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Individual and Sibling Characteristics: Parental Differential Treatment and Adolescent Externalizing Behaviors

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Abstract

Adolescents' reports of parental differential treatment have been linked to increased externalizing behaviors. The current study investigated whether adolescent self-esteem and sibling relationship characteristics (age-spacing and sibling relationship quality) moderated associations between parental differential treatment and later externalizing behavior. Data was gathered at two assessments from 708 sibling pairs (94% White; 51% male; same-gender pairs < 4 years apart in age). Older/younger siblings were aged $M_{\text{Assessment1}} = 13.5/12.1$ and $M_{\text{Assessment2}} = 16.2/14.7$ years. We found that higher levels of maternal differential treatment predicted greater residualized gains in externalizing behavior among older siblings who were a) the same age as their sibling or near-to and had low self-esteem or b) three years older than their sibling and had higher self-esteem. Higher levels of paternal differential treatment predicted greater residual gains in externalizing for older siblings with wider age ranges (regardless of self-esteem), and among older siblings with high levels of self-esteem (regardless of age difference). Surprisingly, maternal differential treatment was protective in one case: for adolescents with low self-esteem who were at least three years older than their siblings, maternal differential treatment predicted reduced externalizing behaviors. Paternal differential treatment was protective for more youth than maternal differential treatment: older siblings with low self-esteem who experienced paternal differential treatment exhibited decreased externalizing behaviors across adolescence, regardless of age difference. The findings highlight the importance of self-esteem and sibling age-spacing as particularly salient contextual influences in older siblings' perceptions of maternal and paternal

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Authors' Contributions

ER conceived of the study aims, analyzed the data, and drafted the manuscript. KM aided in the data analysis and interpretation, and edited the manuscript. Both authors read and approved the final manuscript.

Data Sharing Declaration

The datasets generated and/or analyzed during the current study are not publicly available but are available from Dr. Kristine Marceau on reasonable request. The data from the overall Nonshared Environment in Adolescent Development study are available from Dr. Jenae Neiderhiser at Pennsylvania State University on reasonable request.

Conflicts of Interest

The authors have no conflicts of interest to report.

Compliance with Ethical Standards

Ethical Approval

All procedures involving human participants were in accordance with the APA Ethical Standards in the treatment of the participants and approved by the Institutional Review Board at George Washington University, the Pennsylvania State University, and Purdue University.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

differential treatment, and that maternal and especially paternal differential treatment does not always serve as a risk factor for externalizing problems.

Keywords

Siblings; Parental differential treatment; Sibling relationship quality; Externalizing behaviors

Introduction

Parental differential treatment occurs when one child receives less warmth or more negativity from a parent, either perceived or in actuality, than their sibling. Although Western social norms call for equal treatment of offspring, parental differential treatment is extremely common, since most parents recognize differences among their children in behavior, personality, and needs (Atzaba-Poria & Pike, 2008). Adolescence is a critical period to investigate parental differential treatment, as it is a unique developmental time where youth are gaining autonomy, renegotiating family relationships, and placing increased emphasis on outside relationships (e.g., peers and romantic relationships). As one sibling in a sibling-pair enters adolescence, the likelihood of the dyad experiencing differential treatment from parents increases as the parenting needs of the siblings diverge. For example, parents are likely to give increasing responsibilities, as well as freedom, to the older sibling who enters adolescence first. Further, specific parenting practices change as adolescence progresses, for example, the ways in which parents monitor youth who have the freedom of driving themselves (as may be true among older siblings over 16 years of age in some families), or who have regular employment outside of the home (as may be true among older siblings over 14 years of age in some families) would differ from the monitoring strategies employed by parents for the younger sibling. These changes in parenting practices and household roles contribute to perceivable differential treatment in adolescents, which have been shown to impact adolescent adjustment (e.g., Loeser, Whiteman, & McHale, 2016; Padilla, McHale, Updegraff, & Umaña-Taylor, 2016).

Among the households in the United States, more than 80% of youth live with at least one sibling (McHale, Kim, & Whiteman, 2006). Although full siblings are often similar because they share on average 50% of their genes and much of their environment (e.g., home, parents, SES, neighborhood), there is evidence of vast differences between siblings on a range of outcomes and behaviors (e.g., academics and conduct; Feinberg, McHale, Crouter, & Cumsille, 2003; Whiteman, McHale, & Crouter, 2007). These differences are most likely due to non-shared environments, meaning non-genetic influences that make siblings and family members different from one another, which could include differences in each siblings' experiences within and outside of the family. Indeed, twin and sibling studies suggest that about 20–40% of adolescent externalizing behavior is explained by non-shared environmental factors (Burt, 2009). Adolescents' perception of parental differential treatment is likely to be a non-shared environmental influence, contributing to differences in siblings' levels of behavior problems (Buist, Dekovi, & Prinzie, 2013). Given the literature highlighting the significance of parental differential treatment on adjustment (reviewed briefly below), the current study examined the effects of parental differential treatment,

conceptualized as a non-shared environmental influence, on the development of adolescent externalizing behavior across 2–3 years.

Parental Differential Treatment and Adolescent Adjustment

Social comparison (Festinger, 1954) is a key theory for understanding parental differential treatment and posits that parental differential treatment is a form of comparison such that adolescents compare their sibling's treatment by parents to parent's treatment of themselves. Through these comparisons, children are able to form a sense of self-worth and their roles and responsibilities within the family. During adolescence, these comparisons become especially salient as this developmental period is marked by changes in cognition and perspective taking that lead to increased social comparisons as adolescents negotiate transitions and begin to form their identities. Specifically, parental differential treatment is a form of social comparison, specific to the sibling relationship, that adolescents utilize to self-evaluate, and so evaluations of self and self-esteem may hinge on these comparisons (Feinberg, Neiderhiser, Simmens, Reiss, & Hetherington, 2000). Thus, investigating parental differential treatment is important to better understanding the development of roles, identities, and self-evaluation during adolescence.

Inequity in treatment, whether intentional or not, has been linked to maladjustment during adolescence. Parental differential treatment is linked to reports of increased internalizing symptoms (e.g., depression) and risk-taking/delinquency across time (Jensen & Whiteman, 2014), as well as less positive sibling relationships (Shanahan, McHale, Crouter, & Osgood, 2008). There is also evidence that the effects of perceived differential treatment develop across late childhood and adolescence (McGuire, Dunn, & Plomin, 1995). For example, children experiencing higher overall levels of parental differential treatment exhibited increasing externalizing behaviors over time. Parental differential treatment has been shown to be particularly relevant for externalizing behaviors (Meunier, Boyle, O'Connor, & Jenkins, 2013), perhaps because youth tend to act out in response to perceived unfair inequity in caregiving. Although the relation between parental differential treatment and youth's externalizing behaviors has been investigated, less work has considered potential moderators of these effects, including whether adolescent's personal qualities and/or characteristics of the sibling relationship exacerbate (or mitigate) the associations of parental differential treatment and changes in externalizing behaviors across adolescence. Identifying potential moderators of these effects is important for understanding which adolescents are most at risk for parental differential treatment-related externalizing behaviors, and thus could help inform sibling interventions seeking to reduce externalizing behavior by indicating that they should target siblings found to be most at risk. Therefore, the current study investigates whether 1) adolescent characteristics (i.e., self-esteem) moderate the association between parental differential treatment and externalizing behavior, and 2) characteristics of the sibling relationship (i.e., age-spacing and the quality of the sibling relationship) moderate the association of parental differential treatment and externalizing behaviors 2–3 years later (see Figure 1 for conceptual model).

Contextual Influences on Parental Differential Treatment – Adjustment Associations

Recent advances in social comparison theory highlight both individual and contextual factors as important for understanding how social comparisons are linked to behavioral outcomes (Buunk & Dijkstra, 2017). Many studies of parental differential treatment have examined gender, age, and birth order as moderators of the association between parental differential treatment and adolescent adjustment (e.g., Solmeyer & McHale, 2017). A robust body of research highlights distinct familial variables that should be considered when investigating parental differential treatment, specifically, family composition (e.g., sibling birth order and gender) and parent gender. For example, same-gender siblings experienced greater impacts of parental differential treatment in childhood and adolescence (Jensen, Whiteman, Fingerman, & Birditt, 2013) and brother-brother dyads experienced more internalizing problems in association with parental differential treatment compared to mixed-gender and sister-sister dyads (Hibbard & Buhrmester, 2010). Analyzing parental differential treatment separately for older and younger siblings (in terms of birth order) may be particularly important because of evidence that they may be unique populations. For example, older siblings have more power in the sibling relationship (Campione-Barr, 2017), often report more parental differential treatment, and are more sensitive to differential treatment and spend more energy trying to understand why differences occur (Kowal & Kramer, 1997). Thus, in the current study, we examined older and younger siblings separately.

