreases during adolescence appears to be at least partially dependent on reporter (e.g., parent vs. child; Lansford et al., 2018;

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Van Der Ende & Verhulst, 2005). The developmental course of adolescent aggression, as well as discrepancies in reports over time, are therefore currently unclear. As a result, developmental assessments are ambiguous, which has considerable implications for both science and practice. Ascertaining reporter discrepancies in aggression longitudinally could inform whether differences between reports increase, decrease, or remain stable over time and identify periods of reporter convergence and divergence during adolescence. Importantly, conditions and contexts that lead to increasing or decreasing discrepancy can be evaluated to determine potential causes of these longitudinal differences. Findings from this research could lead to more accurate assessments of adolescent aggressive behavior problems, which is critical for enacting prevention and intervention strategies. The purpose of this study was to address this gap in the research by longitudinally examining informant discrepancies between parent- and adolescent-reports of adolescent aggressive behavior problems and examine family- and adolescent-level factors as potential explanations for change in discrepancies during adolescence.

The Operations Triad Model

Low reliability between reports of the same behavior are more often the norm than the exception in psychological research (De Los Reyes & Kazdin, 2005). Interpreting these discrepancies has been challenging given the tendency among researchers to treat differences as error while they may actually contain important information (De Los Reyes et al., 2013). To help disambiguate the former from the latter, the Operations Triad Model was developed (De Los Reyes et al., 2013). The model distinguishes between converging operations, which center on the conditions wherein reporters would agree, and diverging operations that stipulate the circumstances that cause meaningful informant discrepancies. A third condition, compensating operations, describes the situation where differences between reports reflect only measurement error. Key to the current study, the Operations Triad Model lays out a series of steps for posing and testing hypotheses about expected multiple reporters' convergence or divergence, and was adopted as the guiding framework for this study. According to the Operations Triad Model, a hypothesis is first posed about the expected convergence or divergence of multiple reporters based on theory and/or prior empirical evidence. Once posed, testing the hypothesis centers on evaluating measurement reliability and validity of the measures, ruling out methodological explanations for the discrepancies, and testing if the discrepancies can be predicted by other factors germane to the discrepancy. Although the Operations Triad Model was not developed to evaluate

informant discrepancies longitudinally, the principles are extended to repeated measures data in this study.

Parent and Adolescent Reports of Aggressive Behavior Problems Over Time: Convergence or Divergence?

Adolescence reflects a significant transition period when youth are gradually granted greater autonomy over their own behavioral decisions. During this period, youth increasingly spend less time with their family and more time outside the home, particularly with peers (Larson et al., 1996). The process of reorientation toward peers combined with increasing time spent outside the family may contribute to decreasing parent–adolescent agreement on the prevalence of adolescent aggressive behavior problems since parents have less opportunity to directly observe these behaviors. As a result, from a developmental perspective, it could be hypothesized that parent- and adolescent-reports of aggressive behavior problems will diverge over time, such that parents may know increasingly less about their adolescents' aggression (and therefore report lower aggression compared to youth) over the adolescent period (Lippold et al., 2011).

The longitudinal literature on how discrepancies change between parent and adolescent reports of aggressive behavior problems during adolescence partially supports this hypothesis. More specifically, one study (Verhulst & Van Der Ende, 1992) used a sample of 11 to 19 year olds to compare parent and adolescent reports of aggressive behavior problems and to examine whether discrepancies changed across age cohorts. Although an overall mean level difference emerged (adolescents reported more aggressive behavior problems than parents), the evidence indicated this difference was stable across age cohorts. A second study found similar results: Although adolescents reported more externalizing behavior problems (which partially consists of aggressive behavior problems) than parents across adolescence, the difference between parents and adolescents was stable across time (Seiffge-Krenke & Kollmar, 1998). However, a third study, which used a large sample ($N = 1122$) of 11 to 18 year olds, found that discrepancies between parent and adolescent reports of aggressive behavior problems *increased* during adolescence (van der Ende & Verhults, 2005). Finally, a more recent study that included participants from 9 different countries (Lansford et al., 2018), found that parent-reports of externalizing behavior problems decreased between age 7 and age 14. Adolescent-reports were initially lower than parent-reports at age 7 and remained relatively stable until approximately age 11 when their reports increased and became higher than parent-reports. This study suggests that differences between parent- and adolescent reports might decrease (converge)

between age 7 and age 11, with parents initially reporting more than adolescents, and then increase (diverge) following age 11, with adolescents reporting more than parents.

In addition to the handful of longitudinal studies that include multiple reporters, several studies have examined the developmental course of adolescent aggressive behavior problems using only parent- or adolescent-report. In one of the first studies to model normative change in child and adolescent behavior problems, parent-reported aggressive behavior problems were found to decline from age 4 to 18 years (Bongers et al., 2003). Two studies (De Haan et al., 2012; Fowler et al., 2014) found a similar decline in parent-reported aggression from age 9 to 16/18 as did Schlomer and colleagues (2015) during early- to mid-adolescence (age 11.5 to 15). Additional research using parent-reported externalizing behavior problems also showed a decline from childhood to adolescence (age 5 to 17; Leve et al., 2005) while another study found no change in parent-reported externalizing behavior problems (Wasserman et al., in press). In contrast, three studies that used adolescent-report found that aggressive behavior problems *increased* during adolescence. One study used a sample of 2550 students from 20 middle schools across the U.S. and found aggression increased between ages 12.5 and 14.5 (Slater et al., 2003). Another study (Williams et al., 2007) showed aggression increased between ages 12 and 16 and a third found aggression increased during the high school years (approximately age 14 to 18) using a sample of 1492 Canadian students (Willoughby et al., 2012). Two additional adolescent-report studies also found that externalizing behavior problems increased during early- to mid-adolescence (age 12 to 15; Fosco et al., 2013; Galambos et al., 2003). Notably, an additional study of externalizing behavior problems (DuBois et al., 2002) and another study on aggressive behavior problems (Reitz et al., 2007) showed decreasing adolescent-reported aggressive behavior problems during early- to mid-adolescence. Taken together, parent-reported adolescent aggressive behavior problems are consistently found to decrease, while the developmental course of adolescent-reported aggressive behavior problems during adolescence is inconclusive.

In sum, from a developmental perspective it might be expected that the discrepancy between parent and adolescent reports of aggressive behavior problems will increase during adolescence given the transition to greater autonomy and orientation toward peers. The empirical literature suggests that increasing divergence across adolescence is at least a possibility, though the research is mixed with some studies indicating differences are stable and others suggesting they may increase. Considered together, and in the interest of posing a specific hypothesis for the Operations Triad Model, it is hypothesized in the current study that informant discrepancies between parents and adolescents

will increase during adolescence. Further, it is hypothesized that the increasing discrepancy will be driven by parent-reports that decline over time while adolescent reports increase. These hypotheses are consistent with the divergence hypothesis in the Operations Triad Model (De Los Reyes et al., 2013). Formally testing the divergence hypothesis includes 1) evaluating the psychometric properties of the informants' reports and 2) determining if the discrepancies are correlated with factors that meaningfully inform contexts and/or conditions where reporter divergence is expected.

