DIFFERENTIAL-MATERNAL PARENTING BEHAVIOR: ESTIMATING WITHIN- AND BETWEEN-FAMILY EFFECTS ON CHILDREN

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ABSTRACT

This study examines the impact of differential-maternal parenting behavior, evaluated as a family-level experience, on children's emotional-behavioral problems. Data come from three child development studies conducted in 1983 (Ontario Child Health Study: OCHS), 1994 (National Longitudinal Study of Children and Youth: NLSCY) and 1992 (National Longitudinal Study of Youth: NLSY79). In two of three studies, there was consistent evidence that differential-maternal parenting behavior had an adverse impact on all siblings as a group, over and above behavior directed at individual siblings. The strength of association was sensitive to the type of maternal parenting behavior, dimension of child maladjustment and respondent perspective (stronger for hostile/negative parenting, child externalizing problems and mother assessments of child emotional-behavioral problems).

INTRODUCTION

Parenting practices have a substantial impact on child health and development (see Bornstein, 1995). Two general approaches to conceptualizing parenting behavior stress a constellation of positive characteristics such as warmth, responsiveness, engagement, support, consistency and stimulation; and a constellation of negative characteristics such as hostility, disapproval, punitiveness, inconsistency and harshness (Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000). Positive parenting behavior is associated with the development of child competence in life areas such as cognitive functioning and behavioral regulation. Negative parenting, in contrast, is implicated in the development of emotional-behavioral problems, in particular, antisocial behavior and aggression (Patterson, 1982).

Knowledge about the effects of parental behavior on child health and development comes mostly from studies that focus on between-family differences in maternal parental behavior directed towards one child in the family. In studies which sample one child per family, it is not possible to examine within-family effects of parenting, that is, the extent to which treating each sibling differently has a differential effect on his/her health and development (O'Connor, 2002). The impetus to investigate the influences of differential parenting within families came from Plomin & Daniels (1987) who argued that residual differences among siblings in their health and development, net of genetic relatedness and general environmental forces (those forces shared between children), must be due to non-shared environmental forces.

Effects of Differential Parenting

Why should differential parenting impact on child adjustment? The most convincing explanation comes from social comparison theory (Festinger, 1954). The general idea is that inequitable parental treatment can have negative effects on self-esteem and adjustment for children who see themselves as 'worse off' than their sibling. The perception experienced by one sibling of being worse off is based on a conscious or unconscious comparison of the parenting that they see their sibling receiving. In this explanation, actual parenting levels and the magnitude of the gap between them exert separate influences on adjustment. It is accepted that the gap in parenting exerts a negative influence on the sibling perceived to be worse off (McGuire, Dunn & Plomin, 1995). However, there have also been suggestions and modest evidence to support the idea that differential parenting could have a positive impact on the sibling perceived to be better off (Reiss et al., 1995).

The call to study differential parenting by Plomin and Daniels resulted in the selection of two, rather than one child per family, and focused attention on the effects of child specific, within-family differences. The techniques used to analyse information collected in these studies focus on nonshared influences within the family: they are neither intended for nor suited to the task of partitioning within from between-family effects. One technique relies on a sibling difference score (Rovine, 1994) – a dyadic score based on the treatment received by Sib A minus the treatment received by Sib B. Calculating a similar difference score for sibling adjustment, most of these studies have examined differential adjustment as a function of differential treatment, by correlating the difference between siblings on adjustment with the difference between siblings on parenting received. In general, these studies indicate that children who are subject to less positive and more negative treatment, relative to their siblings, exhibit poorer adjustment and relationship quality (Ashbury, Dunn, Pike, & Plomin, 2003; Brody, Stoneman & McCoy, 1992; Deater-Deckard, Pike, Petrill, Cutting, Hughes & O'Connor, 2001; Conger & Conger, 1994; McGuire, Dunn & Plomin, 1995; Stocker, 1993; Tarullo, DeMulder, Ronsaville, Brown, & Radke-Yarrow, 1995). On its own, the dyadic score confounds level and differential. Differential may be higher when at least one of the children in the family is exposed to high levels of negativity. Is it the level of negativity or the differential with the child's sibling that explains the negative effect?

Another technique is to separate the sample into younger and older siblings and to use scores of direct parenting and parenting to sibling as predictor variables (Feinberg & Hetherington, 2001; Reiss et al.,1995; Wagner & Cohen, 1994). Feinberg & Hetherington (2001), for instance, found that differential parenting (negativity, warmth) assessed in 516 families accounted for unique variance in the adjustment of siblings after controlling for actual levels of parenting extended to adolescents. This technique accounts for both level of parenting and the magnitude of differential parenting but creates a new challenge of interpreting differences that emerge from carrying out separate analyses for younger and older children.

Differential Parenting from a Family-System Perspective

The present study examines the effects of differential-maternal parenting behavior from an ecological or family-system perspective. A basic premise in family system theories (Minuchin, 1981; Nichols & Schwartz, 2001) is that the functioning of the system is more than the sum of its component parts. This would suggest that, over and above the individual level processes of a) direct parenting and b) differential parenting, a system-wide process operates to affect children adversely. The proposed mechanism is that on the affective dimension of co-operation/competition (Jenkins & Greenbaum; 1999; Oatley, 2000), the family ethos becomes more negative. The discomfort, personal insecurity and social anxiety of all children increase as they a) engage in competitive practices over parental behavior, b) experience fear or concern over losing their privileged position in the future or c) experience deteriorating sibling relationships.

We hypothesize that differential-maternal parenting behavior evaluated within a family context will have a negative influence on all children in the family, not just those individual children subject to the more negative behavior. This hypothesis was inspired by an analogy between income inequality (i.e., variability in the allocation of income to individual members of a defined population) and differential parenting behavior. The analogy works as follows. One, income and parenting behaviour are scarce resources valued by adults (income) and children (parenting behavior). Two, income inequality and differential parenting behavior are characteristics of groups, for example, communities (income inequality) and sibships (differential parenting behavior): they both operate at a system level and can reflect allocation imbalances with undesirable consequences. Three, income inequality has been linked to poor health. As an example, Lobmayer & Wilkinson (2002) modelled potential years of life (PYLL) lost in 276 cities in the US as a function of income inequality (variance of the logarithm of household income), average household income and residential segregation (the extent to which rich and poor occupy different census tracts within individual cities). Among men, they found that income inequality explained about 29% of the variance in PYLL for those 65 years of age and younger while mean income and residential segregation explained about 5 and 1%, respectively. Among women, the corresponding estimates were 20, 15 and 5%, respectively. Wilkinson (1996), a longstanding believer in the income-inequality hypothesis, argues that individual and communal processes drive this association. At the individual level, income inequality leads to a sense of unfairness and dissatisfaction accompanied by detrimental psychological effects and reactions. At the communal level, income inequality undermines social cohesion and provokes distrust and interpersonal conflict. The mechanisms underlying income inequality effects extend the idea of social comparison theory (Festinger, 1954) to include ecological or system-level phenomena. In our view, differential-maternal parenting behavior, if unjustified or perceived to be unfair, should be capable of unleashing individual and social processes within the family that adversely affect the health and functioning of all siblings. In general, we expect that the larger the variability of maternal parenting behavior, the more likely it is to be perceived as unjustified or unfair.

Table 1 is used to clarify our perspective. The table presents hypothetical scores for a measure

of ‘negative/punitive maternal parenting’ recorded in four families. Imagine that these scores are on continuum from 0 to 15 and that the four families have two to four siblings. The raw scores for each sibling, displayed in the second column, represent child-specific treatment by the mother. In family 1, sibling B, with a score of 12, receives the most negative/punitive treatment. Sibling C, with a score of 4, receives the least negative/punitive treatment; there is a difference of 8 scale units between B and C.

Studies of parenting behavior that focus on the raw score obtained by one child in the family neglect within-family variation and draw attention arbitrarily to one specific child. For example, the selection of sibling B in family 1, would serve to represent maternal behavior as intensely negative/punitive, while the selection of sibling C would have the opposite effect (Table 1). The selection of two, rather than one child per family, focuses attention on the effects of child specific, within-family differences. However, in families with three or more siblings, only part of the system is represented and sibling selection is still a concern. For example, child-specific differential-maternal parenting in family 1 might be cast large through the selection of siblings B and C, or small through the selection of siblings C and D. The selection of all siblings in the family makes it possible to model the influence of parental behavior as both child specific (within family) and family specific (between family) effects. Columns 3 and 4 in Table 1 illustrate this distinction. In column 3, the overall mean score for maternal behavior (7.5) has been subtracted from each raw score. The new scores preserve the sibling differences in maternal behavior (child-specific differences) while removing the family average. For example, the raw-score difference between siblings B and C in family 1 (i.e., 8 from 12 minus 4) is still 8 from 4.5 minus (-3.5) but the average level of maternal behaviour has become 0. Column 4 shows family-specific differences in maternal behavior and divides them into two components: average maternal behaviour represented by the mean, and family-differential maternal behavior represented by the standard deviation.