Research utilizing maternal and paternal data point to distinct influences attributable to mothers or fathers. For example, paternal differential treatment accounted for more variance in adolescent adjustment generally compared to maternal differential treatment in young adulthood, and maternal and paternal differential treatment were uniquely associated to depressive symptoms, sometimes in opposite directions (Jensen et al., 2013). Further, one study that investigated maternal and paternal differential treatment separately in 11 to 13 year-olds found that children who perceived that paternal but not maternal differential treatment was fair experienced higher levels of sibling warmth and closeness (Kowal & Kramer, 1997). Finally, Davey and colleagues (2009) found that, in adulthood, maternal differential treatment was more salient compared to paternal differential treatment. Thus, in the current study, we examined maternal and paternal differential treatment separately. The innovative contribution of this study is our focus on novel individual- and family-level contextual influences on parental differential treatment-externalizing associations that adds to the literature investigating how adolescents conduct self-evaluations and form self-concepts at the family level.

Adolescent self-esteem.—Parental differential treatment is arguably a subjective phenomenon, based on adolescents' perceptions of treatment, and as a result is associated with adjustment. Thus, characteristics of the adolescent may influence how the differential treatment is perceived and is linked to outcomes (Atzaba-Poria & Pike, 2008). For example, adolescents with low self-esteem have been shown to exhibit more negative emotionality (e.g., increased anxiety and perpetual anger) and delinquency (Wood & Forest, 2016). Self-esteem is a particularly salient individual characteristic for considering the role of parental differential treatment on adjustment because low self-esteem is associated with conducting

increased social comparisons like parental differential treatment (Major, Sciacchitano, & Crocker, 1993). Feinberg et al. (2000) examined the importance of self-esteem as a context for adolescents' perceptions of parental differential treatment and found that adolescents with lower self-esteem were more likely to report absolute levels of differential treatment compared to his/her co-sibling. Further, higher levels of parental differential treatment were also shown to predict later decreases in self-esteem, suggesting an intertwined developmental relation of parental differential treatment and self-esteem (Shebloski et al., 2005). Given the role of self-esteem in both adjustment and parental differential treatment and the importance of investigating the influence of contextual factors on associations between parental differential treatment and adjustment, highlighted in the literature, we hypothesized that adolescents' self-esteem would moderate the association between parental differential treatment and later externalizing behavior. Specifically, we expected that parental differential treatment would be more strongly associated with externalizing behavior among youth with low self-esteem relative to youth with higher self-esteem. That is, adolescents with low self-esteem will perceive greater amounts of parental differential treatment, which is associated with increased externalizing behaviors across adolescence, but also, they will express themselves more negatively than those with higher self-esteem, exhibiting the highest levels of externalizing behavior.

Sibling age difference.—Substantial work has been devoted to understanding family composition as a family-level contextual influence on associations of parental differential treatment and externalizing behaviors, most often focusing on the ages of adolescents and gender composition of the sibling dyads, as explained above. Though studies of parental differential treatment have largely collected data from families with siblings that are roughly 1–4 years apart in age, examination of the potential role of sibling age difference on the association between parental differential treatment and adolescent adjustment is far less common (e.g., Kowal, Kramer, Krull, & Crick, 2002; Tamrouiti-Makkink, Dubas, Gerris, & Aken, 2008). There is some evidence suggesting that when siblings are closer in age, negative effects of social comparisons were more prominent (Forgas & Fitness, 2008). Further, siblings who are closer in age tended to compete with each other more often (Buhrmester & Furman, 1990). These findings are in line with social comparison theory, and empirical evidence that siblings were more likely to make comparisons with individuals to whom they were more similar (Loeser et al., 2016). Therefore, we considered sibling age difference as a moderator of the association of absolute parental differential treatment and later externalizing behavior, expecting that youth with a closer age difference would be more likely to exhibit externalizing behaviors associated with parental differential treatment (e.g., a stronger association of parental differential treatment and externalizing) than siblings with wider age differences. We also included an exploratory three-way interaction among parental differential treatment, adolescent self-esteem, and sibling age difference. Theoretically, siblings with lower self-esteem may be more prone to make social comparisons, particularly with individuals to whom they are more similar. Thus, it may be that siblings with lower self-esteem and who have a co-sibling who is close in age would make be most likely to compare themselves with their siblings via perceived parental differential treatment, and may also be most affected by that perceived differential treatment (e.g., manifesting as increased externalizing behaviors over time).

Sibling relationship quality.—In addition to sibling age difference, sibling relationship quality is also likely a key family-level contextual influence on parental differential treatment-externalizing associations. For example, siblings who have more conflictual relationships are uniquely impacted by social comparisons, suggesting they differ from siblings with a more positive sibling relationship. Specifically, siblings with conflictual relationships reported greater negative effects (e.g., delinquency) of social comparisons (Scholte, Engels, de Kemp, Harakeh, & Overbeek, 2007), suggesting that the sibling relationship creates a unique context for adolescents experiencing parental differential treatment. Further, siblings who reported more support from their family (Cooper, Holman, & Braithwaite, 1983), and who were in a more harmonious, as opposed to conflictual or affect-intense relationship with a sibling (Buist & Vermande, 2014), had higher self-esteem. Given findings from the social comparison and self-esteem literature, we also considered quality of the sibling relationship when investigating whether self-esteem moderates the association between parental differential treatment with later externalizing behavior.

Current Study

During adolescence, it is necessary to evaluate personal traits as a context through which youth thrive (Seligman & Csikszentmihalyi, 2000). Therefore, the current study focused on personal traits and family factors that may influence the association between parental differential treatment and adolescents' externalizing behavior. Importantly, we extended the work begun by Feinberg et al. (2000), which found that self-esteem influenced adolescents' perceptions of parental differential treatment in the same sample used here, by examining self-esteem and sibling relationship characteristics as moderators of associations between parental differential treatment with change in externalizing behavior across 2–3 years in adolescence. This study makes two major contributions: first, it examines moderators of change in externalizing behavior during adolescence, a key period in which we expect parental differential treatment to be associated with behavior. Second, it considers multiple key potential moderators at both the child and family level, providing a more robust and contextualized picture of how parental differential treatment and externalizing behaviors are associated in adolescence than has previously been reported. It is unlikely that each proposed moderator operates independently, and examining higher-order interactions is critical when complex, contextualized theoretical models of development are expected, as are frequently posited in the literature on the ways in which parental differential treatment is associated with adolescent adjustment (Jensen et al., 2013).

Based on social comparison theory, and parental differential treatment and self-esteem literature, we hypothesized that 1) parental differential treatment would be associated with increased externalizing behaviors across adolescence, 2) the association between parental differential treatment and change in externalizing behavior would be stronger for adolescents with lower levels of self-esteem than adolescents who have higher self-esteem, 3) the characteristics of the sibling relationship (i.e., age difference and sibling relationship quality) would also moderate the association between parental differential treatment and change in externalizing behavior, such that siblings who are in a negative sibling relationship and are closer in age will experience increased externalizing behavior related to parental differential treatment, and 4) characteristics of the sibling relationship (e.g., age difference and quality)

would exacerbate the hypothesized 2-way interaction of parental differential treatment and self-esteem on adolescent externalizing, such that sibling who are closer in age, report higher parental differential treatment, and have lower self-esteem would exhibit the most externalizing behavior.

Based on literature suggesting that maternal and paternal differential treatment may differentially affect adolescent outcomes (Kowal & Kramer, 1997), we examined maternal and paternal differential treatment separately. Further, older and younger siblings have been shown to be unique populations with differences in perception and sensitivity to parental differential treatment (Feinberg et al., 2000), and so we examined older and younger siblings separately. Finally, because sibling relationships are often characterized by both closeness and conflict simultaneously (Kramer, 2010; Punch, 2007), and to enhance interpretability of multiple moderators, we created a categorical variable for sibling relationship quality that included a) *high affect* marked by high closeness and high conflict, b) *primarily positive* marked by high closeness and low conflict, c) *primarily negative* marked by low closeness and high conflict, and d) *low affect* low closeness and conflict, and conducted models separately for each type of sibling relationship.