Correlates of Parent–Adolescent Discrepancies in Adolescent Aggressive Behavior Problems

Low parental affective quality (Lippold et al., 2014), characterized by low parental warmth and high hostility, could result in greater discrepancies between parent- and adolescent-reports of adolescent aggressive behavior problems. The process of greater autonomy and peer orientation that characterizes adolescence is generally guided by a continuing warm and supportive relationship with parents (Greenfield et al., 2003). However, adolescents who experience low parental warmth and support and even parental hostility may seek out, spend more time with, and be influenced by peers to a greater extent than other adolescents (Deković et al., 2004). Less time spent with the family and more time spent with peers could create larger reporter discrepancies via even less parental opportunity to observe aggressive behaviors. Parental warmth, or lack thereof, is also a strong determinant of adolescent disclosure to their parents (Goodman et al., 2010). Adolescents who have warm relationships may be more likely to disclose information to their parents about their activities, even if their parents may disapprove. In contrast, adolescents with negative relationships with their parents may be less likely to disclose information generally, and especially when they feel their parents would disapprove (Tilton-Weaver et al., 2010). This research suggests that lower parental warmth will lead to greater informant discrepancies, especially about undesirable behaviors such as aggression. Although this proposition has not been tested longitudinally, it is expected that decreasing parent affective quality during adolescence will be related to increasing parent–adolescent informant discrepancies (Goodman et al., 2010).

Additional research indicates that living with one parent and having parent(s) with a low educational level (Van Roy et al., 2010) are related to larger parent–adolescent discrepancies in cross-sectional research. Though currently untested, they may also be related to longitudinal change in informant discrepancies during adolescence. Parents who live together may receive information about their child from each other (Crouter et al., 2005; Crouter & Head, 2002) and

mothers and fathers are more or less sensitive to different aspects of adolescent observed behaviors (Hay et al., 1999). As a result, living with one parent may be related to larger parent–adolescent discrepancies over time compared to living with both parents. In addition, parents with a low educational level tend to be less engaged with their children compared to parents with more education (Guryan et al., 2008) and the financial strain linked to low education can undermine parent–adolescent communication (Conger & Conger, 2002). Adolescents that have parents with a low educational level may be less likely to communication with their parents compared to having parentings with a high educational level (Van Roy et al., 2010) and this issue may compound over time. Consequently, it is possible that having parents with a low educational level is also related to larger discrepancies between parent report and adolescent report over time. Last, the adolescent transition away from the family may have a more profound effect on discrepancies between parents and their daughters compared to parents and their sons. Parent-daughter relationship quality degrades during adolescence at a faster rate compared to parent-son relationship quality (De Goede et al., 2009; McGue et al., 2005), which may further lead to less shared information between parents and daughters than between parents and sons. Last, aggressive behaviors may be seen as more undesirable among girls than boys, which can result in less disclosure of these behaviors when they happen (Tilton-Weaver et al., 2010). Thus, the change in parent–adolescent discrepancies in adolescent aggressive behavior problems during adolescence may be greater for girls compared to boys.

Current Study

The Operations Triad Model was implemented in the current study to evaluate longitudinal informant discrepancies in adolescent aggressive behavior problems between parents and their adolescents. Adolescent aggressive behavior problems are the focus given 1) the serious public health concern that adolescent aggressive behaviors pose, 2) the mixed extant literature on how aggressive behavior problems change during adolescence (dependent on reporter), and 3) the ambiguous literature on how informant discrepancies in aggressive behavior problems are expected to change during adolescence. Determining whether and how discrepancies between reporters change over time is informative about when, developmentally, to expect divergence between reporters and, potentially, when to expect convergence. It was hypothesized, consistent with the Operations Triad Model, that informant discrepancies will diverge across adolescence, driven by decreasing aggression based on parent report and increasing aggression based on adolescent report. To address this

hypothesis, the current study used five waves of longitudinal assessments of mother-, father-, and adolescent reports of aggressive behavior problems during early- to mid-adolescence to answer three inter-related questions. First, what is the developmental change in adolescent aggressive behavior problems during early- to mid-adolescence when using mother-, father-, and adolescent reports? Addressing this question first provides a baseline to compare informant discrepancies. It was hypothesized that aggressive behavior problems would decline over time for mother- and father-reports and that adolescent reports would show increasing aggressive behavior problems. Second, how do parent–adolescent informant discrepancies change from early- to mid-adolescence? Consistent with the Operations Triad Model and based in prior research, informant divergence was hypothesized such that mother-adolescent and father-adolescent informant discrepancies were expected to increase during adolescence, as a result of parent-reports that decline over time while adolescent reports increase. Third, to address whether the expected change in discrepancies during adolescence reflects meaningful information about conditions and contexts that lead to these differences, parental affective quality as well as family status (single vs. two parents), parental education level, and adolescent gender were tested as predictors of change in informant discrepancies. It was hypothesized that increasing hostility, decreasing warmth, single parent status, and low parental education level would be related to increasing informant discrepancies. It was further hypothesized that informant discrepancies would increase faster for daughters compared to sons.

Method

Participants

Data for the current study comes from the PROSPER project. The PROSPER project is a community-university research project designed to study a partnership model for delivering evidence-based preventive interventions through a university-school-cooperative extension partnership. At wave 1, approximately $N = 11,000$ adolescents and their families in 28 school communities were randomized into 14 intervention and 14 control units. Participants in the 14 intervention communities received programming designed to prevent/reduce substance use and other behavior problems (Spoth et al., 2004). A random sample of $N = 2267$ families were invited to participate in an in-home data collection in tandem with in-school data collections; $N = 977$ (43%) elected to participate at wave 1 and comprised the current analytic sample (Lippold et al., 2014). Wave 1 was collected in the fall semester of 6th grade and wave 2 to wave 5 were collected annually in the spring semester from 6th grade.

Five waves of data from the in-home data collection were used to model growth curves of adolescent aggressive behavior problems. Fifty-two percent of current analytic sample at wave 1 were female and approximately 87% were Caucasian, 6% Hispanic/Latino, 2% African American, and 3% reported other ethnicities. The mean age (years) from wave 1 to wave 5 for the analytic sample was 11.29 ($SD = 0.49$), 11.94 ($SD = 0.47$), 12.95 ($SD = 0.46$), 13.93 ($SD = 0.50$), and 14.90 ($SD = 0.47$) years, respectively.

Wave 1 comparisons of study variables showed families with and without wave 5 data did not differ on mother-, father-, or adolescent report of aggressive behavior problems, or on measures of adolescent-reported maternal/paternal hostility or warmth. In addition, no differences were found for adolescent gender or intervention status. However, wave 1 comparisons between families with and without wave 5 data showed families with missing data were more likely to have a high school education or less (versus at least some college) than families without missing data (for mother-report: 45.76% vs. 32.17%, $\chi^2(1) = 15.58$, $p < 0.01$; for father-report: 43.22% vs. 28.10%, $\chi^2(1) = 23.80$, $p < 0.01$; for adolescent-report: 44.47% vs. 29.78%, $\chi^2(1) = 21.97$, $p < 0.01$). Furthermore, although wave 1 comparisons between families with and without mother-reported data did not differ on family status, the differences on father-reported data and adolescent-reported data related to fathers were found such that families without missing data were more likely to live with two biological parents than families with missing data (for father-report: 71.15% vs. 36.22%, $\chi^2(1) = 116.17$, $p < 0.01$; for adolescent-reported data related to fathers: 64.36% vs. 37.16%, $\chi^2(1) = 68.90$, $p < 0.01$).

