

# Measurement of Parenting Practices in Research on Adolescent Problem Behavior: A Multimethod and Multitrait Analysis

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## MEASUREMENT STRATEGIES

One of the most perplexing issues in research on adolescent problem behavior is establishing the critical dimensions of parenting. What is it that parents do to establish, maintain, or alter the developmental course of their teenager? Careful examination of the measurement properties and validity of diverse approaches to conceptualization and assessment of parenting practices can be informative to intervention science as well as to the understanding of developmental processes. The focus of this study was to conduct a confirmatory factor analysis (CFA) of multiple measures of parenting practices within a sample of families with a high-risk, young adolescent (10 to 14 years old). The families were involved in a series of intervention studies conducted to reduce escalating trends in problem behavior (Andrews et al. 1995; Dishion and Andrews 1995; Dishion et al. 1996).

Parents' family management strategies (Patterson 1982; Patterson et al. 1992) and the affective connection between parent and child (described as either the attachment relationship or parent-child bond) are the two basic sets of variables that are most studied (Bowlby 1969; Elliott et al. 1985; Hirshi 1969). The family management perspective emphasizes the role of parenting practices in minimalizing coercive conflicting exchanges that contribute to antisocial and other problem behaviors. Researchers who emphasize relationship quality in children's development consider this relationship as crucial or prototypical to the adolescent's success in other relationships throughout the lifespan.

It is certainly possible to integrate multiple dimensions of influence into a more comprehensive view of the influence of parenting on child and adolescent social development. Baumrind (1985) considers parenting to be conceptualized on two dimensions: warmth

(relationship quality) and control (behavior management). Hawkins and colleagues (1986) and McCord (1991) view the parent-child bond as a separate but correlated feature of the family environment distinguishable from family management. The integration of family management and relationship theories appears to show promise in accounting for adolescent delinquent behavior in longitudinal studies. For example, McCord (1992) has reanalyzed the Cambridge-Somerville data and found that both dimensions of parenting are prognostic of adolescent delinquency. This study is particularly important because measures of parenting were derived from coding many independent home visitors' impressions.

The developmental and clinical literatures do not necessarily present a coherent picture of the contribution of parents to adolescent substance use. Dishion and Loeber (1985) and Dishion and colleagues (1988) found that parental monitoring is the key factor in accounting for the young adolescent's drift into a deviant peer group as well as early involvement with substance use. A program of research conducted by Conger and colleagues (1992) suggests that poor parent-child relationships and family disruption may be uniquely predictive of substance use in adolescence. Structural and strategic family therapists emphasize the systemic nature of family transactions with respect to the young adolescent's problem behavior (Stanton and Todd 1982; Szapocnik and Kurtines 1989). For example, the drug-using child (being the youngest or only child in a family) is perhaps too close to parents (i.e., enmeshed), which interferes with the parent's ability to set limits and/or monitor their child's behavior. Another systemic theme is the triangulated relationship process, where the child fills a special niche in the lives of parents living in marital distress. Thus, a child may be protected by the mother and punished too severely by the father as a function of the child's position and coalition with respect to the two parents.

It is the authors' position that the systemic view of families is useful for understanding the emotional underpinnings of the compromised parent-child relationships as well as the parent's performance of family management practices. Understanding systemic patterns also provides the details necessary to effectively intervene to reduce or prevent adolescent problem behavior. The authors suggest that all family-based intervention models require a set of constructs and a model that delineates developmental processes leading to adolescent problem behavior and serves as an intervention target. A useful step in this process is to conduct construct validation studies that clarify the interrelation among parenting constructs in addition to measurement issues that affect their predictive validity.

Building on the work of Patterson and colleagues (1992), the authors collected measures from child, parent, and staff impressions on five family management constructs: limit setting, monitoring, problemsolving, positive reinforcement, and relationship quality. A significant advancement in research on parenting practices is the use of multitrait-multimethod data. By combining measures one can reduce the fallibility of any individual strategy and avoid the possibility of monomethod bias (Cook and Campbell 1979; Dwyer 1983). The authors used a multitrait-multimethod (MTMM) measurement strategy to address construct validation questions: To what extent are these parenting constructs intercorrelated and at what level? The level of correlation among the parenting trait constructs speaks to the issue of whether these practices are part of a general parenting style or reflect distinct dimensions. To what extent does the measurement method (i.e., reporting agent) account for covariation among the observed data?

Bank and colleagues (1990) discuss the issue of method problem in the context of structural equation modeling. A method problem exists when the most highly correlated indicators within a model are those derived from the same measurement method. In an MMTM analysis, method constructs can be operationalized and studied along with parenting trait constructs. CFA is a powerful statistical protocol for addressing these questions. In the context of structural equation modeling, competing models (e.g., trait versus method) can be compared using indices of model fit as well as differences in the chi-square goodness-of-fit test (Bentler and Bonett 1980).