In the present study, we put forward a hypothesis that differential-maternal parenting behavior will have a negative influence on all children in the family, not just those individual children subject to the more negative behavior. Table 1 and families 3 and 4 serve to illustrate this hypothesis. In column 2, child-specific differences capture the effects of differential-maternal parenting within each family. In column 3, between-family differences are isolated from child-specific differences: the family average that captures the overall level of maternal behavior and family differential that captures overall variability of maternal behavior. Levels of maternal behavior (amount of negative/punitive treatment) is higher in family 3 than family 4 (11.0 versus 8.0); however, variability in maternal behavior is lower in family 3 than family 4 (1.4 versus 6.0). While it is usual to expect that higher levels of negative/punitive treatment will be associated with more adjustment problems, on average, it is our expectation that greater variability will also be associated with more adjustment problems, on average. Furthermore we expect that this effect will be discernible after controlling for both child-specific differences in maternal behavior and average levels of maternal behavior.

Subdividing maternal parenting behavior into child and family-specific components draws attention to the hierarchical nature of these data. Conceived as an ecological or system-level influence on children, differential-maternal parenting behaviour requires analytical techniques that explicitly model nested data, that distinguish between individual and system-level effects, that consider effects simultaneously and that take into account all siblings in the family. Multilevel modeling is an analytical approach that can meet these needs (Bryk & Raudenbush, 1992; Goldstein, 1995).

Although we have highlighted the negative consequences of differential positivity and negativity, this is likely to be an oversimplification of the relationship between parenting and child adjustment for two reasons. First, recent evidence has shown that children make a distinction between differential treatment that they see as justified and that which is perceived as unfair. Assessments of differential parenting based on child perception (thus capturing perceived 'unfairness') are stronger predictors of child adjustment than those based on parent behavior (Kowal & Kramer, 1997; McHale, Updegraff, Jackson-Newsom, Tucker & Crouter, 2000). Second, many theories of parenting stress the importance of tailoring parenting responses to the developmental and temperamental characteristics of individual children (Ainsworth, Blehar, Walters & Wall, 1978; Kochanska, 1997; Kuczynski, 2003). If this theoretical premise is correct, then good parenting could translate into high levels of differential parenting as parents are responsive to the individual needs of their children. How then can we justify testing a hypothesis about the negative consequences of differential positivity and negativity? First, there are many aspects of parenting, some of which may be problematic for children when differential treatment is experienced while other aspects are unproblematic. It may be, for instance, that experience of differential affective expression (affection, anger, irritation) has a more negative effect than differential experience of the everyday, pragmatic aspects of parenting (time spent together, chore assignment). In this study, the measurements of parental negativity and positivity, although not solely measures of parental affect, involve a substantial component that can be seen to index affective expression.

The objective of this study is to evaluate the association between differential-maternal parenting behavior and levels of children's emotional-behavioral problems among families in the general population with two or more siblings. It was hypothesized that differential-maternal parenting would be associated with increased levels of emotional-behavioral problems among siblings, after controlling for average levels of maternal parenting (family mean), child-specific differential-maternal parenting (family mean subtracted from individual child values) and covariates expected to be associated with maternal behavior and children's emotional-behavioral problems.

The generalizability of the findings was assessed in two general ways: (1) by evaluating the consistency of the findings for different respondents assessing child behavior (mothers, teachers), for different measures of parenting (positive versus negative; self-report versus observed), and

for different aspects of functioning (externalizing versus internalizing behavior versus receptive vocabulary); and (2) by replicating the analyses in families participating in different general population studies.

METHOD

The data for this research come from three general population surveys: (1) the Ontario Child Health Study (OCHS: Ontario, 1983); (2) the National Longitudinal Survey of Children and Youth (NLSCY: Canada, 1994); and the National Longitudinal Study of Youth (NLSY79: USA, 1992).

Study Samples

OCHS: The OCHS is a prospective study of child health, psychiatric disorder and adolescent substance use (Boyle et al., 1987). The study began in 1983 with data collection on a cohort of 3294 children aged 4 to 16 years, living in 1869 households (91.1% response) across Ontario, Canada. Children were identified using a multistage, stratified cluster design based on the 1981 Canada census in which household dwellings (residences) were the sampling units. Contributing to the analyses here are families participating in 1983 who had two or more children aged 4 to 16 years with complete information (no missing data) on the study variables. This restriction left 2245/2455 (91.6%) children in 943 families. A further restriction specified that the primary respondent or 'person most knowledgeable' be the children's mother. This left 2128 children in 894 families (625 with 2 siblings, 215 with 3 siblings and 54 with 4 or more siblings) for the analysis of mother-assessed emotional-behavioral problems and 1618/2045 (79.1%) children in school for the analysis of teacher-assessed emotional-behavioral problems.

NLSCY: The NLSCY is a prospective study initiated by Human Resources Development Canada and Statistics Canada to create a national database on the characteristics and life experiences of children and youth in Canada as they grow from infancy to adulthood (Special Surveys Division, 1996). The study began in 1994 with data collection on a cohort of 22831 children aged 0 to11 years, living in 13439 households (86.3% response) across Canada. Children were identified using a stratified, multistage probability sample design based on area frames in which dwellings (residences) were the sampling units. Contributing to the analyses here are families participating in 1994 who had two or more children aged 4 to 11 years with complete information on the study variables. This restriction left 8007/8635 (92.7%) children in 3664 families. A further restriction specified that the primary respondent or 'person most knowledgeable' be the children's mother. This left 7392 children in 3376 families (3040 with 2 siblings, 569 with 3 siblings and 55 with 4 siblings) for the analysis of mother-assessed emotional-behavioral problems and 3757/6617 (56.8%) children in school for the analysis of teacher-assessed emotional-behavioral problems.

NLSY79: The NLSY79 is one of six, continuing National Longitudinal Surveys sponsored by the U.S. Bureau of Labor Statistics. The study of this cohort began in 1986 and consists of

biennial assessments of children born to female respondents of the NLSY1979 – a nationally representative sample of women enlisted in 1979 (U.S. Department of Labor and Bureau of Labor Statistics, 2001). In 1992, the NLSY79 included 5464 children aged 3 to 14 years (92.1% response) in 2899 families. Contributing to the analyses here are families (women) participating in 1992 who had two or more children aged 3 to 14 years with complete information on the study variables. This restriction left 2876/4301 (66.9%) children in 1218 families (876 with 2 siblings, 268 with 3 siblings and 74 with 4 or more siblings) for the analysis of mother-assessed emotional-behavioral problems and 2689/4301 (62.5%) for the analysis of receptive vocabulary measured by the PPVT.

Variables and Measures

Externalizing and internalizing behavior: In the OCHS, externalizing and internalizing behavior were measured by summing responses (0, never or not true; 1, sometimes or somewhat true; or 2, often or very true) to brief descriptions of problem behavior. Externalizing behavior consists of the 21 items which make up the conduct problems (aggressive, antisocial behavior) and hyperactivity scales (inattentive, impulsive and overactive behavior) developed initially to screen for psychiatric disorder among children in the general population participating in the OCHS (Offord et al., 1987; 1992). Internalizing behavior consists of the 13-item emotional problems scale (depressed mood and anxiety) developed for the same reason. Detailed information on the conceptualization and psychometric properties of the individual scales is available (Boyle et al., 1987; 1993). Briefly, the diagnostic criteria specified in DSM-III (American Psychiatric Association, 1980) were used to guide the selection of items for each scale. The basic pool of items came from the Child Behavior Checklist (CBCL: Achenbach & Edelbrock, 1981) supplemented by additional items to enhance measurement. In the OCHS, internal-consistency reliabilities based on alpha for externalizing versus internalizing behavior are 0.83/0.76 for mother assessments and 0.87/0.79 for teacher assessments. Pearson correlations between the externalizing and internalizing scales are 0.54 and 0.42 for mother and teacher assessments.