Measures

Adolescent aggressive behavior problems

At each wave, mothers and fathers separately completed the Child Behavior Check List (CBCL) and adolescents completed the Youth Self Report (YSR). The CBCL and YSR are widely used parent- and child-report measures that assess children's internalizing and externalizing behavior problems (Achenbach, 1991; Achenbach & Rescorla, 2001). The 17-item aggressive behavior problems subscale from the CBCL and YSR was used in the current study (Achenbach, 1991). Items were scored on a 0 = Never true, 1 = Sometimes true, 2 = Always true scale. Example items include physically attacking people and destroying things during the past six months. Alpha reliabilities for the 17-item aggressive behavior problems subscale ranged from 0.86 to 0.91 across 5 waves and reporters. Correlations between adjacent time points (e.g., wave 1 correlated with wave 2, wave 2 correlated with wave 3, etc.) revealed strong test-retest reliability for parents (mean correlation = 0.78 and 0.77 for mothers and father, respectively) and adolescents (mean correlation = 0.62). CBCL and YSR scores were averaged to create composites for mother-, father- and adolescent-reports of aggressive behavior problems, respectively. Descriptive information on each measure is presented in Table 1.

Parent–adolescent affective quality

Parent–adolescent affective quality was operationalized in this study as parent-directed hostility and warmth toward their adolescent (Spoth et al., 1998). At each wave, adolescents answered four items that were designed to measure adolescents' perceptions of maternal and paternal hostility toward them separately, such as during the past month when you and your mother/father have spent time talking or doing things together, how often does your mother/father insult or swear at you and get angry at you (Conger et al., 1994; 1 = Always to 7 = Never). Alpha reliabilities for the four items ranged from 0.78 to 0.89 across 5 waves and items were averaged within each wave to create the composites. Items were recoded so that higher values indicate more parental hostility.

Similar to parental hostility, adolescents responded to a set of three items at each wave designed to measure

Construct	M(SD)				
	Wave 1 (age 11.5)	Wave 2 (age 12)	Wave 3 (age 13)	Wave 4 (age 14)	Wave 5 (age 15)
MR—Aggression	0.31 (0.28)	0.26 (0.27)	0.27 (0.29)	0.25 (0.27)	0.24 (0.30)
FR—Aggression	0.31 (0.30)	0.25 (0.27)	0.24 (0.26)	0.23 (0.25)	0.22 (0.26)
AR—Aggression	0.23 (0.25)	0.19 (0.24)	0.24 (0.27)	0.26 (0.28)	0.28 (0.28)
Maternal Hostility	2.32 (1.11)	2.06 (1.03)	2.21 (1.16)	2.29 (1.16)	2.39 (1.21)
Paternal Hostility	2.06 (1.13)	1.94 (1.11)	2.10 (1.23)	2.16 (1.24)	2.19 (1.24)
Maternal Warmth	6.04 (1.10)	5.88 (1.24)	5.73 (1.33)	5.58 (1.35)	5.50 (1.35)
Paternal Warmth	5.83 (1.40)	5.59 (1.63)	5.42 (1.68)	5.12 (1.71)	4.95 (1.73)

Table 1 Means and standard deviations for core study variables across five waves

MR mother-report, FR father-report, AR adolescent report

adolescent perceptions of *maternal and paternal warmth* toward them, separately (Lippold et al., 2014). Items included during the past month when you and your mother/father have spent time talking or doing things together, how often did your mother/father let you know she/he really cares about you, let you know that she/he appreciates you, your ideas or the things you do, and act loving and affectionate toward you ($1 = Always$ to $7 = Never$). Alpha reliabilities for the three items ranged 0.79 to 0.94 across 5 waves and items were averaged within each wave. Items were recoded so that higher values indicate more parental warmth.

Family status

Adolescents were asked at wave 1 whether they lived with their biological mother and biological father or a different family structure. Fifty-one percent of participants ($N = 503$; coded 1) lived with both biological parents while others ($N = 448$; 46%; coded 0) did not.

Parent education level

Mothers and fathers answered a question about the highest grade of schooling they completed. Sixty-three percent of parents ($N = 615$; coded 1) had at least some college education and others ($N = 346$; 35%; coded 0) had a high school education or less.

Intervention status

Twenty-eight school districts in Iowa and Pennsylvania were randomized into control and intervention units. Teams of university, school, and cooperative extension members selected a sequence of two interventions, one in-home and one in-school, from a menu of evidence-based programs to be delivered via the PROSPER model (see Spoth et al., 2004 for further details). Intervention status was used as a control variable in the current study to account for intervention participation. Intervention status was coded $0 = control$ (41%, $N = 401$) and $1 = intervention$ (59%; $N = 574$).

Analysis Plan

The Operations Triad Model (De Los Reyes et al., 2013) stipulates that once the hypothesis is posed, a specific set of criterion should be evaluated to test the hypothesis. In the case of divergence, which is hypothesized in the current study, it must first be determined if the individual informant reports reach acceptable levels of reliability within the sample. As reported above, alpha coefficients for the CBCL and YSR scales reached acceptable reliability within each wave as did test-retest reliability across waves, satisfying

the first criterion. Next, the validity of the constructs must be determined, which can be established based on prior psychometric evidence (De Los Reyes et al., 2013). The CBCL and YSR aggressive behavior problems subscales have decades of psychometric work establishing both reliability and validity (Achenbach & Rescorla, 2001), satisfying the second criterion. Once reliability and validity are established, methodological factors must be ruled out as possible explanations for the informant discrepancies. Of primary concern with multiple reporters is measurement invariance: Are the measures measuring the same construct across reporters. This issue becomes more complex with longitudinal data and invariance must establish that the measures are measuring the same construct across reporters at each wave and across waves for each reporter. To test measurement invariance of the CBCL and YSR across mother-, father-, and adolescent-reports within each wave, multiple group CFAs and Type = COMPLEX (clustered by student ID) were used in Mplus (Muthén & Muthén (1998–2017). Measurement invariance across waves was tested using the means Eq.syntax function of the semTools package in R (Jorgensen et al., 2018; Mastrotheodoros et al., 2020). As recommended by prior empirical research testing CBCL and YSR measurement structure (Ivanova et al., 2007; Van Lieshout et al., 2015; Yarnell et al., 2013), weighted least squares means estimation, which helps account for measurement non-normality, was used to test the invariance of the 17 CBCL and YSR items.

Following successful measurement invariance tests, Mplus was used to estimate a series of Latent Growth Curve Models (LGM). First, to establish individual growth patterns, unconditional LGMs were conducted for mother-reported, father-reported, and adolescent-reported adolescent aggressive behavior problems. Intercepts were centered at wave 1 (approximately age 11.5 years) and slopes and intercepts were allowed to freely covary. Linear models were used after finding non-significant quadratic terms in all models. It should also be noted that in all models and for all constructs, intervention condition was included as a covariate by regressing individual indicators at each wave on the intervention status variable. Next, mother–adolescent discrepancy and father–adolescent discrepancy on adolescent aggressive behavior problems were evaluated separately using Latent Congruence Modeling (LCM, Cheung, 2009; Ksinan & Vazsonyi, 2016; Mastrotheodoros et al., 2020). Unlike other methods for calculating differences between reporters (e.g., difference scores), this approach controls for measurement error via latent variable modeling (Cheung, 2009; Córdova et al., 2016). In addition, this approach does not privilege one reporter over another as the standard and, in the current case, assumes that parent-report and adolescent-report are of equal importance. Consequently, discrepancy scores using LCM are unbiased (Cheung, 2009). To generate mother-adolescent and

father-adolescent discrepancy scores, two interdependent latent factors were estimated for each dyad at each wave (mother–adolescent and father–adolescent). These represented the latent mean level factors (i.e., capturing the mean of the two reports) and the latent congruence factors (i.e., capturing the difference of the two reports). The latent congruence factor scores reflect the discrepancy between each reporter at each wave. These scores were exported from these models for use in LGMs to model change in mother–adolescent and father–adolescent informant discrepancies over time.