The parenting constructs (trait or method) were also evaluated with respect to criterion and predictive validity. In this analysis, measures of criterion and predictive validity were objective and independent of the measures used to define the parenting constructs. Direct observations of parent-child negative exchanges form a valid criterion measure of parenting relevant to the coercion model of the development of adolescent problem behavior (Patterson 1982; Patterson et al. 1992), as well as serving as a target of change in parenting interventions (Dishion and Andrews 1995; McMahon and Peters 1990; Patterson 1974; Webster-Stratton and Hammond 1990). Official school and police records of the youth's conflicts with authority in the 2-year period after the initial assessment were used as an index of problem behavior.

## METHOD

### Participants

The participants used in this analysis were recruited for the Adolescent Transitions Program, an intervention designed to help prevent adolescent alcohol and other drug use. Participants were recruited in seven cohorts over a 4-year time period, from 1988 to 1992. All participants in the study were considered at risk. Cohorts 1 through 5 were referred by parents and were in grades 6, 7, and 8. Cohorts 6 and 7 were recruited through the schools and were all in grade 7. Baseline data for all participants were combined in the models tested.

The 224 participants included 111 boys and 113 girls. At baseline they ranged in age from 10 to 14 years old, with an average age of 12.2 years. The family status of the participants included 42.9 percent from single- family households (mostly single mothers), 36.2 percent from two-parent families where one of the parents was a stepparent, and 21 percent from intact two-parent families. The families tended to be economically disadvantaged, with 48.2 percent receiving some sort of financial aid. Sixty percent of the families had a gross annual income under \$20,000. Eighty percent of the mothers and 74 percent of the fathers had completed high school. For both mothers and fathers, 17 percent had graduated from college. All participants resided in a moderate-size northwestern city. The participants were predominantly (90 percent) European American. Assessment data included questionnaires, interviews, telephone interviews, videotaped observations, and official records.

### Procedures

**Interviews and Questionnaires.** Prior to the start of treatment (baseline) and again shortly after completion of treatment (termination), the teens and their parents were interviewed separately. The interviews lasted approximately 45 minutes, and afterward the interviewer was asked to fill out an impressions form containing 25 questions covering a broad range of characteristics ranging from rating the child's social skills to how likely it would be for the child to get into trouble with the police. Prior to the interview, the parent (or parents) and child were asked to complete several questionnaires. Questionnaires were also sent to the child's teacher, including the Peer Involvement and Social Skill

Questionnaire (Walker and McConnell 1988) and the Teacher Child Behavior Checklist (Achenbach 1991).

Observations. At baseline and again at termination, the child and parents were videotaped in a 25-minute family interaction task. Before the lab task began, the parents and child were presented with a list of possible discussion topics and asked to rate how “hot” the topic was. The lab task comprised a 5-minute warmup session where the family was asked to plan an activity that they could do together in the coming week, followed by two 10-minute sessions where the family discussed a problem identified by the child as “hottest” and one identified as “hottest” by the parents. Parent and child problems were taken in random order.

The session was coded using the Family Process Code (FPC) (Dishion et al. 1983) and the Pencil and Paper Code (PEN-P) (Dishion and Soberman 1994). The FPC is a microsocial coding system that records family interaction in real time, capturing the interpersonal content and affective valence of the discussion. Twenty percent of the videotapes were coded by two observers. Reliability between the two observers was determined by comparing the moment-by-moment entries using a 6-second “window of agreement.” There was 86.4 percent agreement on the content of the code (basic code category) and 73.4 percent agreement on affective valence. Percent agreement on content and affect codes ranged from 0.37 to 0.91 across different observers. An overall weighted kappa of 0.69 was found on the combined content and valence of each entry, with kappa scores ranging from 0.37 to 0.78 (Cohen 1955).

The PEN-P system uses 1-minute intervals to measure negative and positive exchanges, as well as the rate of negative engagement between the interactants. Two types of exchanges, directed (to an individual) and undirected (not to an individual), were coded.

Coder Impressions. FPC coders were asked to complete a 27-item questionnaire regarding the outcome of the problemsolving: clarity of problem definition, extent of resolution of the problem, quality of solutions, personality variables of the interactants, the parents' skill in discipline confrontations, as well as their involvement with the child and positive reinforcement practices (Forgatch et al. 1985).

PEN-P coders were also asked to give impressions of family variables including endorsement of deviant norms, family management style,

relationship quality, problemsolving resolution, and emotional control.

**Telephone Interviews.** At baseline, termination, and at yearly followup intervals, the parents and teens were contacted by telephone for a series of six brief interviews, conducted at 3-day intervals. An attempt was made to conduct both the parent and the child telephone interviews on the same day whenever possible. The telephone interview included an assessment of the child's involvement in substance use, deviant peer groups, and other delinquent behaviors, as well his or her impressions of the parents' monitoring and discipline practices.