The NLSCY included a subset of more frequently reported problems used in the OCHS to measure externalizing behavior (16/21 items) and internalizing behavior (7/13 items). In the NLSCY, internal-consistency reliabilities based on alpha for externalizing versus internalizing behavior are 0.84/0.74 for mother assessments and 0.86/0.72 for teacher assessments. Pearson correlations between the externalizing and internalizing scales are 0.47 and 0.42 for mother and teacher assessments.

In the NLSY79, externalizing and internalizing behavior were measured by summing responses (0, not true; 1, sometimes true; and 2, often true) to brief descriptions of problem behavior that make-up the Behavior Problems Index (BPI: Peterson & Zill, 1986). Externalizing behavior consists of 17 items taken from the antisocial, headstrong, hyperactive and peer problems scales. Internalizing behavior consists of 10 items taken from the anxious/depressed and dependent

scales. The basic pool of items for the BPI came from the CBCL (Achenbach & Edelbrock, 1981) and other behavior scales (Graham & Rutter, 1968; Rutter, Tizard & Whitmore, 1970; Kellam, Branh, Agrawal & Ensminger, 1975). Factor analysis was used to identify the six subscales of the BPI. Internal-consistency reliabilities based on alpha are 0.80/0.72 for mother-assessed externalizing and internalizing behavior. The Pearson correlation between the two scales is 0.64.

Receptive vocabulary: The Peabody Picture Vocabulary Test-Revised (PPVT-R) was used in the NLSY79 to measure receptive (hearing) vocabulary for children aged 3 years and older. It provides a quick estimate of verbal ability or scholastic aptitude (Dunn & Dunn, 1981). This measure was not administered in the OCHS and administered to 4 and 5 year-olds in the NLSCY.

Maternal parenting behavior: Although different measures of maternal parenting behavior were used in each study, they are classified simply as 'positive' and 'negative' for the analyses in this paper. In the OCHS, parenting was measured by a single question: "In the past six months, how frequently have you punished or disciplined _____for misbehaving or doing something wrong". The five response options – (1) once or more day; to (5) about once a month – were reverse coded so that higher numbers indicated more frequent discipline.

In the NLSCY, maternal parenting behavior was measured by two scales called 'positive interaction' and 'hostile/ineffective'. The former scale included 5 questions ("How often do you praise ____, by saying something like 'Good for you!' or 'What a nice thing you did!' or 'That's good going!'?" "How often do you and s/he talk or play with each other, focussing attention on each other for five minutes or more, just for fun?" "How often do you and s/he laugh together?" "How often do you do something special with him/her that s/he enjoys?" "How often do you play sports, hobbies or games with him/her?") with each question having five response options: (1) never; to (5) many times each day. The latter scale included 7 questions ("How often do you get annoyed with ____ for saying or doing something s/he is not supposed to?" "Of all the times you talk to ____ about his/her behavior, what proportion is praise [reverse coded]?" "Of all the times you talk to ____ about his/her behavior, what proportion is disapproval?" How often do you get angry when you punish____?" "How often do you think that the kind of punishment you give him/her depends on your mood?" "How often do you feel you are having problems managing him/her in general?" How often do you have to discipline him/her repeatedly for the same thing?") with each question, except the first [(1) never; to (5) many times each day] having five response options: (1) never; to (5) all the time. The two scales were derived by factor analysing parenting items included in the NLSCY (Special Surveys Division, 1996) and have been shown to have good concurrent validity (Boyle & Willms, 2002; Jenkins et al., 2003). The internal-consistency reliabilities (alpha) are 0.81 for positive interaction and 0.71 for hostile ineffective.

In the NLSY79, maternal parenting was measured in two ways: (1) by a single question addressed to the mother, "How many times in the past week have you had to spank your child?

" with reported frequencies ≥16 recoded to 15 (negative parenting); and (2) a 'positive parenting' scale developed for this study by adding together four observed maternal behaviors coded (0) absent versus (1) present, abstracted from the NLSY79 HOME assessment: mother's voice conveys positive feeling to child; mother converses with child at least twice during visit; mother answers child's questions or requests verbally; and mother introduces visitor to child (Centre for Human Resource Research, 2000). These items were selected because they were recorded for children 3 to 14 years and independent of maternal responses to questions about her own behavior. The internal-consistency reliability for the scale is 0.54.

Independent control variables: The independent control variables selected for analysis were defined and measured as closely as possible in the three studies. These variables included: (1) child age in years; (2) male child, coded as 0, no, versus 1, yes; (3) one-parent household, coded as 0, no, versus 1, yes; (4) number of siblings contributing to the analysis, two and four or more siblings coded as dummy variables with three siblings serving as the reference category; (5) maternal depressed mood (see following); and (6) family socioeconomic status (SES: see following).

In the OCHS, the negative affect balance scale (Bradburn, 1969) was used to assess maternal depressed mood. The scale consists of a question to mothers "During the past few weeks, how often have you felt..." followed by five brief statements. Each statement is accompanied by a standard response option, coded: (0) never, (1) sometimes and (2) always. In the NLSCY a 12-item adaptation of the Centre for Epidemiologic Studies Depression scale (CES-D: Radloff, 1977) was used to assess maternal depressed mood. The scale consists of an instruction to mothers, "Please mark the circle which best describes how often you felt or behaved this way during the past week..." followed by individual statements. Each statement is accompanied by a standard response option, coded: (0) rarely or none of the time [less than 1 day]; (1) some or a little of the time [1-2 days]; (2) occasionally or a moderate amount of time [3-4 days]; (3) most or all of the time [5-7 days]. In the NLSY79, the full 20-item CES-D scale was used. The internal-consistency reliabilities based on coefficient alpha were 0.65 (OCHS), 0.82 (NLSCY) and 0.89 (NLSY79).

In all three studies, family SES was a composite measure derived from five variables which were standardized, added together and transformed to have a mean of 0.0 and a standard deviation of 1.0: log of household income, years of education of the mother and her spouse/partner (if present in the home), and the prestige associated with the occupation of the mother and her spouse/partner (if present in the home and working). Occupational prestige was measured using the Blishen scale in the OCHS (Blishen, Carroll & Moore, 1987), the Pineo-Porter scale in the NLSCY (Pineo, Porter & McRoberts, 1977) and the Duncan scale in the NLSY79 (Duncan, 1961). The internal-consistency reliabilities of the family SES measures based on coefficient alpha were 0.82 (OCHS), 0.75 (NLSCY) and 0.69 (NLSY79). In all three studies, information to measure family variables was taken from maternal responses to a personal interview. For the analysis, child age and maternal depressed mood were recoded so that their overall mean values

were approximately 0.0 (a process called centering).

Independent Control Variables: Rationale for Selection: The independent control variables were selected to represent the primary socio-demographic and economic characteristics of families and neighbourhoods that might be associated with both maternal parenting behavior – the focus of this report – and children's emotional-behavioral problems. Typically, the core elements of SES include occupational prestige, income and education (McLoyd, 1998). After controlling for income and SES, associations have been found between family structure (one versus two-parent households) and problem behavior in children (Boyle, & Lipman, 2002; Lipman, Offord & Dooley, 1996). There is substantial evidence to indicate that maternal depressed mood influences both the reporting and risk for emotional-behavioral problems of children (Boyle & Pickles, 1997).

ANALYSIS

The assessments collected on children in these studies form a hierarchical structure consisting of individual children (level 1 or child level) nested within families (level 2 or family level). Sibling assessments can be expected to be correlated and violate the assumption of statistical independence. Statistical methods and computer software have been developed to overcome the analytical dilemmas associated with correlated measurement (Kreft & DeLeeuw, 1998). This study uses multilevel regression and statistical software called MLWin (Rasbash et al., 2000). In multilevel modelling, residual error is partitioned across levels, capturing the extent to which variation in response is a function of between-versus within-level influences. This makes it possible to quantify family-level influences after taking into account individual-level attributes.