Finally, having established the psychometric properties of the informant reports and modeled the discrepancies over time, analyses were then conducted to determine if change in the informant discrepancies reflect systematic variation relevant to contexts and/or conditions that could give rise to these differences (De Los Reyes et al., 2013). To address whether the change in informant discrepancies is predicted by change in parent–adolescent affective quality, growth models of parental hostility and warmth were estimated and the intercept and slope from each model were used to predict reporter discrepancy growth parameters. Last, family status, parent education level, and child gender were used as time-invariant manifest predictors of the reporter discrepancy growth parameters.

Results

Measurement Invariance Tests

Table 2 presents the results of the configural, metric, and scalar measurement invariance tests for the Child Behavior Check List and Youth Self Report aggressive behavior problems subscales across reporters at each wave and across waves for each reporter. Measurement invariance was validated using recommended cutoff values in all instances (ΔCFI ≤ 0.01, ΔTLI ≤ 0.01, ΔRMSEA ≤ 0.01, Cheung & Rensvold, 2002). This result indicates that any observed discrepancies between parent and adolescent reports of aggressive behavior problems cannot be attributed to measurement variability between reporters or across time.

Mother-, Father- and Adolescent-Reports of Aggressive Behavior Problems

The linear growth models of aggressive behavior problems fit the data well for each reporter (mother report: $\chi^2(10) = 43.23$, $p < 0.001$; RMSEA $= 0.06$; CFI $= 0.99$, TLI $= 0.98$; father report:: $\chi^2(10) = 17.59$, $p = 0.06$; RMSEA $= 0.03$; CFI $= 1.00$, TLI $= 0.99$; adolescent report:: $\chi^2(10) = 41.50$, $p < 0.001$; RMSEA $= 0.06$; CFI $= 0.98$, TLI $= 0.97$; Hu & Bentler, 1999). Depicted in Fig. 1, and in support of the hypothesis, mother-reported and father-reported adolescent

aggressive behavior problems significantly decreased over time ($\beta = -0.32$ and $\beta = -0.49$, respectively, $p < 0.001$) and adolescent-report of their own aggressive behavior problems significantly increased ($\beta = 0.31$, $p < 0.001$). Constraining slopes for mother- and adolescent-reports to be equal resulted in a significant reduction in model fit ($\Delta\chi^2(1) = 38.21$, $p < 0.001$) as did constraining father- and adolescent-reported slopes ($\Delta\chi^2(1) = 39.25$, $p < 0.001$). These results indicate that the developmental trends for adolescent aggressive behavior problems during early- to mid-adolescence were significantly different and in opposite directions between mother/father report and adolescent report.

The unstandardized intercepts, reflecting aggressive behavior problems at approximately 11.5 years, were $b = 0.30$, $b = 0.28$ and $b = 0.22$ for mother report, father report and youth report, respectively, and all were significantly greater than zero ($p < 0.001$). Additional analysis showed equating the intercepts also resulted in significant model misfit (mother report vs. adolescent report: $\Delta\chi^2(1) = 26.97$, $p < 0.001$; father report vs. adolescent report: $\Delta\chi^2(1) = 12.09$, $p < 0.001$), indicating that mother-report and father-report of their children's aggressive behavior problems at age 11.5 were significantly higher than adolescent-report at the same age (see Fig. 1).

Mother–Adolescent and Father–Adolescent Discrepancies in Aggressive Behavior Problems

The growth curve models of informant discrepancies fit the data well for both dyads (mother–adolescent discrepancy: $\chi^2(10) = 78.84$, $p < 0.001$; RMSEA $= 0.08$; CFI $= 0.95$, TLI $= 0.93$; father–adolescent discrepancy: $\chi^2(10) = 60.20$, $p < 0.001$; RMSEA $= 0.07$; CFI $= 0.96$, TLI $= 0.94$). In addition, there was significant variance in the slopes ($\sigma^2 = 0.005$, $p < 0.001$ and $\sigma^2 = 0.004$, $p < 0.001$, respectively) and age 11.5 intercepts ($\sigma^2 = 0.087$, $p < 0.001$ and $\sigma^2 = 0.075$, $p < 0.001$, respectively) for both mother–adolescent and father–adolescent discrepancies. The intercepts at age 11.5 significantly differed from zero and were positive in value in both models (mother–adolescent discrepancy: $b = 0.10$, $p < 0.001$; father–adolescent discrepancy: $b = 0.08$, $p < 0.001$) indicating that at age 11.5 parents reported more aggressive behavior problems than their adolescents reported. By age 15, the intercepts became negative (mother–adolescent discrepancy: $b = -0.07$, $p < 0.01$; father–adolescent discrepancy: $b = -0.11$, $p < 0.001$), such that parents reported *fewer* aggressive behavior problems relative to their adolescents. Following this pattern, the slopes for both mother-adolescent and father–adolescent discrepancies were significantly negative ($\beta = -0.70$, $p < 0.001$ and $\beta = -0.87$, $p < 0.001$, respectively), indicating that the discrepancy changed over time such that parents initially reported more aggressive behavior problems than

Table 2 Fit indices of measurement invariance analyses for the Child Behavior Check List and Youth Self Report across mother-, father-, adolescent-reports for waves 1–5 and across waves 1–5 for each reporter

	χ^2	df	CFI	TLI	RMSEA	ΔCFI	ΔTLI	ΔRMSEA
W1								
Configural	1165	357	0.964	0.959	0.051			
Metric	1364	389	0.957	0.955	0.054	−0.007	−0.004	0.003
Scalar	1338	421	0.959	0.961	0.050	0.002	0.006	−0.004
W2								
Configural	945	357	0.971	0.67	0.048			
Metric	1092	389	0.966	0.964	0.050	−0.005	−0.003	0.002
Scalar	1058	421	0.969	0.970	0.046	0.003	0.006	−0.004
W3								
Configural	1150	357	0.961	0.956	0.056			
Metric	1238	389	0.59	0.957	0.056	−0.002	0.001	0
Scalar	1194	421	0.962	0.964	0.051	0.003	0.007	−0.005
W4								
Configural	1158	357	0.956	0.950	0.057			
Metric	1262	389	0.952	0.950	0.057	−0.004	0	0
Scalar	1234	421	0.955	0.957	0.053	0.003	0.007	−0.004
W5								
Configural	1121	357	0.960	0.955	0.058			
Metric	1241	389	0.956	0.953	0.059	−0.004	−0.002	0.001
Scalar	1237	421	0.958	0.959	0.055	0.002	0.006	−0.004
Longitudinal Invariance of Mother Report (W1 – W5)								
Configural	4410	3305	0.978	0.976	0.019			
Metric	4466	3369	0.978	0.977	0.018	0	0.001	−0.001
Scalar	4524	3433	0.978	0.977	0.018	0	0	0
Longitudinal Invariance of Father Report (W1 – W5)								
Configural	3963	3305	0.978	0.976	0.017			
Metric	4018	3369	0.978	0.977	0.016	0	0.001	−0.001
Scalar	4078	3433	0.978	0.977	0.016	0	0	0
Longitudinal Invariance of Adolescent Report (W1 – W5)								
Configural	4201	3305	0.963	0.960	0.017			
Metric	4252	3369	0.964	0.962	0.016	0.001	0.002	−0.001
Scalar	4359	3433	0.962	0.961	0.017	−0.002	−0.001	0.001

CFI comparative fit index, *TLI* tucker-lewis index, *RMSEA* root-mean square error of approximation, *W1–W5* wave 1 to wave 5

their adolescents, but by age 15 this difference had flipped. By age 15, adolescents reported more aggression than their parents. Notably, the mother-adolescent discrepancy intercept became non-significant at age 13 ($b = 0.03$, $p = 0.05$) and at age 14 ($b = -0.02$, $p = 0.33$), suggesting that reports converged and, on average, were similar at these ages. Likewise, at age 13, the intercept for father-adolescent discrepancy became non-significant ($b = -0.01$, $p = 0.80$), meaning that, on average, there was relative agreement between father- and adolescent-reported aggressive behavior problems at age 13. This pattern of results partially contradicts and partially supports the hypothesis that parent and adolescent reports would diverge during adolescence. In total, parent and adolescent reports were initially

divergent at age 11.5 (parents reported more aggression than adolescents). Contrary to the hypothesis, reports converged over time, becoming similar around age 13. However, reports diverged following approximately age 13, consistent with the hypothesis, such that adolescents reported more aggression than their parents by age 15 (see Fig. 1).