**Official Records.** Adult and juvenile court records were retrieved from the court system by Oregon Social Learning Center (OSLC) staff members. School records assessment included standard test scores, transcripts of grades, attendance, and discipline contacts. Records were also kept of out-of-home placements to juvenile corrections facilities, group homes, and special schools for children with problem behavior.

**Construct Formation.** The formation of constructs was hypothesis driven. Items from the interviews and from staff impressions were generated to measure constructs within a general model of antisocial behavior (Patterson et al. 1992). Items with measures were related to constructs on an a priori basis. In the present analysis, the measurement method refers to reporting agent. Table 1 includes an identification of the construct, the reporting agent, the instrument used, and 3-month retest stability. All constructs were formed from data collected prior to the start of treatment. Three-month retest stability scores were formed by correlating baseline measurements with like measurements taken shortly after termination.

## CONSTRUCT DEFINITIONS

### Monitoring

The definition of this construct relies on measures used in previous studies (Patterson and Dishion 1985). Parent monitoring involves

	Monitoring		Limit Setting		Relationship Quality		Positive Reinforcement		Problemsolving	
	N	$\alpha$	N	$\alpha$	N	$\alpha$	N	$\alpha$	N	$\alpha$
Total construct		0.70 <sup>‡</sup>		0.54 <sup>‡</sup>		0.67 <sup>‡</sup>		0.51 <sup>‡</sup>		0.47 <sup>‡</sup>
Total child report		0.63 <sup>‡</sup>		0.47 <sup>‡</sup>		0.61 <sup>‡</sup>		0.47 <sup>‡</sup>	5	0.87 <sup>m</sup>
Child interview	8	0.68	--	0.47 <sup>‡</sup>	--	0.49 <sup>‡</sup>	--	0.40 <sup>‡</sup>		0.46 <sup>‡</sup>
Child daily report	--	--	--	0.33 <sup>‡</sup>	--	0.67 <sup>‡</sup>	--	0.40 <sup>‡</sup>		
Total parent report		0.51 <sup>‡</sup>		0.64 <sup>‡</sup>		0.63 <sup>‡</sup>		0.59 <sup>‡</sup>	7	0.79 <sup>mm</sup>
Parent interview	13	0.81 <sup>m</sup>	11	0.81 <sup>m</sup>	5	0.85 <sup>m</sup>	--	0.57 <sup>‡</sup>		
Parent daily report	5	0.38	--	0.29 <sup>‡</sup>	--	0.60 <sup>‡</sup>	--	0.42 <sup>‡</sup>		
Family activities report					28	c				
Total staff impressions		0.33 <sup>‡</sup>		0.15 <sup>‡</sup>		0.43 <sup>‡</sup>		0.35 <sup>‡</sup>		0.43 <sup>‡</sup>
FPC coder impressions		0.20 <sup>‡</sup>	5	0.73	5	0.86 <sup>m</sup>	0.22 <sup>†</sup>	0.31 <sup>‡</sup>	--	--
PEN-P coder impressions		0.26 <sup>‡</sup>	--	0.32 <sup>‡</sup>	5	0.86 <sup>m</sup>	0.38 <sup>‡</sup>	0.20 <sup>†</sup>	8	0.86

NOTE: Dashes indicate the scales consisting of fewer than five items were not reported; m = values for the mother responses; n = separate alphas computed for the parent and child problems; c = scale was formed as a count of the number of items enclosed.

<sup>†</sup>p < 0.05

<sup>‡</sup>p < 0.01

<sup>‡‡</sup>p < 0.001

ensuring that the child is in settings that are supervised by adults, articulation and enforcement of rules that track the child's whereabouts (e.g., knowing the phone number of friends where the child is visiting), and professional impressions of the parent's supervision of the child.

**Child Report.** This score is made up of the child's report from a personal interview and a series of telephone interviews that were conducted six separate times. In the interview the child was asked, "Do your parents know if you play with kids who get into trouble?", "Do your parents let you go anywhere without asking?", "How often do you tell your parents when you will return?", and "How often do you leave a note for your parents?" In the telephone interview the child was asked, "How much time have you spent with your parents in the previous 24 hours?" and "How often do you talk with your parents about what you have done or are going to do?"

**Parent Report.** This score consists of the parent's report from a personal interview and a telephone interview conducted six separate times, covering the previous 24 hours. In the personal interview the parent was asked, "How often does your child go to forbidden places?", "How difficult is it to know where your child is?", "How often is there adult supervision when your child is away from home?", "How often is your child home by the set time?", and "How often is your child at a friend's house when they say they will be?" In the telephone interview the parent was asked, "How much time have you spent with your child in the previous 24 hours?" and whether or not the child was out after 7:00 p.m. without an adult.

**Staff Impressions.** This score includes two separate impression inventories. Staff members using the FPC were asked to rate how well the parent (or parents) seemed to monitor the child. FPC intercoder reliability was 0.55,  $p < 0.001$ . Staff members using the PEN-P were asked to rate how well informed the parents were about their child's whereabouts and whether the parents avoided intervening with the child. The intercorrelation between two raters was 0.38,  $p < 0.05$ .