The study hypotheses are tested using variants of the multilevel regression model depicted below in which variation in the response variable Y is 'explained' by the single fixed intercept $y_{ij} = \_0X_0 + \_1X_{1ij} + \_2X_{2ij} + ...+ \_mX_{mij} + (\_j + \_ij$ term $\_0$, the overall average for problem behavior; m fixed effects (the _s) associated with 'predictor' variables (the Xs) for individual children and families; and two random terms associated with the intercept and fixed effects which reflect residual variation at the child level $\_ij$ and the family level $\_j$. This residual variation can be summarized in two variance terms: $\_\_^2$ and $\_\_^2$ which estimate respectively the between-child (or within family) and between-family variation. The fixed effects estimates in regression using multilevel modelling are interpreted in the same way as fixed effects in ordinary least squares (OLS) regression: the intercept is the estimated mean response while the beta coefficients represent the increase or decrease in response associated with a unit change in the covariate. Fixed effects that are approximately twice the size of their standard errors are statistically significant at $p<0.05$.

<u>Specific Hypotheses</u>

This study examines the strength of association between children's emotional-behavioral problems and differential-maternal parenting behavior. On average, it is expected that higher

levels of differential-maternal parenting within the family, whether positive or negative, will be associated with more negative child adjustment at the family level. However, the strength of this association will vary depending on the type of maternal behavior (negative versus positive), the dimension of child adjustment (externalizing versus internalizing behavior), and perspective of respondent assessing child adjustment (mother versus teacher). Specifically, negative versus positive maternal behavior is expected to be more strongly associated with children's emotional-behavioral problems and this relationship is expected to be strongest for externalizing behavior. Furthermore, the effects of differential-maternal parenting are expected to be stronger for mother versus teacher-assessed emotional-behavioral problems. This general pattern of association has been reported in the past and is consistent with our understanding about the links between different dimensions of parenting and child psychopathology (McGuire, Dunn & Plomin, 1995), and the likely impact of context and rater on these associations (Offord et al., 1996).

Although differences in sampling and measurement among the studies included in the analyses will lead to heterogeneity in the regression estimates, the pattern of findings is expected to be replicable across studies. In particular, higher levels of differential-maternal parenting is expected to be associated with increased negative adjustment, tempered by the type of parenting behavior, dimension of child adjustment and respondent perspective. The availability of the PPVT in the NLSY79 makes it possible to examine whether or not the impact of differential parenting might extend to other aspects of child functioning.

RESULTS

Selected characteristics of the OCHS, NLSCY and NLSY79 study samples appear in Table 2. The percent male is nearly identical across the studies while the variation in age reflects differences in target populations. The percent of families headed by one parent is much higher in the NLSY79 (38.1) than in the NLSCY (12.5) or the OCHS (8.3). Secular trends are partly responsible for these differences. More importantly, common-law partners could not be identified in the NLSY79, leading to inflated estimates of lone parents in this study. The percent of families with 4+ siblings is much lower in the NLSCY (1.5) than in the OCHS (6.0) and the NLSY79 (6.1) because of the restricted age range (4-11 years) in the NLSCY. Socioeconomic status is standardized within each study, while depressed mood is measured by different instruments.

The percent of subjects with complete data and eligible for inclusion exceeds 85% in both the OCHS and the NLSCY (Table 2). In the NLSY79, 66.9% of children have complete information for analysis. Data loss in the NLSY79 is attributable in large part to the absence of children during the home interview, making it impossible to observe parent-child interactions within the family. To assess this data loss, each eligible child in the NLSY79 was coded as 0, included versus 1, excluded from the analysis and modelled as a dependent variable in a logistic regression analysis. The independent variables included child age in years, male child, sibship size, lone-parent family and family SES. Excluded children were younger (43.0% of 3 to 6 year olds versus

28.3% of 7 to 14 year olds); had fewer siblings (35.7% with one sibling versus 30.3% with two or more siblings; lived more often in one-parent families (36.5% versus 30.9%); and were subject to lower SES (-0.10 versus 0.05 on the standardized measure). (All estimates are computed at the child level.)

Teacher report availability was 79.1% in the OCHS and 56.8% in the NLSCY. In the NLSCY, the acquisition of teacher assessments required separate consent from school boards, principles, teachers and parents across Canada, which created multiple opportunities for nonresponse; in the OCHS, consent was limited to parents and teachers. Modelling teacher nonresponse in the NLSCY as a function of family socioeconomic variables and mother ratings of children's emotional-behavioral problems indicated that family SES was higher among teachers providing assessments (Boyle, 2002).

The bivariate associations between independent and dependent variables appear in Table 3. The patterns of associations are generally similar across the three studies. There are strong positive associations between being a male child and reports of externalizing behavior. Child age in years tends to be associated negatively with externalizing behavior and positively with internalizing behavior. One-parent households (positively) and SES (negatively) are associated with emotional-behavioral problems, although these effects tend to be weaker in the OCHS. Maternal depressed mood is associated strongly with emotional-behavioral problems, although the effect is attenuated for teacher reports. Indicators of negative maternal parenting are associated more strongly with externalizing than internalizing behavior and for mother versus teacher reports, irrespective of study. Also, the magnitudes of these associations are consistently larger in the NLSCY than in the OCHS and NLSY79. The associations between negative family differential behavior and children's emotional-behavioral problems go from 0.014 to 0.208 and 8 of 10 are statistically significant (Table 3). In the NLSY79, family differential parenting, both positive (-.173) and negative (-.183) are inversely associated with the PPVT (Table 3).

Familial Clustering

To estimate between-family variability in behavioral problems, a two-level random intercepts model is developed with a single, fixed effect intercept estimating the overall average and separate random effects estimates (error terms) estimating between-versus within-family variability in child emotional-behavioral problems.

Table 4 presents the fixed and random effects estimates for externalizing and internalizing behavior in the three studies and for PPVT scores in the NLSY79. The random effects variances are converted to percentages that sum to a 100 so that between-family variation (level 2) can be interpreted as an intra-class correlation coefficient representing familial clustering of response. The intra-class correlation is calculated as the level 2 variance over the total variance (level 1 + level 2). Estimates of clustering vary between the studies. Maternal assessments of externalizing and internalizing behavior exhibit stronger clustering in the OCHS and NLSY79 (37.5-47.8%) than in the NLSCY (18.1-29.6%). However, teacher assessments collected in the OCHS (11.5-

21.1%) versus the NLSCY (17.9-28.0%) exhibit slightly lower levels of clustering. In the NLSY79, 52.9% of the variation in the PPVT is attributable to between-family differences. The –2*loglikelihood is a deviance statistic which serves as a measure of lack of fit between model and data (Snijders, & Bosker, (1999: p. 89). These estimates are not directly interpretable on their own. However, differences in deviance values for models fitted to the same data set can be used as a test statistic having a chi-square distribution with $m_1 - m_0$ degrees of freedom where m refers to the number of parameters in each model.

Between-family Differences in the Variability of Parenting Behavior

Tables 5-7 for the OCHS, NLSCY and NLSY79, respectively, present the fixed effects estimates and random effects variances that model mother and teacher assessments of children's emotional-behavioral problems and PPVT scores as a function of maternal parenting behavior and control variables. The intercept is an estimate of the average response level after controlling for all variables in the model, for example, mother-assessed externalizing behavior in the OCHS (Table 5: 0.92). The fixed effects regression parameters estimate the change in the dependent variable associated with a unit change in the independent variable. In Table 5, being a male child in the OCHS is associated with a 1.19 unit increase in mother-assessed externalizing behavior. The standard errors shown in parenthesis estimate the reliability of the regression parameters, and for being male this is 0.14. The random effects variances, accompanied by their standard errors, show the residual variation at each level not explained by the fixed effects parameters.

In the OCHS, family-differential parenting is associated significantly with mother-and teacher-assessed externalizing behavior (0.46 and 0.63, respectively in Table 5). This is not the case for mother-and teacher-assessed internalizing behavior: the parameter estimates are substantially smaller (0.15 and 0.08, respectively) and statistically nonsignificant. In the NLSCY, negative and positive maternal parenting behavior are modelled together (Table 6). Negative family-differential parenting is associated with mother-and teacher-assessed externalizing and internalizing behavior (Table 6). This is not the case for positive family-differential parenting, except for mother-assessed externalizing behavior (0.08). In the NLSY79, negative maternal parenting behavior and interviewer observations of positive maternal behavior directed towards siblings are modelled together (Table 7). Here, negative family-differential parenting is not associated with parent-assessed externalizing and internalizing behavior and PPVT scores. However, there is a statistically significant association between positive family-differential parenting and PPVT scores: for each unit increase in family-differential parenting, there is a reduction of 1.96 in PPVT scores (Table 7).

