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Parents' Differential Treatment and Adolescents' Delinquent Behaviors: Direct and Indirect Effects of Difference Score- and Perception-Based Measures

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Abstract

A body of work reveals that parents' differential treatment (PDT) is linked to adolescents' adjustment. To date, researchers have generally used one of two different methods of assessing PDT--difference scores or perception-based measures--yet, have largely failed to consider whether these measures index similar or distinct aspects of PDT. The current study examined these distinctions and the conceptual and empirical links between these two approaches by assessing the direct and indirect associations (difference scores via perceptions) of PDT and adolescents' delinquency and substance use. Furthermore, we explored whether these within-family differences were moderated by between-family differences in levels of parenting. Data were analyzed from 282 adolescent sibling pairs (N = 564; older siblings, *M* = 17.17 years old, *SD* = .94; younger siblings, *M* = 14.52 years old, *SD* = 1.27). Results from structural equation models revealed that for youth in affectively mild (low in conflict and intimacy) and intense families (high in conflict and intimacy), difference scores and perceptions were uniquely and directly linked to adjustment, such that less favored treatment and the perception of less favored treatment was linked to greater participation in delinquent activities and substance use. Additionally, in several instances difference scores for youth in affectively mild and intense families were indirectly linked to delinquency and substance use through the perception of PDT. Discussion focuses on the distinctions and links between these two approaches within the Social Comparison Theory framework and the greater context of family levels of conflict and intimacy.

Keywords

adolescent substance use; family process; parent-adolescent relations; parents' differential treatment; sibling relations

Since the 1980s, scholars have highlighted links between parents' differential treatment (PDT) of siblings and offspring development and behavior (e.g., Daniels & Plomin, 1985; Plomin & Daniels, 1987). Differential treatment has been linked with adolescents' adjustment (Shebloski, Conger, & Widaman, 2005), family relationships (e.g., Kowal & Kramer, 1997; Shanahan, McHale, Crouter, & Osgood, 2008), and delinquent and risky behaviors (e.g., Richmond, Stocker, & Rienks, 2005; Scholte, Engels, de Kemp, Harakeh, & Overbeek, 2007). Researchers have typically measured PDT via one of two broad categories, by contrasting separate reports of how each sibling is treated (hereafter referred to as difference scores) or by asking an individual how they are treated in reference to a sibling (hereafter referred to as perceptions). Typically, both of these approaches have been considered conceptually equivalent measures of differential treatment or differential parenting. Discussion in the literature, however, regarding their possible distinctions has been thin (for exceptions see Coldwell, Pike, & Dunn, 2008; Dunn, Stocker, & Plomin, 1990; Meunier, Roskam et al., 2012; Quittner & Opipari, 1994). Therefore, the first goal of this study was to examine possible distinctions between these two approaches and address their direct links to adolescents' substance use and delinquent behavior. The second goal of this study was to integrate difference scores and perceptions into a more comprehensive framework by assessing the indirect link of PDT measured via difference scores on adolescents' delinquency and substance use via adolescents' perceptions of differential treatment. Lastly, because differential treatment occurs within the overall larger family context of ambient parenting (e.g., Meunier et al., 2011; Tamrouti-Makkink, Dubas, Gerris, & van Aken, 2004), we also explored whether the overall levels of family conflict and intimacy moderated the links between PDT and adolescents' outcomes.

Practical and Empirical Distinctions between Difference Scores and Perceptions

Difference score and perception-based measures of PDT differ in terms of collection and creation. Perception-based measures address PDT explicitly by assessing youths' perceptions of how they are treated in comparison to a brother or sister. For example, Richmond et al. (2005) asked adolescents to report if their parents treated them better than their sibling, whether treatment was equal, or if their sibling received better treatment. In contrast, difference score measures address PDT implicitly by using reports from each individual sibling or from a separate reporter (e.g., a parent, child, or researcher) on how each sibling is treated by the parents without regard to the treatment another sibling may receive. The separate reports are then used to create a numerical description of the discrepant treatment. For example, Shanahan, McHale, Crouter, and Osgood (2008) asked older and younger siblings to individually rate their relationship quality with their mother and father. The authors then subtracted the younger siblings' reports from the older siblings' and vice versa. The result was each sibling having differential treatment difference scores with a scale including negative values (reflecting less favored treatment), zero (equal treatment), and positive values (reflecting favored treatment).

Given practical differences in assessment, it is unlikely that the correlation between perceptions and differences scores would be overly large. But if both approaches do indeed

assess the same overall construct, as has been assumed in the literature, then it is reasonable to expect that they would be consistently and highly correlated. To date, four studies have included both difference score and perception-based measures of PDT (Coldwell et al., 2008; Dunn et al., 1990; Meunier, Roskam et al., 2012; Quittner & Opipari, 1994). Data from these studies do not support the assumption that both approaches measure the same overall construct, but rather that these measures are distinct. For example, Dunn and colleagues (1990) found that a greater number of younger siblings reported favored treatment than was indicated by differences scores. Bivariate correlations among perceptions of differential treatment and PDT measured via difference scores as reported in the other three studies (Coldwell et al., 2008; Meunier, Roskam et al., 2012; Quittner & Opipari, 1994) were generally small to moderate in size (*r*'s ranged in absolute values from .01 to .46, $M = .16$, $SD = .12$). It is important to note, however, that the slight majority (55%) of the correlations reported by Coldwell et al. (2008), Meunier, Roskam et al. (2012) and Quittner and Opipari (1994) were statistically significant or at the trend level.