### Limit Setting

This construct (referred to as discipline in previous research; Patterson 1982; Patterson et al. 1984, 1992) has been expanded to include the parents' tendency to articulate clear and consistent rules. Skillful limit setting is firm, consistent, nonabusive, and used sparingly.



Child Report. The child's report from the personal interview asked, "How often do your parents punish you after threatening punishment?", "How often can you get out of your parents' punishment?", "How often do your parents agree on punishment?", and "How often do your parents punish fairly?"

Parent Report. This report from the personal interview assessed limit-setting skills: "How often do you follow through on punishment?", "How often does your punishment depend on mood?", and "How often can your child get out of a punishment?"

Staff Impressions. After coding the family's videotaped interaction using the FPC, staff members rated the parents' limit-setting abilities: "Did the parent (or parents) use ineffective discipline?", "Did the parent seem to lack parental discipline?", and "Did the parent give rationales?" FPC intercoder reliability was 0.61,  $p < 0.001$ . The two relevant questions from the PEN-P coder impressions, "Mom/Dad suggested ability to set limits" and "Mom/Dad suggested use of punitive limit setting," were dropped due to poor correlation with other limit-setting items.

## Relationship Quality

The quality of the parent-child relationship in early adolescence reflects three theoretical dimensions: the extent to which the parent and child are positive with one another when discussing family issues, the extent to which the parent and child are involved in one another's lives in terms of shared activities, and the sense of mutual acceptance and lack of rejection.

Child Report. This score included the child's report from the personal interview and the telephone interview. In the personal interview the child was asked, "How well do you get along with each of your parents?" In the telephone interview the child was asked, "Do your parents hug, kiss, or show affection to you?"

Parent Report. This score included the parent's report from the personal interview, the telephone interview, and the Family Activities Checklist (1984). This checklist contains 28 activities that previous groups of OSLC-study parents and children have identified as pleasurable events (e.g., go to a movie together). Parents were asked to indicate whether any of the activities occurred within the last week. In the personal interview the parent was asked, "How easy is it to spend time with your child?" and "How difficult is it to be patient

with your child?" In the telephone interview the parent was asked, "How often do you hug, kiss, or show affection to your child?"

Staff Report. After coding the family's videotaped interaction using the FPC, staff members were asked to rate the relationship each parent had with the child, how often each parent engaged in various behaviors with the child (e.g., "How often was Mom/Dad verbally affectionate with child?", "How often was Mom/Dad hostile to child?"), and how often the child engaged in various behaviors with each parent (e.g., "How often was the child friendly to Mom/Dad?", "How often did the child seem detached from Mom/Dad?"). FPC intercoder reliability was 0.69,  $p < 0.001$ . Staff members using the PEN-P were also asked, "How often did Mom/Dad/child show expressions of affections?", "How often did Mom/Dad/child use humor to lighten the situation?", and "How much does each family member enjoy spending time with the family?" The correlation among PEN-P coders was 0.66,  $p < 0.001$ .

### Problemsolving

This construct reflects the parent's skill in actively resolving points of conflict or other family problems. The construct was first specified in Patterson's (1982) discussion of family management. Research by Forgatch (1989) studied the problemsolving process in detail, finding that expressed negative emotion disrupted problemsolving discussions and outcomes.

Child Report. After a structured problemsolving task where the family was asked to solve a problem that the parent (or parents) chose and one that the child chose, the child was asked, "How well did you understand the problem?", "Do you think the problem was solved during the discussion?", and "How satisfied are you with the discussion?"

Parent Report. After the structured problemsolving task, the parents were asked, "How much did you agree on a solution?" and "Did the family decide to take some action?"

Staff Report. After coding the structured problemsolving task using the FPC, staff members were asked to rate how much each parent provoked the child to argue. FPC intercoder reliability was 0.64,  $p < 0.001$ . Staff members using the PEN-P were asked to rate how much of an emotional topic the problem was for the family and how well the family solved the problem (e.g., "What was the quality of the

proposed solution?”, “How likely is the family to follow through with the proposed solution?”, and “Did the family discuss the advantages and disadvantages of the proposed solution?”). PEN-P intercoder reliability was 0.52,  $p < 0.001$ .

### Positive Reinforcement

This construct reflects the parents’ skill in praising or complimenting their child as well as their use of giving extra privileges for desired behaviors.

**Child Report.** In the personal interview the child was asked, “How often does your parent reward or praise you daily?” and “How often is your parent hard to please?” In the telephone interview the child was asked, “Did your parent praise or compliment you in the previous 24 hours?” and “Did your parent give you extra privileges?”