Although secondary to the main aim of this investigation, the impact on child emotional-behavioral problems of maternal parenting level (assessed by family average) and child-specific differential parenting are also worthy of comment to enable comparison with other studies. With respect to negative maternal parenting, both child-specific differential parenting and family average levels were associated significantly and in the expected direction with all externalizing

outcomes, most internalizing outcomes (excluding OCHS teacher) and the PPVT. With respect to positive maternal parenting, associations were much weaker and more inconsistent. Three out of seven associations were significant (across the NLSCY and the NLSY79 samples) for child-specific differential parenting. Only one out of seven associations for family average levels was significant and this involved the PPVT in NLSY79.

Table 8 presents another perspective on the impact of parenting on children. Shown in the table are standardized coefficients linking maternal parental behavior to children's outcomes. The standardized effects for negative family-differential parenting (0.06 to 0.08) are similar in the OCHS and NLSCY for mother-and teacher-assessed externalizing behavior. In the NLSCY, the standardized effects for positive family-differential parenting are smaller and only one estimate (0.02) is statistically significant. As noted in the previous table, there is almost no association between family-differential parenting (positive or negative) and mother-assessed externalizing behavior in the NLSY79. Focussing on internalizing behavior, the standardized coefficients for negative family-differential parenting in the OCHS are nonsignificant and close to 0.0 for both parent and teacher assessments. In the NLSCY, there are statistically significant associations between negative family-differential parenting and parent-and teacher-assessed internalizing behavior (0.08 and 0.07, respectively in Table 8).

Explained Variance

Figure 1 shows the amount of explained variance attributable to the covariates and maternal parenting measures, respectively. Explained variance was estimated in three steps. In step one, only the covariates were entered into each model. The difference in residual variation between the null model and the covariate model, expressed out of 100%, indicates the variability accounted for by the covariates. The bottom part of the first column of Figure 1 shows that 10.67% of the variability in mother-assessed externalizing behavior in the OCHS was accounted for by the covariates. In step two, child-specific differential maternal treatment and family average were added to the model. The difference in residual variation between this model and the covariate model, expressed out of 100%, provides an estimate of the incremental variation accounted for by these two parenting measures combined. For mother-assessed externalizing behavior in the OCHS, this estimate is 6.98% shown in the middle part of column one. In step three, family-differential parenting was added to the model, and the difference in residual variation between this model and the previous one was used to estimate the incremental variation accounted for by family-differential parenting on its own. These estimates appear in dark grey at the top of each column. For mother-assessed externalizing behavior in the OCHS, this estimate is 0.62%.

The figure clearly shows that the amount of variation in externalizing behavior attributable to family-differential parenting is small in the OCHS and NLSCY, going from 0.46 to 0.76%. The amount of variation in internalizing behavior attributable to family-differential parenting in the OCHS is 0.09 and 0.02 for parent and teacher assessments, respectively; comparable estimates are larger in the NLSCY: 0.59 and 0.47%, respectively. In the NLSY79, 0.28% of the variation in

PPVT scores is attributable to family-differential parenting.

Overall, there are three general patterns in the distribution of explained variance. One, the covariates account for more variation in externalizing and internalizing behavior than the parenting measures. The exception to this is mother-assessed externalizing and internalizing behavior in the NLSCY where the parenting measures account for substantial amounts of variation in behavior (i.e., 22.41 and 10.38%, respectively). Two, total explained variance is much higher for externalizing behavior than for internalizing behavior. For example, the model parameters explain 18.27% (10.67 + 6.98 + 0.62) of the variation in mother-assessed externalizing behavior in the OCHS and only 10.07% (8.43 + 1.55 + 0.09) of the variation in mother-assessed internalizing behavior. Three, total explained variance is lower for teacher than for mother assessments, particularly for child internalizing behavior. For example, only 0.65% of the variability in teacher-assessed internalizing behavior is explained by the complete model in OCHS versus 10.07% for mother-assessed internalizing behavior.

Paternal Behavior

In the NLSCY, there were 288 (7.9%) families in which fathers served as the primary respondents. In these families, fathers reported on their own behavior (e.g., parenting, mood, etc) as well as their children's emotional-behavioral problems. The analyses were re-run for father respondents in the NLSCY. The explained variance attributable to paternal differential parenting, evaluated as a family-level experience, was 1.18 and 0.94% for externalizing and internalizing problems based on father reports and 0.27 and 0.52% for externalizing and internalizing problems based on teacher reports. The joint chi-square improvement in fit associated with paternal differential parenting was significant for externalizing and internalizing problems based on father reports ($\_^2$ =8.64 (2df), p=0.013; and $\_^2$ =6.00 (2df), p=0.049) but was not significant for teacher reports. Corresponding values for explained variance attributable to maternal differential parenting from Figure 1 – 0.74, 0.59, 0.46 and 0.47% – were slightly lower for three of the four comparisons. These data suggest that the impact of differential parenting behavior, evaluated as a family-level experience may apply to fathers as well as mothers. There were too few families in the OCHS (n=49) where fathers served as primary respondents to merit a separate analysis.

DISCUSSION

The findings of this study suggest that there is a positive association between differential-maternal parenting behavior, evaluated as a family-level experience and children's maladjustment. Although the magnitude of this association is sensitive to the type of maternal behavior, dimension of child adjustment and respondent assessing child behavior, the demonstrated effect is consistent for two of the three studies (i.e., the OCHS and NLSCY). There is also some evidence to suggest that the effect may be applicable to other developmental outcomes such as verbal reasoning (PPVT).

Like others, we found that child-specific differential parenting was associated with the

adjustment of individual children. Child-specific differential parenting was found to explain between 1-10% of the variance in children's outcomes depending on the sample and informant. Although such effects are not large (Turkheimer & Waldron, 2000), they have been found consistently. Within-family correlations and explained variance at level 1 were much larger than the between-family correlations and their explained variance at level 2. In other words, family-differential parenting exerted a modest adverse effect on children's adjustment, over and above the effect of the child's own experience of differential treatment. This effect was stronger for negative maternal behavior; the effects for positive maternal behavior were substantially weaker and less consistent at both the child and family levels.

This study was carried out to test the hypothesis that maternal parenting behavior assessed as a family-level construct, has adverse system-level impacts excluded from consideration in studies focussing only on within-family processes. It was stimulated by empirical studies and theory that have linked income inequality to population health. A central process underlying the perceived ill effects on health of income inequality is the natural tendency for individuals to compare themselves with others. Adverse psychological effects arise when these comparisons (whether conscious or not) lead to experiences of unfairness, inequity, personal insecurity and social anxiety. Proximity, continuous contact and a shared source of nurturance (parents) make children in the same family the natural point of reference for each other's good and bad fortunes. Furthermore, if we view child health and development as a function of how family resources are distributed among siblings (Foster, 2002), then parental treatment is a basic resource subject to competition. In the form of assets (parental warmth, support, stimulation) and liabilities (parental negativity, punitiveness and harshness), this resource can be expected to flow differentially among siblings leading to status hierarchies, with some children better off and some worse off, but more importantly, the system on average degraded by the process.

Family system theorists have argued that there is an experience of the family as a whole that is distinct from the processes in families that pertain to individuals or dyads (Minuchin, 1981; Nichols & Schwartz, 2001). In previous work this difference has been operationalized in measurement terms: unique measures have been constructed for the family level capturing processes such as boundary strength (Beavers & Hampson, 2003) and family cohesion (Olson, Sprenkle & Russell, 1979). An alternative conceptualisation is that the same processes operate across levels of the family but that the different levels of influence (whole family, dyadic, individual) can be captured through hierarchically structured measurement and data analysis, the approach examined in this study.

The individual effect of differential parenting is most likely a result of social comparison (Festinger, 1954). As disfavoured children consider the reasons for differential treatment they may experience themselves as diminished and less worthy of love. At the family level why should 'privileged' children be, on average, worse off? It may be that such children see themselves currently, or in the future, as vulnerable to a loss in status. If reasons for differential

treatment are not experienced as justifiable and predictable (Kowal & Kramer, 1997) this may engender fear that anyone could become the target of disfavour. Another possibility is that the quality of sibling relationship is affected adversely by differential treatment. Thus, although favoured children experience a net gain of parental support, they may simultaneously experience a net loss of sibling support. Brody, Stoneman & McCoy (1992) found that higher levels of differential parenting at Time 1 predicted a decrease in the quality of the sibling relationship. Sibling relationships have also been shown to influence adjustment outcomes (Bullock, Bank & Burraston, 2002). It may be, therefore, that the quality of sibling relationships mediates the family level effect of high variability of parenting on children's adjustment outcomes. Finally, it is possible that better off siblings respond empathically to worse-off siblings. Siblings have been found to confide and offer support to one another in stressful circumstances (Howe, Aquan-Assee, Bukowski, Lehoux, & Rinaldi, 2002; Jenkins, 1992) and the experience of empathy may result in more negative adjustment overall.