Theoretical Distinctions and Potential Links between Difference Scores and Perceptions

Scholars employing difference scores as well as those using perceptions often cite social comparison theory (SCT) as the mechanistic link between PDT and youth adjustment. The general premise of SCT (Festinger, 1954; Suls, Martin, & Wheeler, 2002) is that individuals' self-concept is enhanced by downward comparisons (i.e., comparisons made with those less well off) and negatively impacted by upward comparisons (i.e., comparisons made with those better off; e.g., Mendes, Blascovich, Major, & Seery, 2001; Wheeler & Miyake, 1992). Applied to PDT, SCT implies that favored offspring make downward comparisons and as a result fare better; whereas less favored offspring make upward comparisons and thus fare poorly. Evidence regarding favored treatment (and by extension downward comparisons) is mixed. Some studies indicate that favored offspring fare better (e.g., Scholte et al., 2007; Shanahan et al., 2008; Shebloski et al., 2005), whereas others suggest that equal treatment between offspring may be optimal (e.g., Jensen, Whiteman, Fingerman, & Birditt, 2013; Kowal, Krull, & Kramer, 2004; Meunier, Bisceglia, & Jenkins, 2012). Despite mixed evidence for downward comparisons, studies using difference scores as well as perceptions are consistent that less favored treatment by parents (and by extension upward comparisons) is linked to poorer adjustment (e.g., Richmond et al., 2005; Scholte et al., 2007; Tamrouti-Makkink et al., 2004).

The common theoretical assumptions between difference score and perception-based research and their empirical distinctions (Coldwell et al., 2008; Meunier, Roskam et al., 2012; Quittner & Opipari, 1994) creates a conundrum. On one hand, differential treatment scholars have often written about difference scores and perceptions as if they assess the same construct and studies using both approaches have consistently found less favored treatment to be associated with maladjustment (e.g., Richmond et al., 2005; Scholte et al., 2007; Tamrouti-Makkink et al., 2004). On the other hand, empirical research suggests only low to moderate correlations between the two measurement types (Coldwell et al., 2008; Meunier, Roskam et al., 2012; Quittner & Opipari, 1994). Given the prominence of social

comparison as the linking mechanism between PDT and youth adjustment, SCT is an appropriate starting point for addressing this conundrum.

An important principle of SCT is that comparisons can be either subconscious or conscious, and both impact well-being (Stapel & Suls, 2004; Suls et al., 2002). The procedural ways in which difference score and perception-based measures of PDT are assessed may differentially emphasize either subconscious or conscious comparisons. Specifically, because difference score approaches are based on multiple reporters (i.e., two siblings) or reporters other than the siblings, they may measure some level of comparisons unaware to the individual sibling. Perceptions, in contrast, explicitly ask an individual how they are treated in reference to a sibling. Thus, this approach may emphasize conscious comparisons. Certainly, however, difference scores likely assess conscious comparisons as well, and perceptions may capture some form of subconscious comparisons. If a theoretical distinction exists, it is likely in which type of comparison is emphasized by the approach rather than each approach solely measuring one type of comparison over the other.

Social comparison theory further suggests a conceptual link between subconscious and conscious comparisons (Stapel & Suls, 2004; Suls et al., 2002). The daily patterns of family interaction provide constant opportunity for siblings to compare themselves to one another based on parental treatment and there is some evidence suggesting that because these opportunities are so abundant that most social comparisons are actually subconscious (Mussweiler, Ruter, & Epstude, 2004). Greater amounts of subconscious comparisons, however, may also lead to more frequent conscious comparison (Mussweiler et al., 2004). Given that upward conscious comparisons should be linked to youth adjustment and subconscious comparisons contribute to conscious comparisons, it is likely that in addition to being directly linked to youth adjustment subconscious comparisons should be indirectly linked to youth adjustment through conscious comparisons. If the assumption is made that difference scores place more emphasis on subconscious comparisons, and perceptions on conscious comparisons, then it would follow that difference score measures of PDT, in addition to being directly linked, should be indirectly linked to youth adjustment through perceptions.

The Role of Ambient Parenting

It is important to consider the implications of less favored treatment within the context of ambient parenting (Tamrouti-Makkink et al., 2004). Ambient parenting refers to the overall level of parenting (i.e., low or high warmth) as opposed to specific treatment youth receive relative to siblings. For example, the role of differential intimacy may be very different in a family where the parents display high levels of intimacy with their children as compared to a family that shows very little intimacy. To our knowledge, only two studies have examined this notion, with mixed results. Meunier and colleagues (2011) found that less favored siblings displayed greater levels of externalizing behavior when parents showed overall higher levels of support. In contrast, Feinberg and Hetherington (2001) found that the link between differential treatment and antisocial behavior was amplified in families that were either low in intimacy or high in conflict. Neither of these studies, however, examined the intersection of multiple dimensions of ambient parenting. Akin to how the combination of

responsiveness and demandingness do more to inform on styles of parenting than either construct alone (e.g., Baumrind, 1971), the interaction of both intimacy and conflict may provide a better contextual picture regarding the role of ambient parenting. Thus, in the current study we examined direct and indirect links of PDT with youth outcomes as a moderated by family levels of intimacy and conflict.

Differential Treatment in Adolescence

Exploring the links between PDT, measured via both difference scores and perceptions, and delinquent behaviors, including substance use, may be particularly important among adolescent siblings. Alcohol and other substance use typically onsets and increases throughout adolescence (Johnston, O'Malley, Bachman, & Schulenberg, 2010). Although older adolescents are more likely to use any substance, early use may have particular negative emotional, physical, cognitive, and behavioral consequences (e.g., Mason & Spoth, 2012; Spoth, Greenberg, & Turrisi, 2009), thus it is important to understand potential covariates of substance use. Given past research linking PDT to delinquent behavior (Richmond et al., 2005; Scholte et al., 2007), it is possible that adolescents who are treated less favorably than a brother or sister recognize their disfavored status and act out behaviorally or engage in substance use as means to cope with such feelings. Consistent with a literature on child driven effects (e.g., Bell, 1968; Crouter & Booth, 2003; Kuczynski, 2003), however, it is important to note that youth who engage in more delinquent behavior and substance use may also evoke less favorable treatment from parents. Although bidirectional effects are likely, the results of a recent study (Lam, Solmeyer, & McHale, 2012) suggest that discrepant parental treatment during adolescence plays a consistent role in influencing adolescent adjustment. Consistent with the results of this study as well the tradition of the literature on focusing on a parent driven model, we based our models on the notion of PDT influencing adolescent behavior.