**Parent Report.** In the personal interview the parent was asked, “How often did you praise your child for a good job?” and “How often did you give something extra because you were pleased with your child?” In the telephone interview the parent was asked, “Did you praise or compliment your child in the previous 24 hours?” and “Did you give something extra to your child in the previous 24 hours?”

**Staff Report.** After coding the family's videotaped interaction using the FPC, staff members were asked to rate each parent on whether they used sarcasm and whether or not they were positive and reinforcing. FPC intercoder reliability was 0.62,  $p < 0.001$ . PEN-P coders were asked to rate each parent on whether they suggested using a social learning strategy for behavior management and whether they suggested behavior management strategies that were hard to carry out. The correlation among PEN-P coders was not significant at 0.27.

### Observed Family Coercion

This construct reflects the amount of conflict or unpleasantness within the family. It comprises the rate-per-minute score of negative engagement from the observations by staff members using the FPC and the total number of negative engagements using the PEN-P. Negative engagements were considered to be interactions that were negative by their very nature (e.g., hitting, insulting) or interactions that were carried out in an aversive affect. The score was based on mother-to-child negative engagements and child-to-parent negative engagements. The correlation between the negative engagement

scores derived from the FPC and PEN-P was 0.56. Observation data used in this study were taken prior to the start of treatment.

### Authority Conflict

This construct indicated how often the child was disciplined at school or had contact with police for problem behavior in the 2 years after intervention. It was measured using three scores created from public records. First, from juvenile court records, the number of offenses were counted and split into four scores: 0 = no offenses, 1 = one offense, 2 = two offenses, and 3 = three or more offenses. Second, the child's school status was defined: 0 = in public school, 1 = in a special school because of behavioral problems or court mandate, and 2 = dropped out or expelled from school. Third, from school records a score was created based on the number of discipline contacts the student received: 0 = no discipline contacts, 1 = below the 50th percentile of those receiving discipline contacts, 2 = between the 50th and 75th percentiles, and 3 = above the 75th percentile. The three scores were then added together to create the Authority Conflict score.

### ANALYSIS STRATEGY

In analyzing this MTMM dataset, the authors followed the recommendations of Bagozzi and Marsh (Bagozzi 1993; Marsh and Grayson 1995). The Structural Equations Program (EQS) (Bentler 1989) was used to test four nested factor models: (1) the least plausible model is the null model ( $M_0$ ), specifying that all measures were mutually uncorrelated; (2) the trait model ( $M_1$ ), suggesting that covariation among measures is accounted for by four correlated parenting traits; (3) the methods model ( $M_2$ ), indicating that the factors associated with the reporting agent accounted for the majority of the covariation within these data; and (4) the "relativism" model ( $M_3$ ), stating that both measurement method and parenting traits accounted for covariation among those data.

The models were evaluated with three fit indices: traditional chi-square goodness-of-fit, the Tucker-Lewis Index (TLI) (Tucker and Lewis 1973), and the Comparative Fit Index (CFI) (Bentler 1990). The authors followed Marsh's (1989) guidelines when running and evaluating the models: obtaining a well-defined solution (i.e., a proper converged solution, permissible parameter estimates), considering the theoretical justification parameter estimates, and examining test

statistics and goodness-of-fit indices of a model with those obtained through alternative model comparisons.

After testing the four nested models of the data, the authors examined the relative proportion of variance in the indicators that were accounted for by method and construct variance. In addition, the validity of the parenting method constructs was tested with respect to observed family coercion (criterion validity) and subsequent adolescent conflicts with authority (predictive validity).

## RESULTS

Originally, 15 indicators represented the five parenting constructs. Inspection of the correlation matrix and initial confirmatory factor analyses revealed that the Limit Setting construct was not empirically supported.<sup>1</sup> Dropping this construct rendered a 12 x 12 correlation matrix, shown in table 2. Using the terms defined by Campbell and Fiske (1959), the MTMM matrix comprised three types of correlations: first, the monotrait-heteromethod (MTHM) correlations, describing the correlation among measures of the same trait using different methods (i.e., convergent validity). Second, heterotrait-heteromethod (HTHM) correlations, including measures of different traits assessed by different methods. Third, heterotrait-monomethod (HTMM) correlations represented correlation among measures of different traits assessed by the same method.

Campbell and Fiske (1959) provided criteria for evaluating convergent and discriminant validity. Evidence of convergent validity is obtained if the MTHM correlations are large and significantly greater than zero. Discriminant validity is indicated if the MTHM correlations are significantly greater than the HTHM correlations, the MTHM convergent validities are higher than HTMM correlations, and the pattern of correlations using different traits is similar for different methods.