Change in Parental Affective Quality as Predictors of Mother–Adolescent and Father–Adolescent Discrepancies

To determine if variability in mother–adolescent and father–adolescent discrepancies across time could be
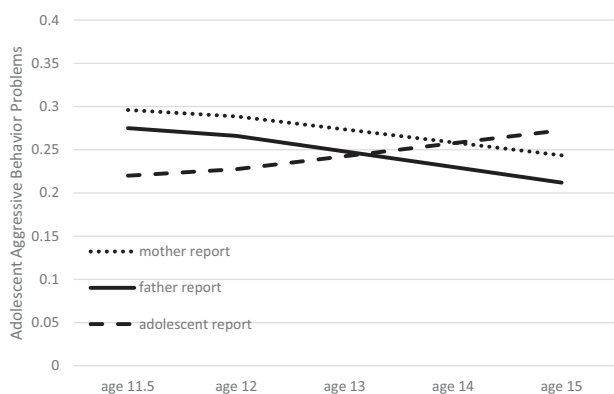
Fig. 1 Unconditional Growth Models of Adolescent Aggressive Behavior Problems for Mother, Father and Adolescent Reports from Age 11.5 to Age 15. Note. Intervention status was controlled for in all models by regressing indicators across waves on the intervention status variable. Unstandardized values (y-axis) were used to depict the slopes via re-centered intercept values over time

Table 3 Parental hostility and warmth growth models and exploratory predictors of the raw reporter discrepancy growth parameters

Predictors	Reporter discrepancy growth parameters			
	Mother-adolescent		Father-adolescent	
	Intercept	Slope	Intercept	Slope
Growth Models				
Parent Hostility Intercept	0.09	−0.05	0.09	−0.21[**]
Parent Hostility Slope	0.02	−0.27[**]	0.07	−0.24[**]
Parent Warmth Intercept	0.01	−0.02	0.04	0.03
Parent Warmth Slope	0.01	0.09	−0.01	0.25[**]
Exploratory Predictors				
Child gender	−0.05	−0.12[*]	0.00	−0.14[*]
Family status	−0.06	0.04	−0.03	0.12[*]
Parent educational level	−0.08[*]	0.07	−0.08	0.10

Models include intervention status as a covariate

$*p < 0.05$; $**p < 0.01$

predicted by parental affective quality, growth models were estimated for maternal and paternal hostility and maternal and paternal warmth, respectively. Results showed that adolescents perceived increasing maternal ($\beta = 0.37$, $p < 0.001$) and paternal hostility ($\beta = 0.40$, $p < 0.001$) as well as decreasing maternal ($\beta = -0.82$, $p < 0.001$) and paternal warmth ($\beta = -0.94$, $p < 0.001$) from early- to mid-adolescence. The parental affective quality intercept and slope parameters were then used as predictors of the intercept and slope parameters of the informant discrepancy growth models. Results of the predictive analyses (summarized in Table 3) showed that the maternal and paternal hostility slopes were both negatively associated with their discrepancy slopes (mother–adolescent: $\beta = -0.27$, $p < 0.01$; father–adolescent: $\beta = -0.24$, $p < 0.01$). Because, on average, maternal and paternal hostility were found to increase over time, the negative associations indicate that as hostility increased, mother–adolescent and father–adolescent discrepancy slopes became more negative (see Fig. 2). Stronger negative mother/father-adolescent discrepancy slopes reflect that the discrepancy scores decreased over time (i.e., discrepancy = mother-/father-report – adolescent report), such that adolescents reported more aggressive behavior problems over time compared to mothers/fathers. Thus, increasing hostility over time was related to increasing mother–adolescent and father–adolescent discrepancies such that adolescents reported more aggressive behavior problems across time relative to their parents. In addition, the paternal warmth slope was positively associated with the father–adolescent discrepancy slope ($\beta = 0.25$, $p < 0.01$, see Fig. 2). Similar to the above, because, on average, paternal warmth decreased over time, as paternal warmth decreased father–adolescent discrepancy slopes became more negative as well (leading to the positive correlation), indicating that decreasing paternal warmth was related to larger

father–adolescent discrepancy over time such that adolescents reported more aggression relative to their fathers. Last, the paternal hostility intercept at age 11.5 was negatively associated with the father–adolescent discrepancy slope ($\beta = -0.21$, $p < 0.01$), suggesting that perceiving more paternal hostility at age 11.5 was related to stronger change in the father–adolescent discrepancy over time such that adolescents reported more aggression compared to their fathers. No associations were found for the maternal warmth (see Table 3).

Family Status, Parent Education, and Adolescent Gender

Family status, parent education, and adolescent gender were simultaneously entered as time-invariant predictors of the mother–adolescent and father–adolescent informant discrepancy intercepts and slopes. Results (Table 3) showed that adolescent gender predicted both the mother–adolescent ($\beta = -0.12$, $p < 0.05$) and father–adolescent discrepancy slopes ($\beta = -0.14$, $p < 0.05$). Follow-up analysis grouping models by gender showed that both mother–adolescent and father–adolescent discrepancies changed more dramatically for adolescent girls ($\beta = -0.91$, $p < 0.001$ and $\beta = -0.99$, $p < 0.001$, respectively) compared to boys ($\beta = -0.55$, $p < 0.001$ and $\beta = -0.79$, $p < 0.001$, respectively). This finding indicates that the parent–adolescent discrepancy increased faster for girls compared to boys such that girls reported more aggressive behaviors than their parents reported. Furthermore, family status was significantly associated with the change in father–adolescent discrepancy ($\beta = 0.12$, $p < 0.05$) such that father–adolescent discrepancy changed slower when living with both biological parents.