Present Study

This study examined the implications of and conceptual links between PDT indexed via difference scores and individual perceptions. Given that PDT, in particular less favored treatment, has been consistently linked to delinquent and externalizing behaviors (e.g., Scholte et al., 2007; Tamrouti-Makkink et al., 2004), adolescents' substance use (i.e., cigarettes, alcohol, and marijuana) and delinquency were examined as dependent variables. Based on theory and previous research the following were proposed: Hypothesis 1: Difference scores and perceptions of PDT would be directly associated with offspring outcomes such that less favored treatment would be associated with more delinquency and a greater likelihood of substance use; Hypothesis 2: Difference scores would be indirectly associated with substance use and delinquency through perceptions of PDT; and Hypothesis 3: Direct and indirect associations of PDT with youth delinquency and substance use would be moderated by the family level averages of parent-child conflict and parent-child intimacy. Because of the mixed findings of previous work on ambient levels of parenting (e.g., Feinberg & Hetherington, 2001; Meunier et al., 2011), however, we posited no formal hypotheses on the potential patterns of moderation.

Method

Participants

Participants included one parent and two adolescent-aged siblings from 326 families (978 participants). Although only one parent was interviewed, in cases where youth lived with both parents or had contact with a non-residential parent, participating youth reported on treatment from both parents. Analyses were limited to families where youth reported on treatment from both their mother and father, and the siblings were not twins (n = 564 adolescents from 282 families). On average, participating parents (87% mothers) were 44.95 years old (SD = 5.54) and had 14.60 years of education (SD = 2.11), older siblings were 17.17 years old (SD = .94), and younger siblings were 14.52 years old (SD = 1.27). Just over half of the families had only two children (54.6%). The sample included 146 same-sex sibling pairs (52%) and 136 mixed-sex pairs (48%). Seventy-seven percent of households included two married parents. Seventy-one percent identified themselves as White (not Hispanic), 23% as African American, 4% as Latino, 1% as Asian, and 1% as multi-ethnicity.

Procedure

To generate the sample, families with at least two adolescent offspring were identified from a purchased marketing list and mailed information regarding the study. Seven counties in a Midwestern U.S. state were targeted. Interested families replied via mail and were then contacted to establish criteria for participation. A total of 6,854 families were originally mailed letters of which 3,002 contained incorrect contact information. An additional 2,556 families never responded and were not contacted by the research team. In total 785 families were identified as eligible, of which 326 participated (a 42% response rate). Upon successful evaluation of selection criteria (two siblings residing in the home between the ages of 12 and 18), informed consent and assent was obtained in writing via mail from each family member. Telephone interviews were then conducted individually and privately with each participating member of the family. Research assistants trained in standardized interviewing procedures conducted the interviews which lasted approximately 40 minutes with each member. Following completion of the interviews each participant received an honorarium of $35 ($105 per family).

Measures

Demographic information—Parents reported on background information relating to the family, themselves, and each sibling. Information included ethnicity, household composition, parental marital status, age, gender, and education level of each member of the household.

Parent-offspring intimacy—Offspring independently responded to eight items from Blyth, Hill and Thiel's (1982) Intimacy Questionnaire regarding their intimacy with their mother and with their father. Items were rated on a 5-point scale, ranging from 1 (*not at all*) tot 5 (*very much*). Example items included, "How much do you go to your mother/father for advice or support?" And, "How important is she/he to you?" Items were averaged together separately for each parent with higher values reflecting greater intimacy. Responses indicated that older siblings had moderately high intimacy with both mothers (M = 3.58, SD

= .72) and fathers (*M* = 3.23, *SD* = .84), as did younger siblings (maternal *M* = 3.61, *SD* = .65; paternal *M* = 3.30, *SD* = .76). Cronbach's as ranged from .83 to .89.

Parent-offspring conflict—Offspring independently reported on their conflict with each parent using 12 items adapted from Smetana (1988). Items were rated on a 6-point scale, ranging from 1 (*not at all*) to 6 (*Several times a day*). Items assessed the frequency of parent-offspring conflict across 12 domains, including chores, homework/grades, activities with friends, saving and spending of money, and getting along with siblings. Items were averaged together for each parent and higher scores reflect more frequent conflict. Responses indicated that older siblings had relatively low levels of conflict with both mothers (*M* = 2.21, *SD* = .70) and fathers (*M* = 2.04, *SD* = .75), as did younger siblings (maternal *M* = 2.27, *SD* = .73; paternal *M* = 2.04, *SD* = .72). Cronbach's as ranged from .84 to .89.

Parents' differential treatment measured by difference score—Difference scores were created separately for maternal intimacy, maternal conflict, paternal intimacy, and paternal conflict. For differential intimacy difference scores were calculated for each offspring by subtracting their own value from that of their sibling. Thus, positive values reflected that the sibling received relatively less intimacy (i.e., less favored). Difference scores created for older siblings indicated that both mothers (*M* = .01, *SD* = .77) and fathers (*M* = .07, *SD* = .92) had roughly equal intimate relationships with both older and younger siblings. For differential conflict, differences scores were calculated by subtracting their sibling's value from their own so that positive values reflected having relatively more parental conflict (i.e., less favored). Difference scores created for older siblings indicated that mothers (*M* = −.02, *SD* = .94) and fathers (*M* = .00, *SD* = .92) also had relatively equal conflict with older and younger siblings.