Methods

Participants and Procedures

Data are drawn from the US-based Nonshared Environment in Adolescent Development study (NEAD; Neiderhiser, Reiss, & Hetherington, 2007). The sample consists of 720, predominantly White (94%), families of twins and siblings in two family types: monozygotic twins (N = 93 pairs), dizygotic twins (N = 99 pairs), and full siblings in non-divorced families (N = 95 pairs); and full siblings (N = 182 pairs), half-siblings (N = 109 pairs), and stepsiblings (N = 130 pairs) in stepfamilies (12 pairs could not be classified). The parents of children in stepfamilies were required to be married at least 5 years prior to data collection to ensure that none of the stepfamilies were in the unstable early phase of family formation. Recruitment was conducted in the United States through a national market survey of 675,000 families, along with random digit dialing of 10,000 telephone numbers. Data collection occurred over three time periods, in 1988; 1991; and between 1999 and 2001. For the purposes of the current study, we used data from the first two Waves of the study, due to the availability of self-esteem measures and the age of the siblings (e.g., adolescents) at these assessments. At Wave 1, sample selection required families to have two same-gender adolescent (i.e., between 9 and 18 years old) siblings, who resided in the home at least half-time and were no more than 4 years apart in age. Further, the participation of mothers, fathers, and both siblings were required (for more information see Hetherington et al., 1999; Reiss et al., 1995). At Wave 2, occurring 2–3 years later, sample selection required that both adolescent siblings reside in the home at least half-time with both parents (N = 434, for a detailed description of participation from Wave 1 to Wave 2, see Neiderhiser et al., 2007 and Reiss et al., 2000). Attrition between waves was primarily due to participants aging out of the study (i.e., both siblings did not still reside in the home at least half of the time; Reiss, Plomin, Neiderhiser, & Hetherington, 2000). Demographics between waves were not significantly different (Neiderhiser, Reiss, Hetherington, & Plomin, 1999). Further, t-tests

suggested a significant difference for younger $t(676) = 2.40, p = .02$, and older siblings $t(666) = 2.15, p = .03$ in initial levels of externalizing behaviors: those who did not participate at Wave 2 had increased levels of Wave 1 externalizing behaviors compared to those who did participate at Wave 2. Families were visited a total of three times, twice at Wave 1 and once at Wave 2. Both caregivers and adolescent twin/siblings completed questionnaires and were recorded during interactions. Further data was attained through questionnaires mailed ahead of time and collected during both visits. Demographic characteristics for twin/siblings and caregivers, at Wave 1 and Wave 2, are presented in Table 1.

Measures

Parental differential treatment.—Parental differential treatment was measured by the Sibling Inventory of Differential Experiences at Wave 1, where both siblings reported on their own experiences with sibling interaction, parental treatment, and peer-group characteristics in comparison with those of their sibling (Daniels & Plomin, 1985). We used adolescents' report of parental treatment, separately for mothers and fathers. Youth were asked to rate the extent to which they perceived differential maternal and paternal affection and control on a scale of 1 to 5 (1 = with me much more, 2 = with me a bit more, 3 = with both of us the same, 4 = with [sibling] a bit more, and 5 = with [sibling] much more), on 9 items. "Absolute" scores were utilized to measure the degree of parental differential treatment (e.g., quantity of differential treatment occurring) given the hypotheses that certain adolescents are more likely to report greater social comparisons, as opposed to which sibling was experiencing more favored treatment (e.g., the younger sibling is more favored than the older sibling). Average scores of paternal and maternal differential treatment were created using absolute values from both subscales because parent affection and control were significantly correlated ($r = .57$ to $.64$ across siblings and for mothers and fathers). Thus, the absolute score encompasses all domains of differential treatment (i.e., warmth and control), and combining across domains is similar to how previous work has utilized this measure (e.g., Jensen & McHale, 2017; Kowal & Kramer, 1997; Loeser, Whiteman, & McHale, 2017). Internal consistency was acceptable for younger, Chronbach's $\alpha = .71$ to $.81$, and older siblings Chronbach's $\alpha = .67$ to $.86$, across subscales.

Sibling relationship characteristics.—Sibling relationship quality was measured using previously published and validated composite scores reflecting sibling positivity (Reiss et al., 2000) and negativity (e.g., Neiderhiser, Marceau, & Reiss, 2013) based on maternal, paternal, observer rating, and adolescent self-report at Wave 1. For sibling negativity and positivity, parents completed the sibling rivalry, aggression, avoidance, companionship, empathy, and teaching subscales of the Sibling Inventory of Behavior (Hetherington & Clingempeel, 1992; Chronbach's $\alpha = .85$). Both older and younger siblings completed the criticism subscale of the Network of Relationship Inventory (Hetherington & Clingempeel, 1992; Chronbach's $\alpha = .72$) as well as the sibling rivalry, aggression, avoidance, companionship, empathy, and teaching subscales of the Sibling Inventory of Behavior (Hetherington & Clingempeel, 1992; Chronbach's $\alpha = .71$). During the dyadic sibling interaction task (Hetherington & Clingempeel, 1992) observers rated anger, coercion, transactional conflict, warmth, assertiveness, communication, and involvement between

siblings. All scales and coding were reliable, see Reiss, Neiderhiser, Hetherington, and Plomin (2000). For each measure, a standardized score was created (i.e., z-score) and then standardized scores were summed to create the composite positivity and negativity scores for the sibling relationship (see Reiss et al., 2000 for further details).

The scores were then used to create a four-level categorical variable: sibling relationship quality group. The categorical variable grouped sibling relationship quality by siblings whose relationships were lower-than-average (based on a mean split) in both positivity and negativity (i.e., *low affect*; older N = 219, younger N = 220), higher-than-average for negativity but lower-than-average for positivity (i.e., *primarily negative*; older N = 205, younger N = 212), higher-than-average for positivity but lower-than-average for negativity (i.e., *primarily positive*; older N = 203, younger N = 196), and higher-than-average in both positivity and negativity (i.e., *high affect*; older N = 42, younger N = 40). Notably, *high affect* group had an insufficient sample size and was thus excluded from analyses.

The age difference between siblings was measured as a continuous variable that represented the difference between the older and younger siblings age. One-way ANOVAs revealed that there were significant differences in the age difference between older and younger siblings in the various relationships quality groups, $F(2,625) = 29.13, p < .05$ for younger siblings; $F(2,624) = 12.98, p < .05$ for older siblings, such that the *primarily positive* group had the lowest average age difference ($M = 1.03$ years, $SD = 1.24$ years for younger siblings; $M = 1.28$ years, $SD = 1.34$ years for older siblings), and *low affect* and *primarily negative* groups had relatively higher age differences ($M = 1.79$ years, $SD = 1.32$ years for younger siblings reporting *low affect*; $M = 1.48$ years, $SD = 1.26$ years for older siblings reporting *low affect*; $M = 1.89$ years, $SD = 1.14$ years for younger siblings reporting a *primarily negative* relationship, $M = 1.91$ years, $SD = 1.19$ years for older siblings reporting a *primarily negative* relationship).

Self-esteem.—Self-esteem was measured using the Global Self-Worth subscale of the Harter Perceived Competence Scale for children (Harter, 1982) at Wave 1. To be developmentally appropriate, a distinction between elementary school-aged children (grades 3 to 6) and junior high school adolescents (grades 7 to 9) was made (Harter, 1982): siblings self-reported using either the child or adolescent version of the Harter Perceived Competence Scale. Both versions included five items on a 4-point Likert scale. Internal consistency (for child and adolescent versions) ranged from Chronbach's $\alpha = .72$ to $.79$ for younger and older siblings.

Adolescent externalizing behavior.—A previously published multi-method multi-rater composite score was used to measure adolescent externalizing behaviors (e.g., see Feinberg et al., 2000). Parental and adolescent self-report were assessed using a 9-item subscale from the Behavior Events Inventory for the 3-months prior to assessment (Chronbach's $\alpha = .60$ -.61 child and $.37$ -.42 parent; Hetherington & Clingempeel, 1992) and the Behavior Problems index for the week prior to assessment ($\alpha = .72$ -.78; Zill, 1985), a scale adapted from the Child Behavior Events Inventory (Achenbach, 1983). Ten-minute interactions between all possible combinations of family dyads were coded using a global coding system (intraclass correlation coefficient = $.86$; Hetherington & Clingempeel, 1992); observational coding

attended to behavior that was disruptive or disrespectful (e.g., rude or coercive). The composite score was internally consistent, $\alpha = .85$. See Reiss et al., (2000) for further detail.

Covariates.—Due to the nature of our sample, we sought to control for genetic relatedness of siblings. We created an ordinal variable called *Sibling Type* wherein 3 = monozygotic twins, 2 = dizygotic twins and full siblings, 1 = half-siblings, and 0 = step-siblings, which was treated continuously (where higher scores represented more genetic relatedness) in analyses. Associations of sibling type with continuous study variables are provided in the results section. One-way ANOVAs revealed that there were significant differences in the genetic relatedness of siblings in the various relationships quality groups, $F(2,625) = 20.89$, $p < .05$ for younger siblings; $F(2,624) = 9.14$, $p < .05$ for older siblings, such that the *primarily positive* group had on average higher genetic similarity ($M = 1.86$, $SD = 0.99$ for younger siblings; $M = 1.78$, $SD = 1.01$ for older siblings), than *primarily negative* ($M = 1.64$, $SD = 0.72$ for younger siblings; $M = 1.64$, $SD = 0.74$ for older siblings) and *low affect* groups ($M = 1.29$, $SD = 1.02$ for younger siblings, $M = 1.39$, $SD = 1.04$ for older siblings). Other covariates included child age and sex, and the internalizing and externalizing scores created through the multi-rater, multi-method composites previously used in Feinberg et al., (2000) and Reiss et al., (2000).