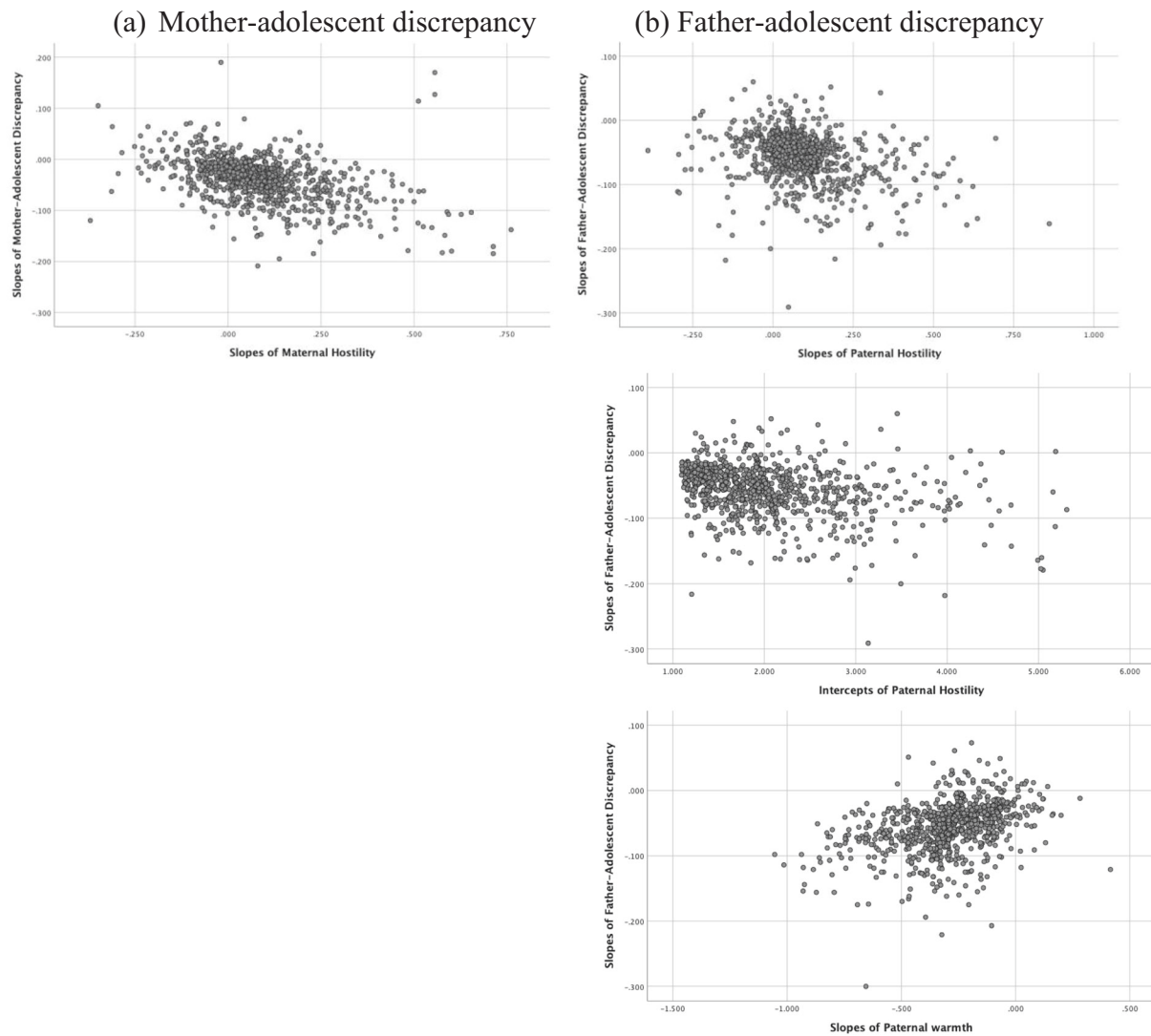(a) Mother-adolescent discrepancy   (b) Father-adolescent discrepancy

Fig. 2 Correlations between Mother–Adolescent Discrepancy Slope and Maternal Hostility Slope and between Father–Adolescent Discrepancy Slope and Paternal Hostility Slope and Intercept and Paternal Warmth Slope. **a** Mother–adolescent discrepancy (**b**) Father–adolescent discrepancy

The age 15 intercept remained negative ($\beta = -0.09$, $p < 0.05$) indicating that the overall pattern — fathers reporting more aggression initially and adolescents reporting more by age 15 — remained the same despite the slower increase in discrepancy. Parent education was not related to either slope after controlling for the other factors but was related to the mother–adolescent discrepancy intercept ($\beta = -0.08$, $p < 0.05$), indicating lower education was related to greater mother–adolescent discrepancy (specifically mothers reporting higher aggression than youth) at age 11.5.

Sensitivity Analysis

The current study required that multiple growth curves be estimated in a single model so that intercepts and slopes could be used as both predictors and outcomes. The most parsimonious way to achieve these requirements was to use a structural equation model to construct latent growth curve models (Hox & Stoel, 2005). To estimate the growth curves, assessment wave was used as the metric of time. One limitation of this approach is that the within-wave variability in participant age is not well-accounted for and this variance may have implications for modeling developmental phenomena. Given this possibility, a sensitivity analysis was conducted using a multilevel model approach, which can better accommodate age as the metric of time instead of wave (Singer & Willett, 2003). A comparison of the structural equation model and multilevel model approaches are presented in Table 4. As can be seen, growth curve results were the same whether using a structural equation model or multilevel model approach, indicating that the within-wave age variability did not bias the latent

Table 4 Estimated unstandardized parameters of linear latent growth curve using SEM approach and MLM approach

Parameter	Mother report		Father report		Adolescent report		Mother–Adolescent discrepancy		Father–Adolescent discrepancy	
	SEM	MLM	SEM	MLM	SEM	MLM	SEM	MLM	SEM	MLM
Fix part										
Intercept	0.296	0.296	0.275	0.277	0.222	0.224	0.104	0.101	0.078	0.079
Slope	−0.015	−0.013	−0.018	−0.017	0.015	0.16	−0.048	−0.045	−0.054	−0.053
Random part										
Intercept	0.064	0.059	0.65	0.60	0.036	0.034	0.087	0.077	0.073	0.060
Slope	0.002	0.002	0.001	0.001	0.003	0.002	0.005	0.002	0.004	0.001

Models include intervention status as a covariate. All estimated parameters were statistically significant at 0.001 level

SEM structural equation model, *MLM* multilevel model

growth model estimates. This sensitivity analysis also suggests that the results in current study are robust to choice of modeling approach.

Discussion

Aggression during adolescence poses a serious risk to the health and well-being of youth and accurate behavioral assessment is key to prevention and intervention strategies. Utilizing multiple reporters is the gold standard of assessment, though low agreement between reporters is generally the norm rather than the exception. Commensurate to this observation, the developmental course of aggressive behavior problems during adolescence differs depending on reporter (i.e., parent versus adolescent). Modeling the differences between reporters across adolescence can potentially point to periods when larger or smaller informant discrepancies should be expected and lend insight into which reporter is likely to report more aggression than the other over time. Further, predictors of change in informant discrepancies can be used to uncover conditions and contexts that might lead to differences in reports across time. The few longitudinal studies on how these differences change during adolescence are conflicting and no study has attempted to evaluate potential causes of how these differences change over time. The purpose of this study was to address this gap by using parent- and adolescent reports of aggressive behavior problems to longitudinally model change in informant discrepancies for adolescent aggressive behavior problems. Importantly, family- and adolescent-level predictors were tested to determine if these differences reflect meaningful variation or measurement error. To guide the analyses, the Operations Triad Model (De Los Reyes et al., 2013) was used, which provided a set of criterion for evaluating reporter differences across time. Results were generally in-line with expectations with some important exceptions, which are detailed below.