**TABLE 2.** *Person product-moment correlations among measures of parenting practices (N = 220).*

Trait Measured	1	2	3	4	5	6	7	8	9	10	11	12
<b>Monitoring</b>												
Child	1.00											
Parent	0.34	1.00										
Staff	0.31	0.34	1.00									
<b>Relationship quality</b>												
Child	0.37	0.26	0.27	1.00								
Parent	0.30	0.54	0.22	0.39	1.00							
Staff	0.20	0.29	0.47	0.39	0.34	1.00						
<b>Problemsolving</b>												
Child	0.24	0.14	0.25	0.40	0.15	0.38	1.00					
Parent	0.16	0.15	0.31	0.32	0.27	0.35	0.67	1.00				
Staff	0.15	0.20	0.40	0.28	0.27	0.67	0.39	0.44	1.00			
<b>Positive reinforcement</b>												
Child	0.42	0.21	0.15	0.50	0.21	0.19	0.16	0.14	0.04	1.00		
Parent	0.08	0.25	0.12	0.08	0.36	0.14	0.11	0.14	0.09	0.26	1.00	
Staff	0.11	0.27	0.49	0.19	0.24	0.67	0.28	0.29	0.65	0.06	0.15	1.00

Examining the convergent validities in table 2, all correlations but one were moderate in size (ranging from 0.06 to 0.67 with a mean of 0.34) and statistically significant ( $p$  value ranging from 0.03 to 0.001). In general, the data were consistent with moderate levels of convergent validity.

The first step in examining discriminant validity was to compare the convergent validities with those correlations that did not share method or trait (HTHM). At the very least, measures of the same trait should correlate higher than those that measure neither the same trait nor method.

Consistent with Bagozzi and Yi (1990) and Byrne and Goffin (1993), the authors used an a priori value to determine the degree to which discriminant validity was achieved: Less than 5 percent of the comparisons of violated expectations would reflect a high degree of discriminant validity, less than 30 percent of violated expectations represented moderate, and greater than 30 percent represented a low level of discriminant validity. On the basis of these guidelines, the authors found moderate support for discriminant validity (i.e., 14 percent of violations in 10 out of 72 comparisons, convergent validities were higher than HTHM values). Violations were primarily due to child-staff and parent-staff measures.

The second step in determining discriminant validity concerns the issue of method effects. Of the 72 comparisons, 13 were found to have violated the Campbell-Fiske criterion. Thus moderate support for the discriminant validity of the 12 indicators was found using the a priori criterion described previously (i.e., 18 percent violations in 13 out of 72 comparisons). Again, violations were primarily due to child-staff and parent-staff measures.

In summary, evaluation of the MTMM matrix based upon the Campbell-Fiske (Campbell and Fiske 1959) criterion appeared to lend moderate support for discriminant and convergent validity for both the method and trait constructs. Reliance on observed correlations, however, provided an imprecise and potentially misleading basis for assessing construct validity. An observed correlation will reflect random error and method effects in addition to the true association among measures of traits. The Campbell-Fiske procedure provided no concrete information as to the separate amounts of variation in measures due to traits, methods, and random error. For this reason the authors used structural equation modeling to disentangle trait, method, and uniqueness in this set of 12 measures of parenting.

## MTMM Confirmatory Factor Analysis

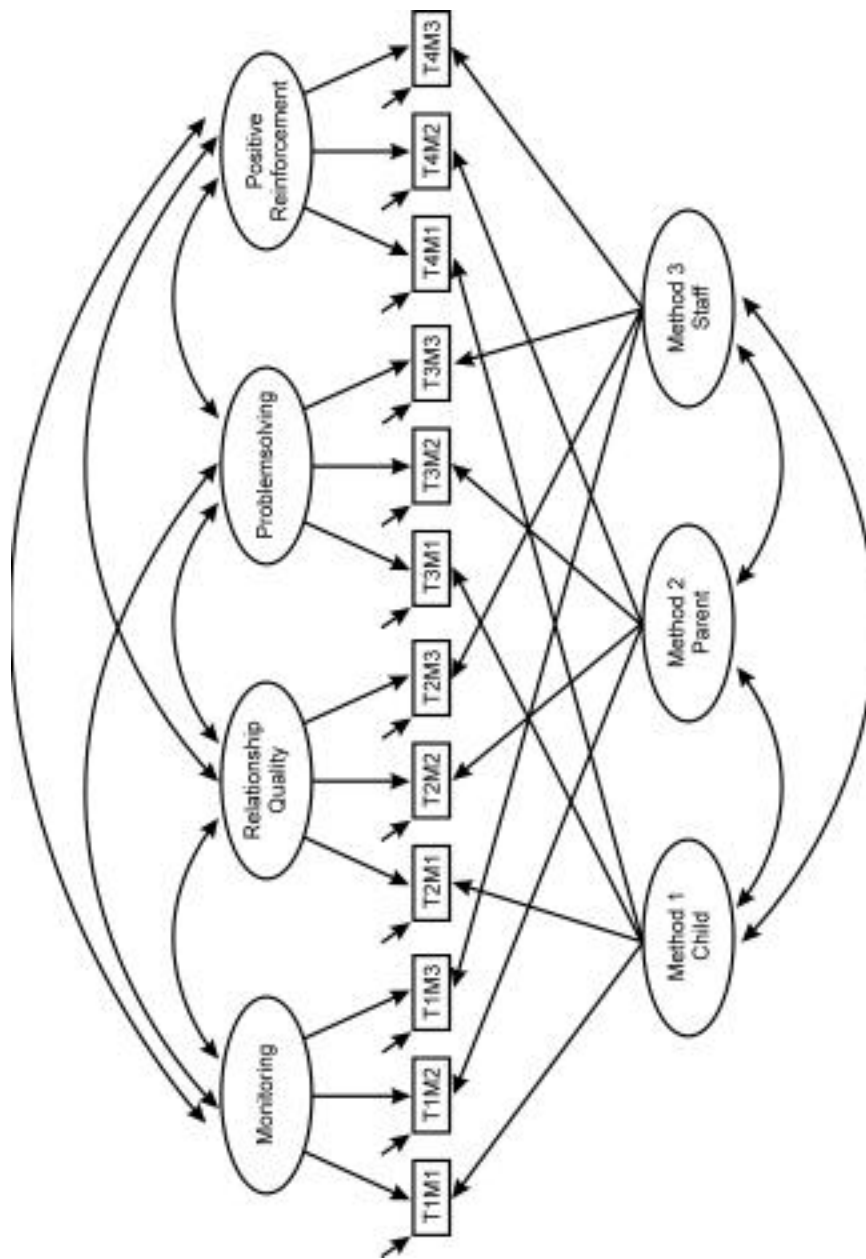
Maximum likelihood estimation assumes that the data being analyzed are multivariate normal. As a preliminary step, the distributional properties of the 12 indicators used in the MTMM analysis were examined (see figure 1). Skewness and kurtosis measures suggested that the marginal distributions of the data set were normal; skewness values averaged 0.35, with a range of  $-0.53$  to  $0.16$ , and kurtosis values averaged 0.27 (absolute value), with a range of  $-0.53$  to  $0.14$ .