Because the literature is mixed whether favored or equal treatment is related to better outcomes, but is consistent that less favored treatment is linked to poorer outcomes, scores were further recoded so that all negative values were zero and positive values were left unaltered. Recoding the difference scores in this manner also placed them on a similar metric as the perception variable. Thus, a score of zero reflected either favored or equal treatment and positive values reflected the degree to which the sibling was less favored.

Perceptions of maternal and paternal differential treatment—Using two items, offspring reported on their perception of maternal and paternal differential treatment (McHale, 2006). Items were rated on a 5-point scale, ranging from 0 (*never*) to 4 (*very often*). Items were worded, "My mother/father treats my sibling like her/his favorite more than she/he treats me that way." And, "My mother/father treats my sibling better than she/he treats me." Items were averaged together with zero reflecting equal or favored treatment and positive values reflecting less favored treatment. Reports indicated that both older and young siblings reported receiving slightly less favored treatment from both mothers (older sibling *M* = 1.97, *SD* = 1.06; younger sibling *M* = 1.87, *SD* = 1.04) and fathers (older sibling *M* = 1.83, *SD* = .98; younger sibling *M* = 1.78, *SD* = .99). Cronbach's a ranged from .89 to .93.

Substance use—Offspring reported on their substance use via three items measuring the use of cigarettes (Johnston, O'Malley, Bachman, & Schulenberg, 2006), alcohol (National Institute on Alcohol Abuse and Alcoholism Task Force on Recommended Alcohol Questions, 2003), and marijuana (Johnston et al., 2006). Alcohol use in the past year was measured on a 6-point scale ranging from 1 (*not at all*) to 6 (*several times a day*). Cigarette and marijuana use in the past year were measured on a 6-point scale ranging from 1 (*0 occasions*) to 6 (*20 occasions or more*). With the exception of alcohol use by older siblings, all other substance use variables were positively skewed and leptokurtic. Therefore, items were recoded to reflect whether the adolescent had used the substance in the last year or not. A sum variable was then calculated reflecting the number of substances used in the past year. The majority of adolescents had not used any substance in the past year (63.3%); fewer adolescents had used only one substance (20.7%), two substances (8.4%) or all three substances (7.5%) in the past year.

Delinquency—Offspring responded to 21 items assessing their participation in risky and delinquent behaviors (Dishion, Patterson, Stoolmiller, & Skinner, 1991; Eccles & Barber, 1990). Items were rated on a 4-point scale ranging from 0 (*never*) to 3 (*often*). Items asked how frequently the youth participated in a particular deviant behavior (e.g., skipped a day of school, been in trouble with police, cheated on school tests, or done something they knew was dangerous). Items were averaged together with higher scores reflecting more deviant behavior. Older (M = .51, SD = .38) and younger (M = .47, SD = .42) siblings reported low levels of delinquent behavior. Cronbach's as were .84 and .89 for older and younger siblings, respectively. Because adolescents' reports of delinquency were positively skewed, the delinquency variables were square-root transformed prior to analysis (M = .61, SD = .28).

Results

Analytic Strategy

To examine the conceptual links and distinctions between difference score- and perception-based measures of PDT, analyses were conducted within the structural equation modeling (SEM) framework using Mplus 6 (Muthén & Muthén, 2010). We used the cluster option in Mplus to account for the nested nature of the data which still allowed for the linking of within-family differences in parental treatment with one's relative position on the endogenous variables compared to the entire sample as moderated by between-family levels of ambient parenting (assessed via multi-group analyses based on family level intimacy and conflict).

The model (see Figure 1) included the perceptions of maternal treatment and paternal treatment, delinquency, and substance use as endogenous variables. Differential treatment from both mothers and fathers as measured by difference scores were included as exogenous variables. Perception variables were estimated as latent (based on two items each) and all others were observed/manifest. Substance use could have been considered either a count variable (i.e., the number of substances used in the past year) or an ordered categorical variable (0 substances; 1 substance; 2 substances; or 3 substances). The high frequency of

adolescents who had not used any substances (63.3%) would have required the use Zero-Inflated Poisson regression to assess substance use as a count variable. The examination of clustered data and the estimation of indirect effects, however, prohibited the use of the Zero-Inflated Poisson model. Because the inclusion of both siblings and the testing of the indirect associations were critical to the questions addressed in this study we elected to test substance use as an ordered categorical variable where the corresponding odds ratios refer to the odds of being in the next highest group.

To test Hypothesis 1, direct paths were estimated between maternal and paternal difference scores and each outcome variable (i.e., delinquency and substance use), as well as direct paths from each perception variable and each outcome. Hypothesis 2 was addressed by examining the indirect association of the difference scores through perceptions on each of the outcomes using the indirect command within Mplus. Finally, to test Hypothesis 3, the model was run in a multi-group analysis in order to assess the moderating role of family level averages of parent-child conflict and parent-child intimacy on both the direct associations of differences scores and perceptions on the dependent variables as well as the indirect association of the difference scores on the outcomes through perceptions. The multi-group analysis was performed by constraining the direct and indirect pathways between the independent and dependent variables to be equal across the groups, and then allowing the direct and indirect pathways to vary (all at the same time). The DIFFTEST option in Mplus was used to assess whether to unconstrained model fit better than the constrained model. The DIFFTEST option uses the χ^2 statistic to assess differences in fit between two models.

Groups were created from reports of mothers' and fathers' relationships with both siblings. Mothers' conflict with the older and younger siblings was averaged together with fathers' conflict with both siblings to create the family level average parent-child conflict. The same method was used to create a value for the family level average parent-child intimacy. Using a median split, both parent-child conflict (*Mdn* = 2.15) and parent-child intimacy (*Mdn* = 3.50) were dichotomized into high conflict/low conflict and high intimacy/low intimacy. Using the dummy codes, we then created a four level variable that reflected the interaction of parent-child conflict and parent-child intimacy. The four groups were, low intimacy and low conflict (hereafter referred to as affectively mild), low intimacy and high conflict (hereafter referred to as markedly hostile), high intimacy and low conflict (hereafter referred to as markedly warm), and high intimacy and high conflict (hereafter referred to as affectively intense).