Longitudinal Parent–Adolescent Discrepancies in Adolescent Aggressive Behavior Problems

Because adolescence reflects a period of transition when youth become less oriented toward their family and more oriented toward peers, it was hypothesized that the discrepancy between parent- and adolescent reports of aggressive behavior problems would increase over time. Parents may have less opportunity to observe these behaviors as adolescents spend more time outside the home, while, at the same time, adolescents may be unlikely to disclose these behaviors to their parents (Goodman et al., 2010). Further, based on prior research on the developmental course of adolescent aggressive behavior problems, it was hypothesized that the increasing discrepancy over time would be driven by parent reports that decreased (e.g., Bongers et al., 2003) and adolescent reports that increased over time (e.g., Willoughby et al., 2012). There was partial support for this set of hypotheses. Latent growth curve models showed that both mother-reported and father-reported adolescent aggressive behavior problems decreased from age 11.5 to age 15; adolescent aggressive behavior problems increased when measured by adolescent report during this same age period. The informant discrepancy latent growth model, which modeled change in informant discrepancies during this age period, showed that at age 11.5 parents reported significantly more aggressive behavior problems than their adolescents reported. This difference flipped by age 15 when adolescents reported more aggressive behavior problems than their parents. Given that the difference scores reflect parent-report minus adolescent report, the overall slope for the difference was negative (difference score values continually got smaller over time). This pattern of results indicates that during early adolescence reporter differences might be expected such that parents, in general, will report more aggressive behavior problems than their children. Subsequently, greater agreement between parents and their children is expected

during the early teen years only to diverge again at around age 15, this time with adolescents reporting more aggression compared to their parents.

It is possible that during early adolescence, youth may minimize their behavior problems by attributing their behavior to circumstances outside of themselves (see the *Attribution Bias Context Model* in De Los Reyes & Kazdin, 2005). Consequently, adolescents' self-report may be less accurate compared to their parents during early adolescence and adolescents will underreport compared to their parents. The current results are consistent with this possibility given parents reported more aggressive behavior problems compared to their children during early adolescence. Interestingly, and contrary to the divergence hypothesis, the convergence between reporters found during the early teen years suggests that reports of aggressive behavior problems between parents and adolescents actually agree, on average, at around age 13. One implication is that reports from either parents or adolescents could be used to inform prevention and intervention strategies among youth of this age group. In addition, though these data are not a clinical sample, it is possible that either parent or adolescent reports of aggressive behavior problems could reliably be used to make treatment decisions among youth of this age group. It should be noted though that the agreement was "on average" and individual differences likely still exist, which should be taken into consideration, particularly in clinical settings. The current data additionally indicate that after approximately age 13 adolescent report might be more accurate relative to parents given reporter differences flipped following the early teen years. Due to family and peer transitions that reduce parents' opportunity to observe aggressive behaviors combined with low adolescent disclosure of these behaviors (Goodman et al., 2010), *parents* may subsequently underreport aggressive behavior problems as their children progress further into adolescence.

It is also worth noting that the convergence/divergence pattern found in this study is somewhat similar to prior research that found reporter convergence over time (with parents reporting more externalizing behavior problems than adolescents) followed by divergence over time (with adolescents reporting more externalizing compared to parents; Lansford et al., 2018). However, in the current study, reports were initially divergent at age 11.5, converged at approximately age 13, then diverged thereafter whereas in the prior study reports agreed at around age 11 and were divergent thereafter. It's possible that the difference in timing of convergence/divergence between this and prior research stems from examining aggressive behavior problems (the current study) versus the broader externalizing behavior problems construct (Lansford et al., 2018). In addition, prior research aggregated across 9 cultures while also showing unique patterns of stability and change among

each. Perhaps there is an additional cultural component that is relevant for the timing of parent and adolescent agreement and disagreement in problem behaviors across adolescence. Nonetheless, and despite these differences, both studies highlight that development is an important consideration when evaluating informant discrepancies.

Contexts of Change in Parent–Adolescent Discrepancies in Adolescent Aggressive Behavior Problems

Based on the observation that poor parent–child relationships could possibly lead to a stronger peer orientation and further reduce disclosure by adolescents, negative parental affective quality, operationalized as low parental warmth and high parental hostility, was expected to be related to greater informant discrepancies across time. Latent growth curve models of maternal and paternal warmth and hostility (as reported by adolescents) showed warmth declined and hostility increased over time for both parents. Predictive analyses showed that for both parents, increasing parental hostility was related to increasing informant discrepancies across time. These data indicate that deteriorating parent–adolescent relationships during early- to mid-adolescence, marked by increasing adolescent-directed parental hostility, can accelerate reporter differences between parents and their children. One implication of the accelerated differences is that the reporter agreement during the early teen years discussed above may actually happen sooner and, thereafter, reports may diverge more sharply with adolescents reporting more relative to their parents among adolescents who perceive stronger increasing parental hostility. When it comes to assessing adolescent aggressive behavior problems, increasing parental hostility can change the overall pattern of reporter convergence and divergence over time, which is an important consideration for assessment accuracy. These findings suggest that adolescent report may be the more reliable assessment across much of adolescence for those youth who have a history of poor relationships with their parents, characterized by high hostility.

A similar result was found for paternal, but not maternal, warmth. Decreasing paternal warmth was related to increasing informant discrepancies wherein adolescents ultimately reported more aggressive behaviors than their fathers. The reason for this association is likely due to patterns of disclosure with fathers, where declining warmth may result in reduced adolescent disclosures about their aggressive behaviors and lead to larger discrepancies (with adolescents reporting more than their fathers). Of interest, this pattern did not emerge for mothers, which was unexpected. Although both maternal warmth and paternal warmth declined over time, change in maternal warmth was less drastic and perhaps the variability in maternal warmth

was not sufficient to predict changes in informant discrepancies. Research on how mother–adolescent and father–adolescent relationships change during adolescence supports this possibility given mothers continue to play a stronger supportive role during adolescence compared to fathers leading to less decline in warmth over time (Van Lissa et al., 2019). In addition, although low maternal warmth is robustly related to increasing adolescent aggressive behavior problems (Rothenberg et al., 2020), it appears less relevant for informant discrepancies of these behaviors. Taken together, the current results suggest that parental hostility plays a relatively larger role in how informant discrepancies *change* during adolescence, compared to parental warmth, and may be a key factor for identifying which reporter may be best to use for an accurate assessment of adolescent aggressive behavior problems.

In addition to parental affective quality, family status (single vs. dual parent family) and parental education level were examined as predictors of change in informant discrepancies. These two factors have been linked to larger informant discrepancies in cross-sectional research but are untested as predictors of change. Interestingly, living with both parents was related to slower informant discrepancy increase, but for only father–adolescent discrepancies. This may be because information about adolescent behaviors is communicated between parents (Crouter et al., 2005). Mothers are generally more involved with their adolescents and may have more information relative to fathers (Harris & Morgan, 1991). Fathers may be more likely to get more information from mothers compared to information that mothers obtain from fathers, leading to larger discrepancies for fathers. Parental education was not related to the mother or father informant discrepancy change but was related to larger mother-adolescent discrepancy at age 11.5. Parents with lower education may communicate less with their adolescents as a result of lower engagement (Guryan et al., 2008) or financial-related stress (Conger & Conger, 2002) have less information about their adolescents. However, according to the current results, these issues may be more relevant for predicting static informant discrepancies than change in discrepancies over time. Last, it was hypothesized that parent–adolescent informant discrepancies would increase faster for girls compared to boys. This hypothesis was based on research that indicates that the parent-daughter relationship degrades faster for girls during adolescence (De Goede et al., 2009), and that girls may be less likely than boys to disclose aggressive behaviors to parents since these behaviors might be seen as more undesirable in girls versus boys (Tilton-Weaver et al., 2010). This hypothesis was supported: informant discrepancy slopes were steeper for girls compared to boys for both mothers and fathers. Aggressive behavior problems may be more prevalent among boys, but the difference with parents' reports and the change in this difference over time is more dramatic for daughters. This finding suggests that reports from adolescent girls about their aggressive behavior problems may be more accurate than reports from parents. In addition, reports between adolescent boys and their parents may be more similar, though some degree of discrepancy is still expected to exist.