Analytic Strategy

Multiple regression analyses were conducted in a multiple group framework (sibling relationship quality group: *primarily positive*, *primarily negative*, *low affect*) in R(lavaan), using Full Information Maximum Likelihood (FIML) to accommodate missing data (Cham, Reshetnyak, Rosenfeld, & Breitbart, 2017). FIML handles missing data through an expectation maximization algorithm and uses all available data to identify the values of the model parameters that maximize the fit of the model to the observed data. The inclusion of age difference and Wave 1 externalizing behavior in the model attenuated bias due to known sources of missingness. First, we fit a model wherein all parameters were freely estimated for each sibling relationship quality group. Then, we fit a constrained model in which all parameters (beta-weights, intercepts, and residuals) were set to be equal across sibling relationship quality groups. In instances where there was no decrement in model fit, we concluded that there were no differences based on sibling relationship quality group, and only the constrained model is presented. If the fully-constrained model resulted in a significant decrement in model fit as judged by a significant chi-square test, we presented the analyses separately by sibling relationship quality group.

Parallel regression analyses were conducted separately for older and younger siblings, and maternal and paternal parental differential treatment (e.g., a total of four analyses). For each analysis, Wave 2 adolescent externalizing behavior was regressed on Wave 1 parental differential treatment, age difference, self-esteem, all three two-way interactions of parental differential treatment, age difference, and self-esteem, and the three-way interaction. Covariates included Wave 1 gender, age, sibling type, internalizing, and externalizing behavior (thus, the outcome represents residualized gain in externalizing behavior).

Results

Descriptive statistics for study variables are presented in Table 2. Bivariate correlations are presented in Table 3 for both older and younger siblings. For both older and younger siblings, maternal and paternal differential treatment and sibling age difference were positively associated with Wave 2 adolescent externalizing behavior. For older siblings, adolescent self-esteem was negatively correlated with paternal differential treatment, and for younger siblings self-esteem was negatively related to maternal and paternal differential treatment.

Parental Differential Treatment for Younger Siblings

Maternal differential treatment.—When examining maternal differential treatment for younger siblings, constraining all parameter estimates to equality across *low affect*, *primarily positive*, and *primarily negative* sibling relationship groups did not result in a decrement in model fit, $\chi^2_{\text{change}}(24) = 29.32$, $p = .21$, providing no evidence of differences across sibling relationship quality. Thus, findings from the fully constrained model are presented. For younger siblings, self-esteem, age difference, and maternal differential treatment did not predict later externalizing behaviors, nor were there significant interactions, contrary to hypotheses (see Table 4 for full results).

Paternal differential treatment.—When examining paternal differential treatment for younger siblings, constraining all intercepts and parameter estimates to equality across *low affect*, *primarily positive*, and *primarily negative* sibling relationship types did not result in a decrement in model fit, $\chi^2_{\text{change}}(24) = 29.54$, $p = .20$, providing no evidence of differences across sibling relationship quality. Thus, findings from the fully constrained model are presented. Similarly, to maternal differential treatment, paternal differential treatment did not predict later externalizing behaviors, nor were there significant interactions, contrary to hypotheses (see Table 4 for full results).

Parental Differential Treatment for Older Siblings

Maternal differential treatment.—When examining maternal differential treatment for older siblings, constraining all intercepts and parameter estimates to equality across *low affect*, *primarily positive*, and *primarily negative* sibling relationship quality groups did not result in a decrement in model fit, $\chi^2_{\text{change}}(24) = 0.77$, $p = .16$, providing no evidence of differences across sibling relationship quality. Thus, findings from the fully constrained model are presented (see Table 5 for full results). Hypothesis 1 was supported for older siblings, such that maternal differential treatment predicted increased externalizing behaviors across adolescence ($b = 0.24$, $p = .01$). There was a significant three-way interaction between maternal differential treatment, older sibling self-esteem, and sibling age difference, partially supporting Hypothesis 4. We probed this interaction using Johnson-Neyman regions of significance (see Figure 2), which yields data and model-based thresholds denoting at which levels of the moderator there is a significant focal association. Because Hypothesis 4 predicted that age difference would exacerbate the two-way interaction of self-esteem moderating the association of differential treatment and externalizing (predicted by Hypothesis 2), we examined the moderating effect of self-esteem

on the effect of maternal differential treatment (i.e., the beta-weight for the partial correlation of maternal differential treatment and externalizing behavior from the regressions) at three values of sibling age difference: 0 years (192 twin pairs, and 16 pairs of genetically unrelated step-siblings), 1 year (110 pairs of siblings), and 3 years (200 sibling pairs had an age difference of 3 or higher). Thus, the effect of self-esteem on the association (depicted by the beta-weights presented along the y-axis) of maternal differential treatment and externalizing behaviors is visualized in three separate and unique contexts of sibling age difference (i.e., 0 years, 1 year apart, and 3 years apart, depicted in three separate panels) in Figure 2. For same-aged siblings, higher levels of maternal differential treatment predicted greater residualized gains in externalizing behavior when self-esteem was low, supporting Hypothesis 4 (and the effect of maternal differential treatment decreased as self-esteem increased). Further, for adolescents who were approximately 1 year older than their younger siblings, there was a small effect such that higher maternal differential treatment predicted greater residualized gains in externalizing behavior, only at average/moderately low levels of self-esteem (and the effect of maternal differential treatment decreased as self-esteem increased to average levels or higher). Finally, for adolescents who were at least 3 years older than their younger siblings, findings were not as expected. Higher maternal differential treatment predicted greater residualized gains in externalizing behaviors among youth with average and high levels of self-esteem (and the effect of maternal differential treatment increased as self-esteem increased beyond average levels). Also, higher levels of maternal differential treatment predicted decreases in externalizing behavior among youth with very low levels of self-esteem (see Figure 2).

Paternal differential treatment.—When examining paternal differential treatment for older siblings, constraining all intercepts and parameter estimates to equality across *low affect*, *primarily positive*, and *primarily negative* sibling relationship types did not result in a decrement in model fit, $\chi^2_{\text{change}}(24) = 31.46$, $p = .14$, providing no evidence of differences across sibling relationship quality. Thus, findings from the fully constrained model are presented (see Table 5 for full results). There was a significant two-way interaction between sibling age difference and paternal differential treatment, such that fathers' differential treatment predicted greater residualized gains in externalizing behavior among siblings who were at least 1.16 years older than their younger siblings (e.g., for 508 siblings, or 72% of the sample; see Figure 3). Further, there was a significant two-way interaction between sibling age difference and older sibling self-esteem, such that higher levels of self-esteem predicted greater residualized gains in externalizing behavior among siblings who were at least 1 year older than their younger siblings (e.g., for 508 siblings, or 72% of the sample; see Figure 4). Finally, there was a significant two-way interaction between paternal differential treatment and older siblings' self-esteem that did not conform to the hypothesized pattern (Hypothesis 2). Specifically, higher levels of paternal differential treatment predicted decreases in externalizing behaviors among older adolescents who had low self-esteem (e.g., the bottom 25% of the sample on the measure of self-esteem, or 176 siblings), and higher levels of paternal differential treatment predicted greater residualized gains in externalizing behaviors among older adolescents who had higher self-esteem (e.g., the top 69% of the sample, or 485 siblings), but paternal differential treatment was not

associated with externalizing behaviors among youth with average to moderately low self-esteem (e.g., for only 47 siblings; see Figure 5).

Sensitivity Analyses

Mothers versus fathers.—Because findings seemed to differ in models including maternal versus paternal differential treatment, we explicitly tested whether parameter estimates differed for models of mothers versus fathers. Because the same adolescents were assessed in the separate regression models and therefore correlated errors are introduced, we used a seemingly unrelated regression framework implemented in R(systemfit; Henningsen, Hamann, & Inc, 2007). We tested whether we could constrain a) all coefficients, and b) all coefficients relevant to hypothesis testing interactions (i.e., excluding covariates: age, sex, sibling type, and earlier internalizing and externalizing) across mothers and fathers for 1) younger siblings and 2) older siblings (e.g., birth order). For both sets of seemingly unrelated regressions constraining all coefficients (a), estimates could not be constrained for mothers and fathers, $\chi^2(12) > 420.5$, $p < .0001$. For both sets of seemingly unrelated regressions constraining specifically hypothesis-related coefficients (b), estimates could not be constrained for mothers and fathers, $\chi^2(7) > 422.8$, $p < .0001$. Thus, we conclude that it is reasonable to interpret differences in findings across models including mothers and fathers' parental differential treatment.

Birth order.—Similarly, because findings seemed to differ in models including younger versus older siblings (which are also non-independent samples with correlated errors), we also performed seemingly unrelated regressions across younger and older siblings, for 1) models including mothers and 2) models including fathers. For both sets of seemingly unrelated regressions constraining all coefficients (a), estimates could not be constrained for older and younger siblings, $\chi^2(12) > 36.13$, $p < .0001$. For both sets of seemingly unrelated regressions constraining specifically hypothesis-related coefficients (b), estimates could not be constrained for older and younger siblings $\chi^2(7) > 22.7$, $p < .01$. Thus, we conclude that it is reasonable to interpret differences in findings across models including younger and older siblings' perceptions of parental differential treatment.