The findings in this study raise some interesting questions about the continuum of parental behavior and treatment of siblings in families, particularly about heterogeneity versus homogeneity as a principle guiding parent-child relationships. Although the regression parameters are generally small, they provide some support for the idea that heterogeneity in negativity/punitiveness is associated at a family level with children's emotional-behavioral problems.

Substantive and Methodological Issues

The empirical findings from this study raise some interesting questions about parenting influences at the family level. However, there are a number of study issues that bear close consideration. First of all, differential-maternal parenting measured as a family-level construct is simply the within-family standard deviation of parenting scores. Because of its construction, this measure will pick up nonlinear variation existing between child emotional-behavioral problems and child-specific differential parenting; it will also be correlated highly (e.g., approximately 0.80) with the square of child-specific differential parenting (quadratic term) measured at the child level. Indeed, adding a quadratic term for child-specific differential parenting to the models in Tables 5 and 6, reduces the regression parameters for family-differential parenting by as much as 40% in some instances. The problem here is one of attribution. The two measures are correlated highly and their empirical effects overlap and are difficult to separate. Unfortunately, we understand very little about parenting behavior as a family-level 'experience'. There is little or no basis to favour one explanation over the other (i.e., that the underlying relationship between parenting behavior and child adjustment is the result of nonlinear effects at the child level or variability in parenting behavior at the family level).

Second, the studies used in this report included multiple children per family and presented a unique opportunity to examine family-level effects. In general, strong sampling and weak measurement are common in secondary analysis studies that draw on general population surveys

to address specific research questions not included in the original proposals. These general population surveys tend to have omnibus objectives, substantial resources for sampling, limited time for measurement, and of course, an inability to anticipate or accommodate all of the questions that might interest researchers. The two most serious measurement concerns in this report are the use of single-item measures to assess parenting in the OCHS and NLSY79 and the reliance on a single perspective (mothers) to assess parenting in the OCHS and NLSCY. Although these measurement concerns are inherent weaknesses that cannot be overcome, differences in quality of measurement across the studies afford an opportunity to examine the pattern of results in view of the strength of measurement. Focusing on maternal self-assessments of their own negative parental behavior and ordering the studies by the quality of measurement would list the NLSCY, OCHS and NLSY79. Although the OCHS and NLSY79 both use single-item measures, the former captures a broader concept (frequency of discipline) over a longer period (6 months); while the latter focuses on a very specific activity (frequency of spanking) over a short interval (the past week). It is noteworthy that the size of the standardized regression coefficients for all of the maternal parenting measures (family-differential parenting, family average parenting and child-specific differential parenting) follows the same study ordering – a pattern consistent with the idea that weaker measurement across studies has attenuated associations in these models.

Reliance on a single perspective to assess parenting in the OCHS and NLSCY was inescapable. Two study features partially offset this limitation. One, there were 288 families in the NLSCY where fathers served as the primary respondents. A separate analysis of these families basically replicated the findings for mothers, suggesting that the impact of differential parenting behavior likely apply to fathers as well as mothers. Two, the inclusion of teacher assessments provided an independent perspective on child emotional-behavioral problems – the primary endpoint. Although the associations between child-specific differential parenting and family-average parenting were weaker for teacher-assessed emotional-behavioral problems than for mother-assessed emotional-behavioral problems, this was not the case for family-differential parenting. The standardized coefficients linking family-differential parenting and child emotional-behavioral problems were almost the same for mother and teacher assessments. Further to this, the inclusion of the observer-rated, four-item positive-parenting scale in the NLSY79 provided an alternative measure to maternal self-assessments of their own behavior. Based on this measure, the statistically significant association between family-differential parenting and PPVT scores offers some confirmation that variability in parenting behavior at the family level may have implications for child functioning.

Third, in general population samples, there are number of substantive reasons for expecting only weak associations between family-differential parenting and child adjustment. One, the effect of differential parenting on child adjustment is primarily a within-family phenomenon: this is evidenced by the substantial associations between child-specific differential parenting and child emotional-behavioral problems. Except in unusual circumstances, distal group-level effects are

likely to be weaker than proximal individual-level effects. Two, in the present study, some of the effects that might be attributable to family-differential parenting will be accounted for by family-to-family differences in mean levels of parenting. This occurs because the mean and standard deviation for parenting at the family level are correlated positively with one another. Also, family-differential parenting inhabits a narrower range of scores in comparison with family-to-family differences in mean levels of parenting. This may reflect a basic preference among parents to treat their children fairly and equitably. Economists have shown, for example, that parents place considerable value on equity in the allocation of educational investments among siblings (Behrman & Taubman, 1986).

Fourth, there is reason to believe that the effects of differential parenting will be modified and/or mediated by a variety of processes that are understood poorly at this time. These processes could include the perceptions and subjective experiences of children; and the structural, functional and material circumstances of the family. Researchers have drawn attention to the idea that children's sense of fairness may have an important bearing on the effects of differential parenting. Kowal & Kramer (1997) reported that siblings who rated parental differential parenting as fair also reported more positive sibling relationships; and, in a more recent study, fairness ratings and differential parental warmth exerted independent influences on self-esteem and positive sibling relationships (McHale et al., 2000). In families with a disabled sibling, it has been suggested that differential parenting behavior in response to readily apparent special needs may be viewed by other siblings as legitimate, and have few, if any, adverse effects (McHale & Pawletko, 1992). Indeed, sibling perceptions of each other's needs have been shown to modify the association between self-ratings of their relationship quality and parental-differential treatment. Kowal & Kramer (1997) reported that associations between parental-differential treatment and sibling warmth and closeness among later-born children were negative for those reporting low sibling needs and positive for those reporting high sibling needs. In general, these modifying effects depended on several factors such as sibling age, the aspect of relationship quality under consideration and whether parental-differential treatment referred to maternal or paternal behavior. Finally, the individual characteristics of children (sex and age) as well as the structural aspects of the entire sibship (sex and age composition) may serve to mediate the effects of differential parental behavior. For example, insofar as cognitive processes are involved in assessing sibling needs and evaluating the fairness of differential treatment, older children may be better able to adapt to differential parenting. Also, as parental influences weaken in adolescence, older children may simply be less susceptible to differential parental behavior whether it is viewed as fair or unfair. On the other hand, children close in age (within 2 years) and the same sex may be more likely to see differential parenting as unfair and respond negatively. This could happen if the expectation of equitable treatment is enhanced among children at similar developmental stages.

It is conceivable that the impact of differential maternal behavior on child adjustment, including family-differential parenting, will be more evident where children are drawn from populations at

higher risk for adjustment problems because of family structural, functional or material circumstances. For example, a study by Deal (1996) provides 'modest' evidence that marital conflict is predictive of parental-differential treatment across siblings. In a recent multilevel study examining predictors of differential parenting, Jenkins and colleagues (2003) reported that differential positivity was associated with child age, low SES, marital dissatisfaction and larger family size. Differential negativity was associated with children's temperament (moderated by SES), mixed gender sibships in families with marital dissatisfaction, and lone-parent families. If family stress exacerbates differential treatment then its effects may be more obvious in disadvantaged populations.

Finally, it is important to acknowledge that partitioning within-and between-family variation in child maladjustment and attributing some of this variation to parenting effects does little to resolve the ongoing dilemma about their origin and direction (Kuczynski, 2003; O'Connor, 2002). Parental behavior is part of a reciprocal, evolving interpersonal process with children, governed by genetic and environmental characteristics. The specificity of this process to individual parent-child dyads may mute system-level effects and magnify individual differences within families.

This study has conceptualized differential parenting as both a within-and between-family phenomenon. The evidence suggests that negative family-differential parenting is associated with an increase in externalizing problems. Although modest in size, the association is consistent across two different studies and there is some additional evidence that the phenomenon may generalize to other developmental endpoints such as verbal reasoning. The study of 'system-level' effects associated with parental treatment of siblings deserves further examination using intact sibships, stronger measures and more informative study designs. In addition to questions of generalizability, priority might be given to developing and testing new approaches to measuring differential parenting as a contextual phenomenon (i.e., not just the product of differences in parental treatment observed at the individual level) and to understanding the mechanisms through which parental behavior influences child outcomes.