The tests of the four models are presented in table 3 along with the goodness-of-fit indices (chi-square statistic, TLI, CFI) that were derived from comparing the model-generated covariation coefficients with the observed covariation among the 12 indicators.<sup>2</sup> Because ill-defined solutions occur frequently in the CFA application to MTMM analysis, it is recommended that researchers place their emphasis only on those models that result in proper solutions (Bagozzi 1993; Marsh 1989; Marsh and Grayson 1995). In these analyses, all four models resulted in proper, identified solutions.

Examination of the models' goodness-of-fit indicated that all models were superior in fit to the null model ( $M_0$ ). However, both  $M_1$ , in which no method effects were hypothesized, and  $M_2$ , in which no traits were specified, fit the data poorly. The lack of fit in  $M_1$  and  $M_2$  indicated that model misspecification resulted from the elimination of either trait or method effects and suggested the need to consider modeling both effects (trait and method) simultaneously. As can be seen in table 3,  $M_3$  provided an improved fit to the data over all previous models. Thus, the specifications of both method and trait effects provided the best account of the observed covariation among these of parenting practices.

The standardized loadings for each method and trait construct based on  $M_3$  are shown in table 4. Convergent validity is reflected in the magnitude of the trait loadings. Although most of them were small in size ( $M = 0.41$ ), all loadings on the parenting trait factors were statistically reliable. This constitutes evidence of convergent validity in the sense that different methods measuring the same trait appear to converge. Note, however, that the magnitude of the loadings varied considerably across parenting constructs. For instance, loadings on the





**TABLE 3.** *Summary of goodness-of-fit indices for MTMM model of parenting practices.*

Model Tests	$\chi^2$	df	TLI	CFI
0. Null model ( $M_0$ )	979.28	66	-	-
1. Four correlated traits; No methods ( $M_1$ )	368.92	48	0.5 2	0.6 5
2. Four correlated methods; No traits ( $M_2$ )	260.64	51	0.7 0	0.7 7
3. Four correlated traits; Three correlated methods ( $M_3$ )	62.51	33	0.9 4	0.9 7

KEY: TLI = Tucker-Lewis Index (Tucker and Lewis 1973); CFI = Comparative Fit Index (Bentler 1990)

Problemsolving factor were shown to be the highest in size ( $M = 0.71$ ), whereas loadings on the positive reinforcement factor were the lowest ( $M = 0.31$ ).

Loadings on the method factors were also quite large ( $M = 0.50$ ) and statistically significant. High loadings on the method factors suggest that unique aspects of the reporting perspectives of the child, parent, and staff were an important source of covariation in these data. It is not surprising that method effects were minimal on the problemsolving construct, where the trait loadings were relatively high.

When discussing the magnitude of method and trait effects within each indicator, it is important to consider the proportion of variance accounted for. The proportion of variance of an indicator accounted for by a trait or method factor is equal to the square of the standardized factor loading. These partitioned variances are summarized in table 5.