Twins.—Given that twins are a unique population that may be meaningfully different from other groups of siblings, we conducted sensitivity analyses reanalyzing the data after excluding monozygotic and dizygotic twins. For full results see Supplemental Tables 1–3; similarities and differences in findings are outlined briefly here. With or without including twins, relationship quality groups could be constrained for younger siblings. When excluding twins, a two-way interaction emerged such that younger siblings with a narrower age difference and lower self-esteem had more Wave 2 externalizing behaviors. In the model of paternal differential treatment, this interaction was also present, but was qualified by a three-way interaction with paternal differential treatment that followed a similar pattern to that presented for older siblings in our main analysis: younger siblings with a wider age difference (3 years) and low self-esteem showed positive associations of paternal differential treatment and more externalizing behaviors, whereas siblings with a wider age difference (3 years) and high self-esteem showed inverse associations of paternal differential treatment

and externalizing behavior, though there were no effects for siblings with a narrower (non-zero) age difference.

For older siblings, when excluding twins, there was evidence of differences between sibling relationship groups (i.e., *low affect*, *primarily positive*, and *primarily negative*) in both maternal and paternal models. In the model of maternal differential treatment, the two-way interactions were no longer significant. The three-way interaction presented in the model of maternal differential treatment remained, but only reached significance in the group of older siblings reporting a primarily negative relationship quality. However, constraining only the three-way interaction (and main effects and two-way interactions comprising the three-way interaction) indicated no decrement in model fit. Thus, the main hypothesis-related findings from the model of maternal differential treatment among older siblings were similar whether including or excluding twins. Probing the three-way interaction revealed a largely consistent pattern of findings as presented in the main analysis. The small exception was that in the main analysis, for adolescents who were approximately 1 year older than their younger siblings, there was a small effect such that higher maternal differential treatment predicted greater residualized gains in externalizing behavior, only at average/moderately low levels of self-esteem (and the effect of maternal differential treatment decreased as self-esteem increased to average levels or higher) – in the analysis excluding twins this effect was found for adolescents ranging from the lowest to average levels of self-esteem, not only at average/moderately-low levels.

In the paternal model, there was evidence of differences between sibling relationship groups (i.e., *low affect*, *primarily positive*, and *primarily negative*), such that the only significant findings were found for the *primarily positive* sibling relationships. In the model of paternal differential treatment, there was still a two-way interaction between sibling age difference and adolescent self-esteem, although this was now qualified by a significant three-way interaction (taking the place of multiple two-way interactions that were found in the model including twins). This interaction was specific to older siblings in a *primarily positive* sibling relationship (as judged by a model constraining only the three-way interaction and main effects and two-way interactions comprising the three-way interaction): specifically, siblings who were at least three years older than their co-sibling, and with above average self-esteem had greater associations of paternal differential treatment and externalizing behaviors. Notably, this interaction differs from the pattern of findings described by the two-way interactions for the full sample in that there was no protective effect of paternal differential treatment for older adolescents with lower self-esteem, suggesting that that protective effect in the full sample is driven by siblings who are not in positive relationships. In general, the findings excluding twins were quite similar to findings from the full analysis. The exceptions highlight that the inclusion of twins in the current sample may have buffered some of the contextual effects for younger siblings with regard to paternal differential treatment and the importance of relationship quality for older siblings with regard to paternal differential treatment.

Discussion

Adolescence is a critical time to evaluate parental differential treatment, as the roles of family members shift along with adolescents' greater autonomy and the multiple transitions during this developmental period (e.g., the sibling entering adolescence experiences greater responsibilities matching their newfound developmental period, which may differ from the experiences of younger siblings). We expanded upon prior literature that highlighted the importance of contextualizing the ways in which parental differential treatment is associated with maladjustment by investigating whether novel contexts for the association between maternal and paternal differential treatment and adolescent externalizing behavior for older and younger siblings (i.e., referring to birth order relative to their sibling) using a large, longitudinal sample of siblings and twins. Specifically, we investigated how characteristics of both family and individual are impactful for associations of parental differential treatment and externalizing behavior across adolescence. In general, we found mixed support for hypotheses. Most notably, age difference and self-esteem were important contexts for older siblings, such that higher levels of maternal differential treatment predicted greater residualized gains in externalizing behavior among older siblings who were either the same age as their sibling or near-to (e.g., a 1-year age difference) and had low self-esteem, or had a wider age difference (e.g., 3-years) and higher self-esteem. However, lower levels of maternal differential treatment predicted reduced externalizing behavior among older siblings with low self-esteem and a wider age difference with his/her co-sibling. This pattern of findings is more complex than expected, based on prior literature. Our findings suggest that parental differential treatment, in absolute levels as perceived by the adolescent, is not always a risk factor for externalizing behaviors, and that the traits of the sibling dyad and the individual are important for the ways in which adolescents react to absolute levels of parental differential treatment. In contrast to findings for maternal differential treatment, higher levels of paternal differential treatment predicted greater residual gains in externalizing for older siblings with wider age ranges (regardless of self-esteem), and among older siblings with high levels of self-esteem (regardless of age difference). Again, among older siblings with lower self-esteem, differential treatment was actually associated with reductions in externalizing behaviors. These findings suggest that adolescent characteristics are extremely important to consider, as are characteristics of the sibling relationship (although to a lesser extent) when assessing the influence of paternal differential treatment on outcomes across adolescence.

Contextual Influences on Parental Differential Treatment – Adjustment Associations

Our findings provide evidence that maternal and paternal differential treatment predicted increases (or decreases) in externalizing behaviors across adolescence in specific contexts for older siblings. The current study extends previous research and suggests that the contexts in which maternal differential treatment is directly associated with changes in externalizing behaviors may be somewhat more complex than the contexts in which paternal differential treatment is associated with changes in externalizing behaviors. Mothers are often considered more influential, given that mothers tend to spend more time with children (Bornstein & Lamb, 2002). However, research has begun to move away from this notion, acknowledging that mothers and fathers have differential and shared roles in parenting (Day

& Padilla-Walker, 2009), such that fathers may be more influential for behavioral and externalizing problems (Williams & Kelly, 2005). In the broader literature on parenting, numerous specific parenting behaviors have been linked with forms of externalizing behavior, and a meta-analysis suggested that fathers' supportiveness was more highly associated with delinquency than mothers' supportiveness (Hoeve et al., 2009). However, there were not differences between mothers' and fathers' authoritative control or behavioral control broadly defined, and there were not enough studies to test for differences in mothers' and fathers' use of specific parenting strategies (fathers were only assessed in 20% of the included studies; Hoeve et al., 2009). A more recent meta-analysis also concluded that the associations between maternal and paternal parenting behaviors and styles were similarly associated with externalizing problems (Pinquart, 2017). This literature highlights that there may be some (but likely not most) parenting behaviors that differ in association with externalizing behavior for fathers and mothers, but mostly that there remains a dearth of studies that examine mothers and fathers separately.

Although effects about when parental differential treatment was associated with increased versus decreased levels of externalizing behavior emerged in different contexts for mothers and fathers, in both cases, we found that differential treatment by mothers and fathers could be considered either a risk or protective factor for externalizing behaviors across adolescence. Maternal differential treatment was a risk factor for externalizing in most contexts, and protective in only one narrow case: for adolescents with low self-esteem who were at least three years older than his/her sibling (5 older siblings, or 3% of the sample of adolescents > 3 years older than his/her sibling, or <1% of the entire sample). On the other hand, paternal differential treatment was protective for any older siblings with low self-esteem, regardless of age difference (25% of the sample, or 176 older siblings). Taken together with the broader literature on mothering and fathering, the present findings suggest that although mothering and fathering appear to have similar effects on the main effect level, fathers may exert more systematic effects on adolescents, whereas the effects of maternal differential treatment are more context-dependent. Certainly, more exploration of fathers' differential treatment is needed before strong conclusions about differences between mothers' and fathers' differential treatment for adolescent externalizing behaviors are drawn.

The influence of parental differential treatment, both maternal and paternal, varied based on birth order. Older siblings were more sensitive to parental differential treatment overall, from both mothers and fathers. This is consistent with prior literature showing that chronologically older adolescents (e.g., in terms of age) are more sensitive to parental differential treatment (McHale, Updegraff, Jackson-Newsom, Tucker, & Crouter, 2000; Shanahan et al., 2008), and thus younger siblings, who may still be in preadolescence, may be less sensitive to parental differential treatment. This could explain our finding that, for older siblings' reports of paternal differential treatment, those who were further apart in age reported more externalizing behaviors. Importantly, McHale and colleagues (2000) found that depending on developmental period, first versus second-born siblings experienced parental differential treatment in unique ways: during childhood first-born older siblings reported more favored treatment, but during adolescence second-born siblings tended to experience more favored treatment. It may be the shift from being the favored to the disfavored when experiencing parental differential treatment that links adolescent parental

differential treatment for older siblings with externalizing behaviors. Examining the relative favoritism associated with differential treatment was out of the scope the current study. However, future work should continue to explore both absolute and relative scores of parental differential treatment on externalizing behaviors when investigating birth order effects longitudinally across childhood and adolescence, to examine developmental shifts and their effect on adjustment.