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Table 1. Example parenting scores in sibships of varying size.

	Sibling raw scores				Between siblings Child-specific differences				Between families Family average	Between families Family differential
Family	A	B	C	D	A	B	C	D	(mean)	(SD)
1	8	12	4	6	0.5	4.5	-3.5	-1.5	7.5	3.4
2	6	10	8		-2.0	2.0	0.0		8.0	2.0
3	10	12			-1.0	1.0			11.0	1.4
4	14	8	2		6.0	0.0	-6.0		8.0	6.0

Table 2. Sample characteristics and response

Characteristic	OCHS	NLSCY	NLSY79
Study year	1983	1994	1992
No. of children (% participating)	2128 (86.7)	7392 (85.6)	2876 (66.9)
% male	52.1	50.6	51.3
Age in years, (M,SD)	4-16 (10.1, 3.4)	4-11 (7.47, 2.20)	3-14 (9.03, 2.91)
No. of families (% participating)	894 (86.9%)	3376 (85.9%)	1218 (70.2%)
% one-parent households	8.3	12.5	38.1
Socio-economic status, M(SD)	0.0 (1.0)	0.0 (1.0)	0.0 (1.0)
Maternal depressed mood, M(SD)	2.35 (1.73)	4.63 (5.34)	11.14 (9.74)
% 2 siblings	69.9	82.6	71.9
% 4+ siblings	6.0	1.5	6.1
Negative maternal parenting			
Child-specific differences, M(SD)[a]	0.0 (0.59)	0.0 (1.89)	-0.02 (1.03)[c]
Family average, M(SD)[b]	3.17 (1.59)	9.07 (3.29)	0.80 (1.33)[d]
Family differential, M(SD)[b]	0.40 (0.66)	1.90 (1.74)	0.62 (1.12)[d]
Positive maternal parenting	N.A.		
Child specific differences, M(SD)[a]		0.0 (1.42)	-0.00 (0.47)
Family average, M(SD)[b]		12.54 (2.62)	2.92 (0.99)
Family differential, M(SD)[b]		1.40 (1.26)	0.31 (0.50)
Child functioning (nonstandardized)[a]			
No. mother reports (%)	2128 (86.7)	7392 (85.6)	2876 (66.9)
Externalizing, M(SD)	3.47 (3.78)	5.60 (4.71)	7.44 (5.87)
Internalizing, M(SD)	2.99 (2.96)	2.22 (2.29)	3.53 (3.10)
No. teacher reports (%)	1618 (79.1)	3757 (56.8)	N.A.
Externalizing, M(SD)	3.63 (4.90)	4.34 (5.19)	
Internalizing, M(SD)	2.45 (2.98)	2.27 (2.57)	
No. PPVT reports (%)	N.A.	N.A.	2689 (62.5%)
PPVT, M(SD)			89.37 (18.45)

Note: OCHS = Ontario Child Health Study; parenting=frequency of punishment (negative); NLSCY = National Longitudinal Survey of Children and Youth, parenting=hostile ineffective (negative), positive interaction (positive); NLSY79 = National Longitudinal Study of Youth, parenting=frequency of spanking (negative), observed positive behavior (positive); PPVT = Peabody Picture Vocabularly Test.

[a]Child level variable. [b]Family level variable [c]Based on 1218 families [d]Based on 2876 children

Table 3. Pearson correlations between independent and dependent variables

	Externalizing Behavior					Internalizing Behavior					
	OCHS		NLSCY		NLSY79	OCHS		NLSCY		NLSY79	
Characteristic	Moth	Tea	Moth	Tea	Moth	Moth	Tea	Moth	Tea	Moth	PPVT
Children											
Male	.182	.256	.211	.289	.121	-.027[a]	.025[a]	.023[a]	.061	-.036[a]	-.013[a]
Age in years	-.042[a]	-.044[a]	-.119	-.016[a]	-.093	.117	.047[a]	.156	.027[a]	-.020[a]	.064
Families/parents											
One-parent households	.005[a]	.074	.141	.128	.097	.020[a]	.036[a]	.133	.100	.118	-.270
Socio-economic status	-.064	-.138	-.152	-.191	-.186	-.054[a]	-.052[a]	-.054	-.106	-.145	.393
Maternal depressed mood	.258	.078	.239	.126	.275	.264	.037[a]	.255	.099	.315	-.170
2 siblings	.038[a]	.035[a]	.036	.036[a]	-.062	.035[a]	.021[a]	.045	-.007[a]	-.039[a]	.166
4+ siblings	-.009[a]	-.039[a]	-.008[a]	-.001[a]	.069	-.018[a]	.000[a]	-.019[a]	.003[a]	.045[a]	-.155
Negative maternal parenting											
Child-specific differences	.216	.130	.347	.197	.144	.022[a]	.010[a]	.163	.054	.071	-.050
Family average	.230	.099	.407	.139	.253	.119	-.011[a]	.335	.085	.172	-.215
Family differential	.104	.105	.208	.109	.178	.048[a]	.014[a]	.180	.095	.110	-.173
Positive maternal parenting	N.A.					N.A.					
Child-specific differences			.023[a]	.007[a]	-.003[a]			-.117	- .015[a]	.020[a]	-.011[a]
Family average			-.064	.000[a]	-.037[a]			-.105	-.022[a]	-.050	.263
Family differential			.044	.039[a]	.081			.003[a]	.033[a]	.068	-.183

Note: OCHS = Ontario Child Health Study; parenting=frequency of punishment (negative); NLSCY = National Longitudinal Survey of Children and Youth, parenting=hostile ineffective (negative), positive interaction (positive); NLSY79 = National Longitudinal Study of Youth, parenting=frequency of spanking (negative), observed positive behaviour (positive); PPVT = Peabody Picture Vocabularly Test. Correlations computed at the individual level. Moth=mother report, Tea=teacher report. [a]$p>0.01$

Table 4. Fixed effects intercepts and random effects variance components for child externalizing and internalizing behavior

	OCHS		NLSCY		NLSY79	
Characteristic	Moth	Tea	Moth	Tea	Moth	PPVT
Externalizing						
Fixed effects						
Intercept	3.49 (0.10)	3.66 (0.14)	5.62 (0.06)	4.36 (0.09)	7.36 (0.14)	89.99 (0.46)
Random effects						
Level 2 (family)	5.34 (0.46)	5.06 (0.85)	6.21 (0.37)	7.55 (0.69)	13.73 (0.96)	176.43 (10.51)
Level 1 (child)	8.89 (0.36)	18.97 (0.92)	15.97 (0.36)	19.42 (0.67)	20.16 (0.70)	157.03 (5.69)
-2*loglikelihood	11459.7	9687.8	43526.2	22903.1	17952.0	22693.9
% variation						
Level 2 (family)	37.5	21.1	28.0	28.0	40.5	52.9
Level 1 (child)	62.5	78.9	72.0	72.0	59.5	47.1
Internalizing						
Fixed effects						
Intercept	3.02 (0.08)	2.45 (0.08)	2.23 (0.03)	2.27 (0.05)	3.50 (0.07)	
Random effects						
Level 2 (family)	4.18 (0.30)	1.02 (0.31)	1.55 (0.09)	1.18 (0.17)	4.50 (0.28)	
Level 1 (child)	4.56 (0.18)	7.86 (0.38)	3.68 (0.08)	5.41 (0.19)	4.94 (0.17)	
-2*loglikelihood	10278.1	7986.9.2	32805.9	17636.7	14134.4	
% variation						
Level 2 (family)	47.8	11.5	29.6	17.9	47.6	
Level 1 (child)	52.2	88.5	70.4	82.1	52.4	

Note: OCHS = Ontario Child Health Study, NLSCY = National Longitudinal Survey of Children and Youth, NLSY79 = National Longitudinal Study of Youth

Table 5. Beta coefficients and (standard errors) in multilevel regressions of parent and teacher-rated child emotional-behavioral problems on negative parenting behavior in the OCHS