Given associations between adolescents' reports of mothers' and fathers' treatment (see Table 1; also see Meunier, Bisceglia, et al., 2012), the model specified correlations among maternal differential conflict, maternal differential intimacy, paternal differential conflict, and paternal differential intimacy, as well as the correlation between latent scores for perceived maternal differential treatment and perceived paternal differential treatment. The correlation between delinquency and substance use was also modeled. On each endogenous variable (perception of maternal differential treatment; perception of paternal differential treatment; delinquency; substance use) the model controlled for age, age spacing, gender (0 = female; 1 = male), gender composition of the sibling dyad (0 = same gender; 1 = mixed

gender), the number of children in the family (0 = 2; 1 = 3 or more), and maternal education by estimating direct paths between these control variables and each endogenous variable.

Direct and Indirect Links to Substance Use and Delinquency

Means and standard deviations for all variables included in the model as well as the bivariate correlations among all the variables broken down by group are presented in Table 1. Because the perception of both maternal and paternal differential treatment was assessed via a latent variable, the values reported in Table 1 are based on the mean of the items used in creating that latent score.

Results of the multi-group analysis revealed poor fit for the constrained model, $\chi^2 = 542.67$, $df = 385$, $p < .001$, $CFI = .82$, $TLI = .80$, $RMSEA = .05$. Because the unrestricted model showed adequate fit $\chi^2 = 251.98$, $df = 232$, $p > .05$, $CFI = .98$, $TLI = .96$, $RMSEA = .03$, and significantly better fit than the constrained model, $\chi^2 = 282.70$, $df = 153$, $p < .001$, below we discussed findings regarding Hypothesis 1 (direct associations) and Hypothesis 2 (indirect associations) in the context of family levels of conflict and intimacy (Hypothesis 3).

Consistent with Hypothesis 1, analyses revealed (see Table 2) several direct associations between differential treatment and delinquency and substance use; however, as indicated above, these associations were moderated by the overall level of parenting. Specifically, youth in the affectively intense group who perceived less favorable maternal treatment relative to their sibling reported more delinquent behaviors compared to the sample as a whole ($\beta = .19$, $p < .01$). Adolescents in the affectively mild group who received less warmth from their father as compared to their sibling also reported more delinquent behaviors ($\beta = .16$, $p < .05$). In regards to substance use, only one direct effect emerged. For youth in the affectively mild group, for every additional unit that youth reported less favorable treatment from their mother, they were 1.87 times ($p < .001$) more likely to have used any substances, or an additional substance.

In line with Hypothesis 2, analyses revealed several links between difference scores and perceptions (see Table 2). Specifically, differential maternal conflict was positively associated with the perception of maternal differential treatment for youth in the affectively mild group ($\beta = .41$, $p < .001$), the markedly warm group ($\beta = .22$, $p < .001$), and the affectively intense group ($\beta = .37$, $p < .001$). In those three instances, adolescents who had more conflict with their mother relative to their sibling perceived overall less favorable maternal treatment. Similar patterns emerged for the links between differential maternal intimacy and the perception of maternal differential treatment such that youth who had a less warm relationship with their mother relative to their sibling perceived a greater amount of less favorable treatment from their mother. In this case, the effect emerged for each group (affectively mild, $\beta = .25$, $p < .001$; markedly hostile, $\beta = .17$, $p < .05$; markedly warm, $\beta = .44$, $p < .001$; affectively intense, $\beta = .17$, $p < .01$).

Similar findings also emerged regarding paternal treatment. Differential paternal conflict was linked to the perception of paternal differential treatment for those in the affectively mild group ($\beta = .22$, $p < .001$) and those in the affectively intense group ($\beta = .20$, $p < .001$), such that youth who had more conflict with their father compared to their sibling reported a

higher perception of less favorable paternal treatment. Moreover, the same pattern emerged between differential paternal intimacy and the perception of paternal differential treatment for all four groups (affectively mild, $\beta = .30$, $p < .001$; markedly hostile, $\beta = .43$, $p < .001$; markedly warm, $\beta = .26$, $p < .001$; affectively intense, $\beta = .30$, $p < .001$).

Consistent with Hypothesis 2, several indirect associations between difference scores, perceptions of differential treatment, and adolescents' delinquency and substance use (see Table 2) also emerged. Specifically, differential maternal conflict was indirectly linked to delinquency through the perception of maternal differential treatment for those in the affectively intense group; specifically, those who had more conflict with their mother as compared to a sibling perceived less favorable treatment from their mother and in turn reported more delinquent behaviors ($\beta = .16$, $p < .05$). Differential maternal conflict was also indirectly associated with substance use through the perception of maternal treatment, but only for those in the affectively mild group. For every one unit that youth reported having more conflict with their mother than their sibling did, they perceived less favorable maternal treatment, and in turn were 1.21 times ($p < .05$) more likely to have used any substances or an additional substance in the last year, as compared to the sample as a whole. A similar pattern emerged regarding the indirect link of differential maternal intimacy to substance use through the perception of maternal differential treatment for the affectively mild group. For youth in this group, for every one unit that they reported having less intimacy with their mother as compared to their sibling, they perceived less favorable maternal treatment, and in turn were 1.13 times ($p < .05$) more likely to have used any substances or an additional substance.