Sibling age difference.—A strength of the current study is the inclusion of sibling age difference as a context for parental differential treatment, a less commonly considered moderator in the literature. Sibling age difference was particularly salient for the associations between older siblings' reports of paternal differential treatment and externalizing behavior, and for older siblings' reports of maternal differential treatment and externalizing behavior when also considering adolescent self-esteem. Previous literature has reported that when siblings were more similar in age, social comparisons like parental differential treatment had more prominent negative effects (Noller, Feeney, Sheehan, Darlington, & Rogers, 2008). Further, researchers have considered that parents use sibling age differences to justify differential treatment through rules and chores (Buist et al., 2013). Thus, when siblings are closer in age, and parents cannot defer to age or developmental appropriateness for differential divvying out of rules and chores, it may be less clear why the differential treatment is occurring as opposed to differential treatment as a necessary function of age (e.g., siblings in clearly different developmental domains are expected to have appropriate chores that match their age). Some of our findings supported this literature: particularly for the association of maternal differential treatment and externalizing behavior among older adolescents, and only if they had low self-esteem. However, for paternal differential treatment, we found that more paternal differential treatment was associated with more externalizing behaviors among older siblings with a wider age gap (contrary to hypotheses). A larger age gap between siblings is associated with decreased negativity in the relationship (Buhrmester & Furman, 1990), and is also associated with less modeling and sibling similarities (Whiteman, Jensen, & Maggs, 2014). Notably, as siblings get older, and transition through adolescence, they are likely to gain greater autonomy, thus with a larger age gap relative to their sibling, they may be treated vastly differently from their younger sibling, perhaps particularly by fathers. This autonomy or responsibility may give older siblings more opportunities to engage in externalizing behaviors. More research is necessary to better understand how adolescents perceive parental differential treatment when they are closer or further apart in age from their sibling, particularly with respect to the effects of differential treatment from fathers, if this effect is replicated.

Self-esteem.—Erikson (1968) conceptualized self-esteem as being crucial for identity development, particularly during adolescence. Our findings suggest that self-esteem seems to be a particularly salient context in which comparisons in the family, like parental differential treatment, are associated with adolescents' maladjustment. Our findings regarding self-esteem were somewhat surprising. Self-esteem did not exert any main effects on externalizing behavior in the conditional models, although the zero-order correlations were negative and significant, as expected, for both older and younger siblings. Instead, we found that self-esteem was a key moderator of the effect of maternal and paternal differential

treatment for externalizing behavior in older siblings. For older siblings who were the same age as their younger counterpart, increased levels of maternal differential treatment predicted greater residualized gains in externalizing behaviors when self-esteem was low, as expected. This direction of effects was also found for siblings with low self-esteem and who were about a year older than their co-siblings in the sensitivity analyses excluding twins, and at moderately low levels of self-esteem for siblings who were about a year older than their co-siblings in the main analysis. These findings were in line with literature that suggests adolescents with low self-esteem are more likely to report absolute levels of differential treatment compared to his/her co-sibling as well as exhibit increased negative emotionality and delinquency. Experiencing differential treatment and having low self-esteem thus acted as a “double-dose” of risk for externalizing behavior across adolescence.

However, for older siblings who were at least 3 years older than their younger counterpart, increased levels of maternal differential treatment predicted greater residualized gains in externalizing behaviors for youth with average and high levels of self-esteem, however, at extremely low (but not moderately low) levels of self-esteem, maternal differential treatment predicted reductions in externalizing behaviors over time. This effect was mirrored for fathers – for all older siblings, not just those more than three years older than their co-sibling: older siblings with higher levels of paternal differential treatment showed decreases in externalizing behaviors if they had very low self-esteem but increases in externalizing behaviors if they had very high self-esteem. One speculative explanation of these findings is that parents who see that their older child has low self-esteem indeed treats that child differently- in such a way as to help the child develop higher self-esteem. This increased, likely positive attention from mothers (for some adolescents) and especially fathers, might lead the older child to act out less and become better-adjusted as they progress through adolescence. Parents may not provide this sort of attention to older children who have higher self-esteem. On the other end of the self-esteem spectrum, an alternative, child-driven explanation may be derived from sibling differentiation. Siblings conduct social comparisons within the family to evaluate themselves, and then adjust their behavior accordingly to either match or differentiate themselves from their sibling (Whiteman, Jensen, & Maggs, 2014), and this may be particularly true of siblings who have high self-esteem. For example, an older sibling high in self-esteem may seek differentiation and differential treatment from his/her sibling to further distinguish him/herself. In accordance with social norms of older adolescents, this may entail engaging in more externalizing-type behaviors: for example, instigating conflict in the home or initiating substance use, particularly for youth high in self-esteem who may have less fear of consequences and a stronger sense of entitlement to act out.

As a whole, these findings suggest that self-esteem is not necessarily “good” or “bad” but is related to how adolescents act in response to parenting, or parents act in response to their adolescents, in a complex manner. Our speculative explanations point to likely bidirectional associations of differential treatment and externalizing behaviors over time, with both child- and parent-driven effects hypothesized. Further, these observations lead to the possibility that parental differential treatment may moderate the effect of self-esteem on externalizing, the opposite direction from which we hypothesized. Future research is needed to better

disentangle the clearly complex interplay of differential treatment, self-esteem, and externalizing behavior across adolescence.

Sibling relationship quality.—It was surprising that sibling relationship quality was not a moderator in the main analyses. There were differences in the effects of parental differential treatment across sibling relationship quality groups only when twins were excluded from analyses, and still few. Specifically, there were only significant findings for the *primarily positive* sibling relationship quality groups for older siblings in the paternal differential treatment model, indicating that paternal differential treatment was associated with increased externalizing behaviors only among siblings who were at least three years older than their co-sibling and had high self-esteem. Thus, our findings suggest that the older sibling who seemingly had protective factors, may engage in the most sibling differentiation via age appropriate externalizing behaviors. In this case, the combination of high self-esteem and a *primarily positive* sibling relationship in combination with differentiating treatment by fathers (which could include increased freedom and responsibility relative to the younger co-sibling) may provide a sense of security that allows these older siblings to engage in adolescent-typical externalizing-type behaviors. Recall that our sample is not one with elevated externalizing behaviors and heightened externalizing behaviors at Wave 2 were further attenuated by attrition. However, this explanation is quite speculative, and we offer it as a hypothesis to be tested in future research.

As noted above, this interaction differs from that found for the full sample in that there was no protective effect of paternal differential treatment for older adolescents with lower self-esteem, potentially suggesting that that protective effect in the full sample is driven by siblings who are not in *primarily positive* relationships. If the hypothesis that parents treat older siblings with low self-esteem differently but in a way consistent with the goal of increasing self-esteem, it may be that fathers do not feel the need to do so when the older sibling is already in a *primarily positive* sibling relationship. However, that the interaction was observed only in older siblings in positive sibling relationships is surprising and contradicts our hypotheses with regard to sibling relationship quality: the literature suggests that parental differential treatment is associated with poorer quality sibling relationships. To our knowledge, no other studies have examined sibling relationship quality as a moderator of parental differential treatment – externalizing associations, and so these findings must be replicated and explored further before weight is given to these thoughts.

Parental Differential Treatment and Adolescent Adjustment

We found main effects in the zero order correlations of absolute levels of perceived differential treatment by both mothers and fathers with externalizing behaviors both concurrently and longitudinally, corroborating findings in the literature and Hypothesis 1. However, it is important to keep in mind that parental differential treatment is a specific parenting practice that fits within the context of the larger family unit. In the context of family systems theory, adolescents' perceptions of differential treatment are likely to affect broader family dynamics and relationships. For example, parental differential treatment has been associated with less warm and more conflictual parent-child relationships (Whiteman, Jensen, & McHale, 2017). Further, there is evidence that adolescents' perceptions of

favoritism, another important aspect of differential treatment (that was out of the scope of the current study to explore) was related to warmer and less conflictual parent-child relationships (Jensen & McHale, 2017). Understanding how various individual and broader family characteristics (beyond the sibling relationship) impact adolescents' perceptions of parental differential treatment, contribute to a fuller picture of the association between parental differential treatment and externalizing behaviors across adolescence.

Limitations

Despite the studies many strengths, there are important limitations that must be considered when interpreting findings. First, previous literature on parental differential treatment has established that youth's perception of fairness is an important consideration in associations, such that, when parental differential treatment is perceived as fair, associations with negative outcomes are attenuated (Kowal et al., 2002). Measures of perceived fairness were not assessed in the current sample. Future work would benefit from replicating our findings while controlling for perceived fairness of differential treatment.