Characteristic	Externalizing		Internalizing	
	Moth	Tea	Moth	Tea
Fixed effects				
Intercept	0.92 (0.28)‡	1.34 (0.39)‡	2.07 (0.24)‡	2.21 (0.24)‡
Control variables				
Child gender	1.19 (0.14)‡	2.36 (0.23)‡	-0.18 (0.11)	0.16 (0.15)
Child age	0.05 (0.02)*	-0.03 (0.04)	0.18 (0.02)‡	0.05 (0.02)
One-parent households	-0.56 (0.35)	0.82 (0.48)	-0.24 (0.30)	0.19 (0.30)
Socio-economic status	-0.15 (0.10)	-0.64 (0.13)‡	-0.03 (0.08)	-0.11 (0.08)
Maternal depressed mood	0.47 (0.06)‡	0.08 (0.08)	0.40 (0.05)‡	0.04 (0.05)
2 siblings	0.49 (0.21)*	0.27 (0.29)	0.34 (0.18)	0.16 (0.18)
4+ siblings	0.35 (0.38)	-0.58 (0.51)	0.05 (0.33)	0.04 (0.31)
Negative maternal parenting				
Child-specific differences	1.32 (0.10)‡	0.90 (0.18)‡	0.25 (0.08)‡	0.05 (0.12)
Family average (m)	0.46 (0.06)‡	0.21 (0.08)*	0.25 (0.05)‡	0.00 (0.05)
Family differential (sd)	0.46 (0.14)‡	0.63 (0.20)†	0.15 (0.12)	0.08 (0.12)
Random effects				
Level 2, family	4.26 (0.37)‡	4.38 (0.75)‡	3.69 (0.27)‡	1.03 (0.30)‡
Level 1, child	7.36 (0.30)‡	16.85 (0.82)‡	4.17 (0.17)‡	7.78 (0.38)‡
-2*loglikelihood	11051.5	9494.1	10075.1	7980.7

Note: OCHS = Ontario Child Health Study

*p<0.05, †p<0.01, ‡p<0.001

Table 6. Beta coefficients and (standard errors) in multilevel regressions of parent and teacher-rated child emotional-behavioral problems on positive and negative parenting behavior in the NLSCY

Characteristic	Externalizing		Internalizing	
	Moth	Tea	Moth	Tea
Fixed effects				
Intercept	-1.03 (0.34)*	-0.24 (0.58)	-0.27 (0.18)	1.34 (0.30)‡
Control variables				
Child gender	1.48 (0.09)‡	2.68 (0.15)‡	-0.06 (0.05)	0.26 (0.08)†
Child age	-0.23 (0.02)‡	-0.03 (0.04)	0.18 (0.01)‡	0.04 (0.02)
One-parent households	0.70 (0.16)‡	1.03 (0.28)‡	0.42 (0.09)‡	0.48 (0.14)‡
Socio-economic status	-0.43 (0.05)‡	-0.84 (0.09)‡	0.03 (0.03)	-0.19 (0.05)‡
Maternal depressed mood	0.09 (0.01)‡	0.05 (0.02)*	0.07 (0.01)‡	0.02 (0.01)†
2 siblings	0.47 (0.13)‡	0.49 (0.22)*	0.27 (0.07)‡	0.01 (0.11)
4+ siblings	0.33 (0.37)	0.68 (0.61)	-0.02 (0.20)	0.11 (0.31)
Negative maternal parenting				
Child-specific differences	0.83 (0.02)‡	0.47 (0.04)‡	0.19 (0.01)‡	0.06 (0.02)‡
Family average (m)	0.48 (0.02)‡	0.14 (0.03)‡	0.19 (0.01)‡	0.04 (0.01)*
Family differential (sd)	0.24 (0.03)‡	0.20 (0.05)‡	0.11 (0.02)‡	0.11 (0.03)‡
Positive maternal parenting				
Child-specific differences	0.07 (0.03)†	0.16 (0.06)*	-0.06 (0.02)‡	0.01 (0.03)
Family average (m)	0.01 (0.02)	0.06 (0.04)	0.01 (0.01)	0.00 (0.02)
Family differential (sd)	0.08 (0.04)*	0.10 (0.07)	-0.01 (0.02)	0.03 (0.04)
Random effects				
Level 2, family	3.97 (0.24)‡	6.36 (0.56)‡	1.02 (0.07)‡	1.01 (0.16)‡
Level 1, child	10.18 (0.23)‡	12.83 (0.54)‡	3.13 (0.07)‡	5.35 (0.18)‡
-2*loglikelihood	40204.6	22163.6	31216.5	17511.4

Note: NLSCY = National Longitudinal Survey of Children and Youth

*p<0.05, †p<0.01, ‡p<0.001

Table 7. Beta coefficients and (standard errors) in multilevel regressions of parent-rated child emotional-behavioral problems and PPVT scores on negative parenting behavior and observed positive behaviors in the NLSY79

Characteristic	Externalizing	Internalizing	PPVT
Fixed effects			
Intercept	5.54 (0.51)‡	3.29 (0.28)‡	84.94 (1.72)‡
Control variables			
Child gender	1.34 (0.18)‡	-0.25 (0.10)*	-0.63 (0.56)
Child age	-0.10 (0.03)†	-0.01 (0.02)	0.83 (0.10)‡
One-parent households	-0.02 (0.27)	0.18 (0.15)	-5.69 (0.85)‡
Socio-economic status	-0.66 (0.14)‡	-0.16 (0.08)*	5.17 (0.43)‡
Maternal depressed mood	0.14 (0.01)‡	0.09 (0.01)‡	-0.09 (0.04)*
2 siblings	0.15 (0.29)	0.16 (0.16)	2.67 (0.93)†
4+ siblings	0.24 (0.51)	0.05 (0.29)	-2.16 (1.64)
Negative maternal parenting			
Child-specific differences	0.75 (0.08)‡	0.22 (0.04)‡	-0.48 (0.24)*
Family average (m)	0.83 (0.13)‡	0.32 (0.07)‡	-1.00 (0.42)*
Family differential (sd)	0.00 (0.16)	-0.06 (0.09)	-0.44 (0.50)
Positive maternal parenting			
Child-specific differences	-0.13 (0.18)	0.11 (0.09)	0.19 (0.52)
Family average (m)	0.12 (0.13)	-0.01 (0.07)	2.48 (0.45)‡
Family differential (sd)	0.29 (0.26)	0.08 (0.14)	-1.96 (0.84)*
Random effects			
Level 2, family	9.88 (0.77)‡	3.40 (0.23)‡	105.58 (7.52)‡
Level 1, child	18.32 (0.63)‡	4.84 (0.17)‡	149.22 (5.38)‡
-2*loglikelihood	17513.0	13870.4	22200.9

Note: NLSY79 = National Longitudinal Survey of Youth
*p<0.05, †p<0.01, ‡p<0.001

Table 8. Standardized coefficients and explained variance attributable to negative and positive parenting on child externalizing and internalizing behavior and PPVT scores.

	OCHS		NLSCY		NLSY79	
Characteristic	Moth	Tea	Moth	Tea	Moth	PPVT
Externalizing behavior						
Negative maternal parenting						
Child-specific differences	0.21‡	0.11‡	0.33‡	0.17‡	0.13‡	-0.03*
Family average (m)	0.19‡	0.07*	0.34‡	0.09‡	0.19‡	-0.07*
Family differential (sd)	0.08‡	0.08†	0.09‡	0.06‡	0.00	-0.03
Positive maternal parenting						
Child-specific differences	n/a	n/a	0.02†	0.04*	-0.01	0.00
Family average (m)	n/a	n/a	0.01	0.03	0.02	0.14‡
Family differential (sd)	n/a	n/a	0.02*	0.02	0.03	-0.05*
Internalizing behavior						
Negative maternal parenting						
Child-specific differences	0.05‡	0.01	0.15‡	0.05‡	0.07‡	
Family average (m)	0.13‡	0.01	0.27‡	0.05*	0.14‡	
Family differential (sd)	0.03	0.02	0.08‡	0.07‡	-0.02	
Positive maternal parenting						
Child-specific differences	n/a	n/a	-0.04‡	0.01	0.02	
Family average (m)	n/a	n/a	0.01	0.00	-0.01	
Family differential (sd)	n/a	n/a	-0.01	0.02	0.01	

Note: OCHS = Ontario Child Health Study, NLSCY = National Longitudinal Survey of Children and Youth, NLSY79 =

National Longitudinal Study of Youth. *p<0.05, †p<0.01, ‡p<0.001