Discussion

Rooted in SCT (e.g., Festinger, 1954; Suls et al., 2002) scholars have employed two broad approaches to measuring PDT (difference scores and perceptions) that, to date, have largely been considered to be equivalent. The results of the present study suggest that difference scores and perception indices of PDT may be distinct, yet conceptually and empirically connected. Findings indicate that, at least in some cases (depending on family levels of conflict and intimacy), difference scores (and possibly by extension subconscious comparisons) may influence youth's perceptions of PDT (and potentially conscious comparisons), which in turn are linked to their participation in delinquent activities and substance use.

Direct Links to Substance Use and Delinquency

Based on SCT (e.g., Festinger, 1954; Suls et al., 2002) and previous literature (e.g., Richmond et al., 2005; Scholte et al., 2007; Shanahan et al., 2008), we hypothesized that the extent to which a sibling was less favored, as indexed by both difference scores and perceptions, would be uniquely and positively associated with adolescents' participation in delinquent activities and their likelihood of substance use (Hypothesis 1). We further anticipated that direct links to delinquency and substance use would be moderated by family average levels of parent-child conflict and parent-child intimacy (Hypothesis 3). Consistent with both of these hypotheses, direct links did emerge, but only for some groups. For those

in affectively intense families (high conflict and intimacy), youth who perceived less favorable treatment from their mother reported more delinquent behaviors. Adolescents from affectively mild families (low conflict and intimacy) who received less intimacy from their father relative to their sibling reported more delinquency, and those who perceived less favorable treatment from their mother were more likely to have used any substances or additional substances.

The direct links for difference scores and perceptions with delinquency and substance use are in line with theory and some previous research. First, these findings are consistent with SCT notions of upward comparisons, with less favored offspring faring more poorly. Second, our finding that PDT was linked to both delinquency and substance use for youth from affectively mild and affectively intense families is consistent with reports from Feinberg and Hetherington (2001) that PDT is more salient when the quality of ambient parenting is low. Perhaps in these families less favored treatment as assessed by either difference score or perception accentuates the risk factor of poor parenting. Where our findings diverge, is that we found no associations between PDT and youth adjustment for adolescents from markedly hostile families (high conflict and low intimacy). Arguably these familial patterns also characterize poor parenting. Considering that negative parenting is independently linked to adolescents' anti-social behavior (Bank, Burraston, & Snyder, 2004) and that youth from these families already reported the highest levels of delinquency and substance use among the four groups, it is possible that the higher ratio of conflict to intimacy seen in these families was enough that social comparisons with a sibling mattered less than the overall hostile family environment.

Our findings were also in line with Feinberg and Hetherington (2001) in suggesting that the role of PDT may be less salient when families have less conflict or more warmth with the added layer that you need to take into account both conflict and intimacy. We found no links between PDT and youth adjustment for markedly warm families (low conflict and high intimacy), perhaps because the positive nature of these families' relationships may wash out any associations between PDT and adolescent behaviors. Interestingly, when looking at the bivariate level, there were correlations between difference score measures of differential conflict and delinquency, but no correlations with the perception of PDT. Perhaps on some level, subconscious comparisons as indexed by difference scores may be more likely to be linked to youth adjustment for families low in conflict and high in intimacy than might be conscious comparisons as indexed by the perception of PDT. Furthermore, youth in these families reported the lowest means of the perception of PDT from both mothers and fathers.

Beyond consistencies/inconsistencies with theory and past research, the direct association between the perception of maternal differential treatment and youth behavior also provides insight into the role differential treatment may play in substance use. Youth who perceive that they are less favored by their mother may have a harmed self-concept. Poorer self-concept and associated stress may be linked to substance use as a method of coping (Wills, 1986). Additionally, because substance use was analyzed as an ordered categorical variable the odds ratio refers to the likelihood of being in the next highest group. In this case, a one unit increase in the perception of being less favored was associated with being 1.87 times more likely to have used any substances (over not using any), using two substances (over

using only one), or using three substances (over using two). This link has important clinical implications because multiple substance use has greater negative consequences for mental health and later substance abuse than does the use of a single substance (e.g., Booth et al., 2010; Martin, Clark, Lynch, Jupper, & Clienti, 1999). Clinicians working with adolescents may want to consider the possibility of youth's perceptions of PDT leading to the initiation and intensification of substance use.

Indirect Links to Substance Use and Delinquency

In order to integrate these two different measurement strategies into a more comprehensive framework, we hypothesized that difference scores would be indirectly linked to offspring outcomes through the perception of differential treatment. For this indirect association to exist, difference scores and perceptions must be distinct, but also significantly linked. Across all groups the effect sizes for paths between difference scores and perceptions were small to moderate in size and were consistent with previous work (Coldwell et al., 2008; Meunier, Roskam, et al., 2012; Quittner & Opipari, 1994). Indeed, difference scores accounted for 3–19% of the variation in perceptions. This corroborates the notion that these two approaches to measuring differential treatment are conceptually different by showing that they are empirically distinct. If the two approaches were the same construct, as has been assumed in the literature, then the correlations between these two measures would be much higher. Although we posited that the differences between difference scores and perceptions may be rooted in the difference between subconscious and conscious comparisons our results only support the possibility of this distinction. Our findings do not validate this claim. Future research will need to test subconscious and conscious comparisons as well as other factors that may account for the differences between these two approaches.

Although distinct, many of the paths between difference score- and perception-based PDT suggested a link between the two approaches. Results indicated that for youth in the affectively mild and intense groups, difference scores for maternal and paternal differential conflict and differential intimacy were all significantly linked to the perception of PDT for the corresponding parent (all tested paths). For the markedly hostile group and the markedly warm group, most links between difference scores and perceptions were significant, but overall the links were less robust. The inconsistent links in these groups may indicate that in families where parenting is especially hostile or especially intimate, subconscious social comparisons as marked by difference scores may be less likely to spark conscious social comparisons as marked by perceptions because of the high ratio of either conflictual or intimate parenting.