Revisiting Accepted Knowledge about the Developmental Course of Aggressive Behavior Problems During Adolescence

Developmental change in adolescent behavior problems has been a subject of research interest for some time (e.g., Moffitt, 1993) and several studies have been conducted that specifically model developmental change in adolescent aggressive behavior problems. However, many of these studies have relied solely on parent-report. For instance, a highly influential study of the normative development of internalizing and externalizing behavior problems found that parent-reported aggressive behavior problems decline during childhood and adolescence (Bongers et al., 2003). It could be concluded based on this and other parent-report studies that aggressive behavior problems do in fact decline during adolescence. Parent-report studies reliably find that aggressive behavior problems decline during this developmental period. Indeed, it appears that the current scientific consensus is that "Aggressive behavior actually declines over the course of childhood and adolescence…" (Steinberg, 2017, p. 364). However, the picture becomes less clear when adolescent reports of aggressive behavior problems are used (e.g., van der Ende & Verhults, 2005; see also Lansford et al., 2018). The results of the current multi-informant study reflect these differences and help clarify the contexts and conditions that may cause them. However, it appears that the very existence of these differences is often overlooked in the longitudinal literature on the development of aggressive behavior problems during adolescence. Based on the current results and those of other studies, the conclusion that aggressive behavior problems decline (on average) during adolescence requires revision to take into account known reporter differences as well as the contexts and conditions that give rise to them. In addition, in order to resolve these perceptual differences and identify the true developmental course of adolescent aggressive behavior problems, research specifically designed to obtain unbiased assessments of aggressive behavior problems is needed before firm conclusions can be made.

Considering the Current Study in the Context of Existing Informant Discrepancy Research

The existing research on age-related differences in informant discrepancies of adolescent aggressive behavior

problems shows mixed findings. Some studies show that differences between parents and adolescents are stable across time (e.g., Seiffge-Krenke & Kollmar, 1998), and others indicate differences increase or show some combination of stability and change (van der Ende & Verhults, 2005). The current study improves upon the previous research in several ways that are worth highlighting. First was implementing the Operations Triad Model (De Los Reyes et al., 2013). This framework provided an approach for positing whether reporters were expected to converge or diverge and, importantly, a set of coherent analytic steps for testing the hypothesis. A key component of the Operations Triad Model was establishing measurement invariance, which is an under-utilized analytic step in many studies that evaluate informant discrepancies (though see Mastrotheodoros et al., 2020). Without first establishing that constructs are measured equivalently between reporters, it is impossible to determine if the differences in reporters can be attributed to substantive characteristics, such as parental affective quality, gender, or other relevant factors. In addition, without establishing measurement invariance, substantive differences that might be otherwise be found could fail to emerge and lead to the conclusion that observed differences are actually measurement error. Analyses in the current study, stemming from the Operations Triad Model, determined configural, metric, and scalar invariant measurement across reporters at each wave and across waves for each reporter. The current study improves upon past work that omits this step and the reporter differences found in this study as well as the associations uncovered in predictive analyses (also guided by the Operations Triad Model) should be considered more reliable. Though not central to measurement invariance, it is also worth noting that the current study extends the Operations Triad Model to longitudinal data. The Operations Triad Model was developed with cross-sectional informant discrepancies in mind and the current study offers an example of how the model can be extended to evaluating change in informant discrepancies. Specifically, with regard to the Operations Triad Model divergence hypothesis, the current study suggests that an additional context/condition that should be considered is developmental stage. The current study indicates that hypotheses about divergence, and the convergence corollary, may be sensitive to developmental stage and/or age of the reporters. It would be interesting to see additional theoretical work that more formally integrates change over time into the Operations Triad Model framework.

A second notable strength of this study was the latent variable modeling approaches. The current study used latent growth curve models to examine change in parent and adolescent reports of aggressive behavior problems as well

as change in informant discrepancies during adolescence. A latent growth model framework has several strengths relative to correlational (Verhulst & van der Ende, 1992) or ANOVA-based methods (Seiffge-Krenke & Kollmar, 1998). These include better controlling for measurement error and eliminating the need to used multiplicative product terms to test age-related change, which may have low statistical power. In addition, the current study used Latent Congruence Modeling to create the differences scores. This approach has several advantages over other methods of creating difference scores (e.g., raw difference scores model), which include controlling for the measurement error in the difference scores and treating parent report and adolescent report as equally important for producing unbiased difference scores (Cheung, 2009; Córdova et al., 2016).

Limitations

This study is not without limitations. First, additional factors likely explain informant discrepancies, which were not included here, such as parental disclosure, parental knowledge, and parental supervision. Measurement issues and the interrelationships between adolescent disclosure, parental knowledge, parental monitoring, and other related constructs are complex (Lippold et al., 2014, 2013). Thus, properly examining these constructs would likely include mediational tests, possible moderation, and unique versus overlapping associations among constructs considered. Taken together, and given volume and complexity of the analyses currently reported, these issues are better addressed in additional research.

Another potential limitation is our sole focus on adolescent aggressive behavior problems and not the broader externalizing behavior problems construct. Aggressive behavior problems are the focus of this study given the serious implications for adolescent health and well-being as well as the known issues in the research regarding presumed normative development and ambiguity in studies that have modeled change in informant discrepancies. In addition, externalizing behavior problems, which generally consist of aggressive as well as rule breaking/delinquent behaviors, may show different developmental trajectories and etiology during adolescence (Burt & Neiderhiser, 2009). As a result, there is reason to evaluate these sub-constructs separately. For reasons similar to those described for disclosure and related variables, addressing non-violent delinquency should be the subject of future research. Finally, the sample used in this study is almost entirely Caucasian and the results reported in this study may not generalize to other populations. Additional research with more diverse samples is needed to test this possibility.

Conclusion

Discrepancies between parents and their adolescents in reports of adolescent aggressive behavior problems have serious implications for accurate assessment and subsequent prevention and intervention strategies. Longitudinal assessments of how these discrepancies change over time can uncover periods of agreement and disagreement and permit questions to be evaluated about contexts and conditions that give rise to change in these differences. Existing research is scant and conflicting and no studies have examined why discrepancies between parents and adolescents change over time. Informed by the Operations Triad Model (De Los Reyes et al., 2013) the current study addressed this gap by longitudinally modeling mother–adolescent and father–adolescent informant discrepancies in adolescent aggressive behavior problems during early- to mid- adolescence. This research demonstrates that longitudinal change in parent–adolescent informant discrepancies of adolescent aggressive behavior problems is more than measurement error and that it follows a specific developmental course. Parent reports of aggression decrease from early- to mid-adolescence and adolescent reports of aggression increase. These shifts result in large discrepancies in early and late adolescence, but the nature of these discrepancies differs such that parents report more aggression in early adolescence and adolescents report more aggression in later adolescence. This developmental pattern of reporter agreement and disagreement could only be discovered using a longitudinal approach. In addition to age-related expectations about reporter agreement and disagreement, this study indicates parents may underreport their adolescent's aggressive behavior problems if their adolescent perceives increasing hostility over time and if they are female. Living with two parents compared to one may also reduce informant discrepancies, particularly for fathers. Future informant discrepancy research on this and other constructs should consider seriously how age and development contribute to differences and agreement between multiple reporters.

Data Sharing and Declaration Data used in this paper are currently not publicly available.

Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval The original project grant was approved by the IRB at the Pennsylvania State University. The current study was deemed exempt by the University at Albany, SUNY IRB because the study uses deidentified secondary data. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed Consent was obtained from all individual participants.

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