There were several sample-related limitations. The sample was not diverse in terms of race/ethnicity (i.e., consisted of a majority white participants) and may not generalize to other populations, future work should replicate these findings utilizing diverse samples. Attrition was related to higher Wave 1 externalizing behaviors, which further limits the generalizability of the current findings to behaviorally normative samples without elevated levels of externalizing behaviors. Further, the data was gathered over a decade ago, thus, there is the possibility of cohort effects that may not generalize to modern families. For example, the proliferation of media use by adolescents may alter their relationships (e.g., communication or a greater emphasis on peer relationships given increased access to communication via texting or social media) with family members. Future research should replicate these findings utilizing a modern sample. Additionally, the study was limited to two siblings per family, making the critical assumption that the sibling participating in the study is the one to which youth are making comparisons (e.g., it may be that the influential sibling with whom the participant makes comparisons with is another sibling, and not the sibling included in the study). Future research should strive to consider how parental differential treatment operates in a family system with more than two siblings (Meunier et al., 2013). The current study is also limited to siblings in same-gender pairs, which may bias estimates. Previous literature establishes that comparisons occur more frequently in those who are similar (Loeser et al., 2016; Wheeler et al., 1969), thus same-gender siblings may experience comparison and parental differential treatment more frequently than mixed-gender sibling comparisons (McHale et al., 2000). Future research must consider these associations in mixed-gender sibling constellations as well as replicating our work in same-gender siblings.

There were also some data- and model-related limitations. One of the measures (parent report on the Behavior Events Inventory) comprising the externalizing composites had poor psychometric properties, likely adding noise to the overall composite. We believe, as have others using this particular score, that combining across raters and measures attenuate the specific measurement issues from any given measure, and thus opted to use this composite externalizing score as it has been deemed to be the best measure available in the current

study (Reiss et al., 2000). Further, we discuss the association of parental differential treatment with child behaviors directionally, in line with extant theory and previous work, however, it may be that adolescents with externalizing behaviors or lower self-esteem evoke differential treatment from parents. Further, adolescents with low self-esteem may be likely to make social comparisons, and experience parental differential treatment. The present study was unable to test for directionality in these associations, a limitation that should be considered and tested in future research. It is likely the association of differential treatment and externalizing is transactional, such that earlier externalizing behaviors may contribute to parental differential treatment, which in turn may contribute to subsequent externalizing behaviors in some youth. Finally, we chose to focus on self-esteem and sibling relationship quality as moderators due to previous findings and theoretical rationale, however, it is possible that the magnitude of parental differential treatment may confer risk for externalizing behaviors through self-esteem or sibling relationship quality. Particularly given the lack of findings for sibling relationship quality, future work would benefit from examining these constructs as mediators of parental differential treatment – externalizing associations.

Conclusion

This study advances our understanding of both individual characteristics and sibling characteristics when exploring maternal and paternal differential treatment, in both older and younger siblings, on externalizing behaviors across adolescence. In general, our findings suggest that there are complex contexts in which parental differential treatment can have positive or negative effects on adolescent adjustment, and that adolescents' self-esteem is a particularly salient context for understanding the effects of differential treatment on externalizing behaviors. Older siblings (relative to their younger sibling in the study) were impacted by parental differential treatment, and maternal and paternal differential treatment were uniquely meaningful in different contexts. Specifically, we found that higher levels of maternal differential treatment predicted greater residualized gains in externalizing behavior among older siblings who were a) the same age as their sibling or near-to and had low self-esteem or b) three years older than their sibling and had higher self-esteem. However, higher levels of paternal differential treatment predicted greater residual gains in externalizing for older siblings with wider age ranges (regardless of self-esteem), and among older siblings with high levels of self-esteem (regardless of age difference). Surprisingly, maternal differential treatment was protective in one case: for adolescents with low self-esteem who were at least three years older than their siblings, maternal differential treatment predicted reduced externalizing behaviors. On the other hand, paternal differential treatment was protective for more youth than maternal differential treatment: older siblings with low self-esteem who experienced paternal differential treatment exhibited decreased externalizing behaviors across adolescence, regardless of age difference. It is important to keep in mind that this study is novel in the combination of contextual influences investigated, and so these specific effects must be replicated in future research. Nonetheless, these findings challenge some of the current notions of the literature on parental differential treatment by showing that absolute levels of parental differential treatment can reduce levels of externalizing behaviors across adolescence in some contexts. Future research aiming to understand the

information that adolescents draw about themselves and their role in the family from their perceived differential treatment is critical to fully understand these findings.

Our findings were often surprising, and our explanations somewhat speculative. Instead of presenting definitive explanations of our findings, our discussion is intended to provide testable hypotheses for future research. Our findings also suggest that self-esteem may provide a window into how adolescents interpret differential treatment, and therefore adolescent characteristics, like self-esteem, may be critical contexts necessary for understanding how adolescents interpret and respond to parental differential treatment. Undoubtedly, the present findings underscore the importance of context, including individual and family characteristics, for understanding when parental differential treatment is linked to increased or decreased externalizing behavior across adolescence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Conceptual model. Parental differential treatment is associated with externalizing behaviors, even after accounting for earlier externalizing behaviors. This association is moderated by adolescent self-esteem and sibling age difference and relationship quality. This conceptual model may differ for maternal differential treatment for older siblings, paternal differential treatment for older siblings, maternal differential treatment for younger siblings, and paternal differential treatment for younger siblings. Sibling relationship quality is conceptualized as a multiple-group variable, including: *high affect* marked by high closeness and high conflict, *primarily positive* marked by high closeness and low conflict, *primarily negative* marked by low closeness and high conflict, and *low affect* low closeness and conflict.

Figure 2.

The three-way interaction between maternal differential treatment, sibling age difference, and older sibling self-esteem were probed using Johnson-Neyman regions of significance at three values of sibling age difference: the left panel depicts the two-way interaction of self-esteem and maternal differential treatment on externalizing behaviors when sibling age difference was 0 years (192 twin pairs, and 16 pairs of genetically unrelated step-siblings). The center panel depicts the two-way interaction of self-esteem and maternal differential treatment on externalizing behaviors when sibling age difference was 1 year (110 pairs of siblings). The right panel depicts the two-way interaction of self-esteem and maternal differential treatment on externalizing behaviors when sibling age difference was 3 years (200 sibling pairs had an age difference of 3 or higher). In each plot, the y-axis represents the effect of maternal differential treatment on externalizing behavior (e.g., the model-based beta-weight). The x-axis is the level of self-esteem (mean centered). Johnson-Neyman regions of significance allow us to examine which levels of the moderator is a significant focal association. Darker shaded areas indicate that the effect of maternal differential treatment on externalizing behavior (noted by the beta-weight on the y-axis) is significantly different from zero. Lighter shaded areas indicate that the effect of maternal PDT on externalizing behavior is not significantly different from zero. Vertical dashed lines depict at what level of self-esteem the effect of maternal PDT on externalizing switches from significantly different from zero to not significantly different from zero (or vice versa). The thick black bar represents the range of observed data.

Figure 3.

The two-way interaction for older siblings between paternal differential treatment and sibling age difference were probed using Johnson-Neyman regions of significance. In the plot, the y-axis represents the effect of paternal differential treatment on wave 2 externalizing behaviors (e.g., the model-based beta-weight). The x-axis is the level of sibling age difference (mean centered). The darker shaded area indicated that the effect of paternal differential treatment on externalizing behavior is significantly different from zero. The vertical dashed lines depict at what level of sibling age difference the effect of paternal differential treatment on externalizing switches from not significantly different from zero to significantly different from zero, at .45 years, centered. Because the average age difference is 1.61, the darker (significant) region includes siblings that were at least 1.16 years older than their younger siblings; including 508 siblings, or 72% of the sample. Lighter shaded areas indicate that the effect of paternal differential treatment on externalizing behavior is not significantly different from zero. The thick black bar represents the range of observed data.

Figure 4.

The two-way interaction for older siblings between sibling age difference and adolescent self-esteem were probed using Johnson-Neyman regions of significance. In the plot, the y-axis represents the effect of adolescent self-esteem on wave 2 externalizing behaviors (e.g., the model-based beta-weight). The x-axis is the level of sibling age difference (mean centered). The darker shaded area indicated that the effect of self-esteem on externalizing behavior is significantly different from zero. The vertical dashed lines depict at what level of sibling age difference the effect of self-esteem on externalizing switches from not significantly different from zero to significantly different from zero, at .60 years, centered. Because the average age difference is 1, the darker (significant) region includes siblings that were at least 1 year older than their younger siblings; including 500 siblings, or 72% of the sample. Lighter shaded areas indicate that the effect of self-esteem on externalizing behavior is not significantly different from zero. The thick black bar represents the range of observed data.