Beyond simple links between difference scores and perceptions our analyses also revealed indirect associations from difference scores to delinquency and substance use through the perception of PDT. This pattern, however, only emerged regarding treatment from mothers and for youth from affectively mild and affectively intense families. Specifically, youth who had more conflict with their mother relative to a sibling were more likely to perceive less favorable treatment and in turn engage in more delinquent behaviors and were more likely to engage in substance use. Similarly, youth who had less intimacy with their mother relative to their sibling were more likely to perceive less favorable treatment and in turn engage in

substance use. These patterns support the possibility that at least in affectively mild and affectively intense families conscious comparisons (as marked by perceptions) may serve as a mechanism through which subconscious comparisons (as marked by difference scores) impact youth adjustment. The cross-sectional nature of the data and the fact that we did not directly assess social comparison, however, do not allow for the validation of these claims. The findings are nonetheless compelling. Future work will need to replicate these findings with longitudinal data and measures of subconscious and conscious social comparison.

Limitations and Conclusions

The current study was not without limitations. First, as discussed above, the cross-sectional nature of the data prohibited the validation of a causal model that is implied by the analytic technique. For example, given work on child driven effects (e.g., Bell, 1968; Crouter & Booth, 2003; Kuczynski, 2003), it is possible that sibling differences in substance use and delinquency lead to changes in differential treatment which then lead to the perception of differential treatment. Although some recent longitudinal work has suggested that the direction of effects may be bidirectional, and that in some cases associations of PDT leading to changes in offspring outcomes may be more robust than differences in behavior leading to PDT (Lam et al., 2012), future work on difference scores and perceptions will still need to account for the possibility of child driven effects.

Second, the study was also limited by disparities in how the difference scores and perceptions of PDT were assessed and that they were only reported on by the siblings. The difference score measures of PDT were specific to individual domains of parenting (i.e., intimacy or conflict) and the perception variables were based on treatment in general. It is possible that the use of difference scores and perceptions based on the same domain of treatment would provide more accurate estimates as well as more conceptual depth concerning the links and distinctions between these two approaches. Beyond focusing on the domain of treatment scholars should also utilize alternative methods of assessing PDT such as observational data, parents' reports of treatment toward each sibling, or parents' perception of how the siblings feel they are treated. Approaching PDT from these different angles may capture variance in differential treatment not assessed via typical difference score or perceptions measures.

Third, the present study was limited by the inclusion of only two siblings per family. To date the vast majority of the differential treatment literature has focused on only two siblings at a time (for exceptions see Browne, Meunier, O'Connor, & Jenkins, 2012; Jenkins, Rasbash, & O'Connor, 2003; Meunier, Bisceglia, et al., 2012; Meunier, Wade, & Jenkins, 2012). Yet, many families have three or more children (Kreider & Ellis, 2011). It is possible that differential treatment processes and the perception of those processes are different among three or more siblings than they are between only two siblings. Future work should strive to include all the siblings within a family.

Despite these limitations, the present study contributes to the literature in meaningful ways. First, it supports past research linking differential treatment to delinquency (e.g., Richmond et al., 2005; Scholte et al., 2007) and further suggests a link between PDT and adolescents' substance use. Second, the study contributes to the notion that the family levels of ambient

parenting moderate and impact the role of PDT. Lastly, this study aids researchers in considering the conceptual and theoretical implications of how they choose to measure differential treatment. The findings suggest that not only are the difference score and perception approaches possibly distinct, but that subconscious comparisons as indexed by difference scores may potentially be indirectly linked to offspring outcomes through conscious comparisons as measured via the perception of differential treatment. In the future, scholars should approach the study of PDT by overtly identifying which approach they have selected. Clear delineation between the two measurement approaches will allow for more theoretically relevant findings that will aid scholars in developing a consistent comprehensive framework of this complex family process.

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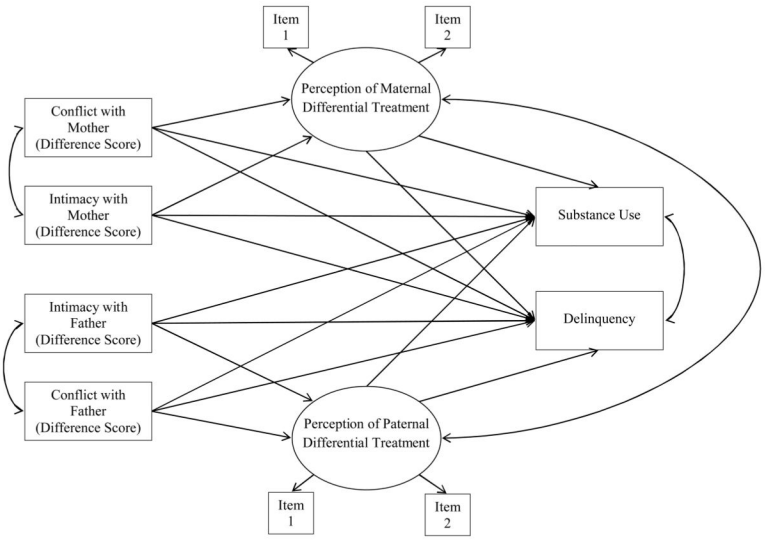

Figure 1.

Proposed Model Testing Direct and Indirect Associations between Differential Treatment and Adolescent Substance Use and Delinquency.

Note. To preserve parsimony the following control variables were omitted from the figure: age, age spacing, gender, gender composition of the sibling dyad, the number of children in the family, and maternal education.

Table 1

Correlations and Descriptive Statistics of Differential Treatment and Adolescent Substance Use and Delinquency by Family average Conflict and Intimacy Groups.