Figure 5.

The two-way interaction for older siblings between paternal differential treatment and adolescent self-esteem were probed using Johnson-Neyman regions of significance. In the plot, the y-axis represents the effect of paternal differential treatment on wave 2 externalizing behaviors (e.g., the model-based beta-weight). The x-axis is the level of adolescent self-esteem (mean centered). The darker shaded area indicated that the effect of paternal differential treatment is significantly different from zero. The vertical dashed line depict at what level of adolescent self-esteem the effect of paternal differential treatment on externalizing behaviors switches from not significantly different from zero to significantly different from zero, at the levels of adolescent self-esteem -5.48 and 2.5 , centered. The darker (significant) regions includes adolescents with higher self-esteem; including 485 siblings, or 69% of the sample, as well as adolescents with lower self-esteem; including 176 sibling or 25% of the sample. Lighter shaded areas indicate that the effect of paternal differential treatment on externalizing behaviors is not significant from zero. The thick black bar represents the range of observe data.

Table 1.

Demographic characteristics for the NEAD project at waves 1 and 2.

	Time 1	Time 2
Adolescent Characteristics		
Mean age for older sibling	13.5 (2.0)	16.2 (2.1)
Mean age for younger sibling	12.1 (1.3)	14.7 (1.9)
Mean age difference	1.61 (1.29)	1.47 (1.34)
% male sibling pairs	51.6%	50.6%
Parent Characteristics		
Mean age for Mother	38.1 (5.2)	40.5 (4.8)
Mean age for Father	41.0 (6.5)	43.0 (6.1)
Mean years education: Mother	13.8 (2.3)	13.9 (2.4)
Mean years education: Father	13.9 (2.7)	14.0 (2.6)
Median family income	\$25,000-\$35,000	\$25,000-\$35,000

Note. Means are presented with standard deviations in parentheses, except for the % of male sibling pairs and median family income. Median family income was measured as a range, starting at 1 = less than 5,000 to 8 = 50,000 or more. Parent education was measured as the highest grade of school they completed, ranging from 6–20, such that higher scores indicate more education.

Table 2.

Descriptive Statistics of Key Study Variables

Variable	Older Sibling		Younger Sibling	
	N	M (SD)	N	M (SD)
Wave 1 Externalizing	668	−0.04 (2.82)	678	−0.21 (2.62)
Wave 1 Internalizing	671	0.02 (2.87)	378	−0.23 (2.64)
Maternal differential treatment	707	1.44 (1.58)	707	1.47 (1.66)
Paternal differential treatment	702	1.17 (1.69)	702	1.08 (1.50)
Self-Esteem	643	15.64 (3.09)	661	15.23 (3.26)
Wave 2 Externalizing	379	−0.02 (2.75)	365	0.01 (2.79)
Sibling Relationship Quality Group				
Low	219		220	
Negative	205		212	
Positive	203		196	
High	42		40	
Sibling Type				
Unrelated Siblings	130			
Half-Siblings	109			
Full Siblings/DZ Twins	376			
MZ Twins	93			

Table 3.

Correlations among study variables

	Age	Gender	Sibling Type	W1 Externalizing	W1 Internalizing	Maternal PDT	Paternal PDT	Self-Esteem	Age Difference	W2 Externalizing
Age	--	.02 708	-.16* 708	-.04 668	-.01 671	.12* 707	.09* 707	-.09* 659	.29* 708	.08 379
Gender	.03 708	--	.06 708	-.17* 668	.18* 671	-.01 707	.02 707	-.05 659	-.02 708	-.17* 379
Sibling Type	.05* 708	.06 708	--	-.09* 668	-.12* 671	-.26* 707	-.27* 707	.10* 659	-.35* 708	-.13* 379
W1 Externalizing	-.05 678	-.17* 678	-.05 678	--	.42* 664	.22* 667	.21* 667	-.21* 620	.19* 668	.48* 370
W1 Internalizing	.01 678	.07 678	-.17* 678	.40* 676	--	.26* 670	.24* 670	-.42* 623	.13* 671	.19* 370
Maternal PDT	.06 707	-.03 707	-.27* 707	.34* 678	.25* 678	--	.55* 707	-.05 658	.19* 707	.21* 378
Paternal PDT	.00 702	.00 702	-.22* 702	.30* 672	.21* 672	.54* 701	--	-.09* 653	.20* 707	.16* 378
Self-Esteem	-.13* 642	-.05 642	-.02 642	-.15* 616	-.30* 616	-.09* 641	-.11* 637	--	.09 590	-.24* 287
Age Difference	-.30* 708	-.02 708	-.35* 708	.12* 678	.10* 678	.15* 707	.16* 702	.33* 529	--	.16* 379
W2 Externalizing	-.03 379	-.17* 379	-.13* 379	.91* 379	.44* 378	.41* 379	.30* 377	-.20* 257	.16* 379	--

Note. Sibling type = the type of sibling relationship based on genetic relatedness (MZ twins, DZ twins/full siblings, half siblings, genetically unrelated step-siblings). Correlations for older siblings are presented on top of the diagonal, younger on the bottom. Sample sizes for each correlation are presented in italics beneath the correlation coefficient. W1 = Wave 1; W2 = Wave 2. PDT = parental differential treatment.

* $p < .05$.

Table 4.

Regression results for younger siblings' Wave 2 externalizing behaviors.

	Maternal Differential Treatment (N = 628)		Paternal Differential Treatment (N = 628)	
	β	(SE)	β	(SE)
Sibling Age Difference	−0.042	(0.111)	−0.055	(0.111)
Youth Self-Esteem	−0.057	(0.056)	−0.045	(0.055)
PDT	0.149	(0.106)	0.152	(0.099)
Age Diff. x PDT	−0.037	(0.074)	−0.107	(0.066)
Age Diff. x Self-Esteem	0.024	(0.041)	0.028	(0.035)
PDT x Self-Esteem	−0.046	(0.037)	−0.045	(0.041)
Age Diff. x PDT x Self-Esteem	−0.044	(0.031)	−0.043	(0.028)
<u>Covariates</u>				
Age	−0.199 ^{**}	(0.065)	−0.201 ^{**}	(0.064)
Gender	−0.090	(0.258)	−0.044	(0.252)
Sibling Type	−0.220	(0.180)	−0.187	(0.198)
Internalizing (W1)	−0.063	(0.065)	−0.054	(0.064)
Externalizing (W1)	0.628 ^{***}	(0.069)	0.624 ^{***}	(0.070)
R ²	0.41		0.31	

Note. Unstandardized beta-weights presented with corresponding standard errors (SE) in parentheses. W1 = Wave 1; Age Diff = age difference. PDT = parental differential treatment. x signifies interaction terms. Sibling type = the type of sibling relationship based on genetic relatedness (MZ twins, DZ twins/full siblings, half siblings, or genetically unrelated stepsiblings). Because there was no evidence of differences across sibling relationship quality type, results from the constrained model (reflecting all sibling relationship quality types) are presented.

⁺ $p < .10$;

^{*} $p < .05$;

^{**} $p < .01$;

^{***} $p < .001$.

Table 5.

Regression results for older siblings' Wave 2 externalizing behaviors.

	Maternal Differential Treatment (N = 627)		Paternal Differential Treatment (N = 627)	
	β	(SE)	β	(SE)
Sibling Age Difference	0.093	(0.106)	0.026	(0.109)
Youth Self-Esteem	0.056	(0.049)	0.074	(0.046)
PDT	0.241 [*]	(0.096)	0.111	(0.090)
Age Diff. x PDT	0.125 [*]	(0.063)	0.156 [*]	(0.066)
Age Diff. x Self-Esteem	0.068 [*]	(0.031)	0.064 [*]	(0.032)
PDT x Self-Esteem	0.037	(0.037)	0.073 [*]	(0.032)
Age Diff. x PDT x Self-Esteem	0.076 ^{**}	(0.024)	0.038	(0.028)
<u>Covariates</u>				
Age	0.090	(0.061)	0.098	(0.063)
Gender	-0.231	(0.241)	-0.302	(0.250)
Sibling Type	-0.103	(0.163)	-0.118	(0.162)
Internalizing (W1)	0.077	(0.057)	0.091 ⁺	(0.050)
Externalizing (W1)	0.394 ^{***}	(0.062)	0.403 ^{***}	(0.067)
R ²	0.32		0.31	

Note. Unstandardized beta-weights presented with corresponding standard errors (SE) in parentheses. W1 = Wave 1. Age Diff = age difference. PDT = parental differential treatment. x signifies interactions. Sibling type = the type of sibling relationship based on genetic relatedness (MZ twins, DZ twins/full siblings, half siblings, or genetically unrelated stepsiblings). Because there was no evidence of differences across sibling relationship quality type, results from the constrained model (reflecting all sibling relationship quality types) are presented.

⁺ $p < .10$;

^{*} $p < .05$;

^{**} $p < .01$;

^{***} $p < .001$.