	Low Int/Low Con (n = 112)	Low Int/High Con (n = 162)	High Int/Low Con (n = 180)	High Int/High Con (n = 108)
Correlations				
Maternal DC ← → Maternal DI	.40***	.36***	.18*	.07
Maternal DC ← → Maternal PPDT	.39***	.20*	.21***	.36***
Maternal DC ← → Paternal DC	.36***	.60***	.81***	.79***
Maternal DC ← → Paternal DI	.20*	.34***	.07	.10
Maternal DC ← → Paternal PPDT	.08	.14	.06	.20*
Maternal DC ← → Delinquency	.30**	.33***	.29***	.16
Maternal DC ← → Substance Use	−.11	.12	−.07	−.01
Maternal DI ← → Maternal PPDT	.42***	.25***	.41***	.16
Maternal DI ← → Paternal DC	.06	.23**	.09	.03
Maternal DI ← → Paternal DI	.44***	.38***	.20**	.31***
Maternal DI ← → Paternal PPDT	.04	.13	−.03	−.05
Maternal DI ← → Delinquency	.32***	.19*	.13	.11
Maternal DI ← → Substance Use	−.02	.06	.07	−.06
Maternal PPDT ← → Paternal DC	.24*	.10	.25**	.31***
Maternal PPDT ← → Paternal DI	.22*	.08	.17*	.07
Maternal PPDT ← → Paternal PPDT	.25*	.17*	.38***	.24*
Maternal PPDT ← → Delinquency	.30**	.09	.09	.20*
Maternal PPDT ← → Substance Use	.31***	.00	.12	.05
Paternal DC ← → Paternal DI	.14	.20*	.07	.17
Paternal DC ← → Paternal PPDT	.37***	.09	.09	.26**
Paternal DC ← → Delinquency	.21*	.22*	.31***	.17
Paternal DC ← → Substance Use	.07	.06	−.06	.06
Paternal DI ← → Paternal PPDT	.35**	.43***	.27***	.36***
Paternal DI ← → Delinquency	.25**	.06	−.03	.09
Paternal DI ← → Substance Use	.03	.01	−.00	−.12
Paternal PPDT ← → Delinquency	.06	.04	.03	.05
Paternal PPDT ← → Substance Use	.10	.01	.12	−.00
Delinquency ← → Substance Use	.40***	.55***	.43***	.51***
Means (SD)				
Maternal DC	.28 (.44)	.46 (.71)	.24 (.38)	.44(.64)
Maternal DI	.35 (.51)	.38 (.53)	.25 (.38)	.24 (.38)
Maternal PPDT	.86 (.99)	1.28 (1.15)	.59 (.77)	.94 (1.02)

	Low Int/Low Con (n = 112)	Low Int/High Con (n = 162)	High Int/Low Con (n = 180)	High Int/High Con (n = 108)
Paternal DC	.23 (.38)	.43 (.66)	.22 (.35)	.51 (.73)
Paternal DI	.44 (.59)	.40 (.61)	.29 (.43)	.32 (.50)
Paternal PPDT	.75 (.95)	.98 (1.05)	.58 (.81)	.98 (1.06)
Delinquency	.58 (.26)	.74 (.30)	.51 (.24)	.65 (.24)
Substance Use	.63 (1.00)	.83 (1.05)	.38 (.71)	.63 (.92)

* $p < .05$

** $p < .01$

*** $p < .001$.

Note: Con = conflict. Int = intimacy. DC = differential conflict. DI = differential intimacy. PPDT = perception of parental differential treatment.

Table 2

Summary of direct and indirect associations from the multi-group analysis testing difference score and perceptions based measures of differential treatment as linked with adolescent substance use and delinquency.

Path	Low Int/Low Con (n = 112)	Low Int/High Con (n = 162)	High Int/Low Con (n = 180)	High Int/High Con (n = 108)
Direct Associations				
Maternal DC → Maternal PPDT	.41***	.10	.22***	.37***
Maternal DI → Maternal PPDT	.25***	.17*	.44***	.17**
Paternal DC → Paternal PPDT	.22***	.00	.05	.20***
Paternal DI → Paternal PPDT	.30***	.43***	.26***	.30***
Maternal DC → Delinquency	.53	1.18	1.05	.78
Maternal DI → Delinquency	.10	.10	.09	.02
Maternal PPDT → Delinquency	.14	.06	−.02	.19**
Paternal DC → Delinquency	.12	.04	.17	−.06
Paternal DI → Delinquency	.16*	−.08	−.02	−.13
Paternal PPDT → Delinquency	−.08	.00	.03	.02
Maternal DC → Substance Use	.70	1.17	.63	1.06
Maternal DI → Substance Use	.53	1.18	1.05	.78
Maternal PPDT → Substance Use	1.87***	.91	1.34	1.23
Paternal DC → Substance Use	1.02	1.15	1.13	1.02
Paternal DI → Substance Use	1.18	.80	1.09	.70
Paternal PPDT → Substance Use	1.02	1.01	1.09	1.08
Indirect Associations				
Maternal DC → Maternal PPDT → Delinquency	.06	.01	−.01	.07*
Maternal DI → Maternal PPDT → Delinquency	.04	.01	−.01	.03
Paternal DC → Paternal PPDT → Delinquency	−.03	.00	.00	.00
Paternal DI → Paternal PPDT → Delinquency	−.02	.00	.01	.01
Maternal DC → Maternal PPDT → Substance Use	1.21*	.99	1.14	1.14
Maternal DI → Maternal PPDT → Substance Use	1.13*	.96	1.28	1.11
Paternal DC → Paternal PPDT → Substance Use	1.01	1.00	1.01	1.02
Paternal DI → Paternal PPDT → Substance Use	1.01	1.01	1.04	1.05

* $p < .05$

** $p < .01$

*** $p < .001$.

Note: All coefficients are presented as standardized betas except for paths linked with substance use, which are presented as odds ratios. Con = conflict. Int = intimacy. DC = differential conflict. DI = differential intimacy. PPDT = perception of parental differential treatment.