Inspection of the proportion of variance in each indicator accounted for by trait and method variance indicated a mixed pattern. The trait variance, in general, was small. The method variance exceeded that of trait variance for 8 of the 12 variables. Consistent with the analyses at the matrix level, large method variances were observed for parent report

**TABLE 4.** *Trait and method loadings for MTMM Model.*

Measurement Procedure	MO	RQ	PS	PR	CR	PR	SI
Child report (CR)							
Monitoring (MO)	0.44				0.45		
Relationship quality (RQ)		0.58			0.54		
Problemsolving (PS)			0.83		0.07		
Positive reinforcement (PR)				0.28	0.71		
Parent report (PR)							
Monitoring (MO)	0.43					0.55	
Relationship quality (RQ)		0.35				0.81	
Problemsolving (PS)			0.81			0.11	
Positive reinforcement (PR)				0.20		0.40	
Staff impression (SI)							
Monitoring (MO)	0.69						0.33
Relationship quality (RQ)		0.55					0.66
Problemsolving (PS)			0.49				0.67
Positive reinforcement (PR)				0.45			0.74

and staff impression. It can be seen that all three measurement procedures showed a considerable amount of uniqueness (i.e., variance that was not explained by either the trait or method factors). These results suggest that both method and uniqueness within each indicator combine to attenuate the level of variation within each indicator, which can be attributed to the parenting traits.

Discriminant validity can be evaluated by inspection of the correlations among the trait and method latent factor scores. Conceptually, correlations among traits should be negligible to satisfy evidence of discriminant validity. Inspection of table 6 reveals that correlations among the traits were all significant and moderately high ( $M = 0.66$ ), with the highest correlation between positive reinforcement and relationship quality ( $r = 0.76$ ). In contrast, correlations among method factors were small in size ( $M = 0.22$ ), suggesting independence among the parenting perspectives of the child, parent, and staff. The standardized factor correlation between child and parent reports (0.36) and between parent and staff reports (0.28) was relatively low.

**TABLE 5.** *Variance components due to trait, method, and uniqueness for MTMM Model.*

Measurement Procedure	Trait	Method	Uniqueness
Child report			
Monitoring	0.19	0.20	0.61
Relationship quality	0.34	0.29	0.37
Problemsolving	0.69	0.00	0.31
Positive reinforcement	0.08	0.50	0.42
Parent report			
Monitoring	0.18	0.30	0.48
Relationship quality	0.12	0.66	0.78
Problemsolving	0.66	0.01	0.67
Positive reinforcement	0.04	0.16	0.80
Staff impression			
Monitoring	0.48	0.11	0.41
Relationship quality	0.30	0.44	0.26
Problemsolving	0.24	0.45	0.31
Positive reinforcement	0.20	0.55	0.25

**TABLE 6.** *Trait and method correlations for MTMM model.*

Measures	Parenting Traits				Methods		
	MO	RQ	PS	PR	CR	PR	SI
1. MO	1.0 0						
2. RQ	0.6 3	1.0 0					
3. PS	0.4 7	0.7 6	1.0 0				
4. PR	0.7 3	0.6 8	0.7 0	1.0 0			
5. CR					1.0 0		
6. PR					0.3 6	1.0 0	
7. SI					0.0 3	0.2 8	1.0 0

KEY: MO = monitoring; RQ = relationship quality; PS = problemsolving; PR = positive reinforcement; CR = child report; PR = parenting report; SI = staff impression.

External Validity. The external validity model ( $M_4$ ) was a simple extension of  $M_3$ , with the inclusion of two objectively measured external variables (authority conflict and observed family coercion). In the  $M_4$  model, each trait and method was allowed to covary with the two external variables. Because of incomplete data in the external variables, the authors utilized EQS multisample procedures to test the assumption that the pattern of missingness is random (Little and Rubin 1987). Detailed procedures for testing missingness hypotheses appear in the appendix.

The model relating the parenting constructs to external criteria resulted in a proper solution and provided a good fit to the data,  $\chi^2(133, N = 220) = 170.71$ , NNFI (Nonnormed Fit Index) = 0.96, CFI = 0.96. At this juncture, the central concern was the extent of criterion and predictive validity to measures of authority conflicts during the 2 years following treatment.

Expectations regarding the external validity of the parenting traits from the  $M_4$  model were, in general, found tenable (table 7). Three correlations specifying relationships between the parenting constructs and the external validity criteria were found to be statistically significant. Results showed that monitoring was negatively related to family coercion and authority conflict, indicating that high levels of parental monitoring were associated with low levels of family coercive behavior and conflicts with authority.

**TABLE 7.** *Correlations among parenting practices and external validity factors of adolescent problem behavior.*

Model	Family Coercion	Authority Conflict	Carbon Monoxide
Trait Effect ( $M_4$ )	-0.35*	-0.32*	-0.25*
Monitoring	-0.56*	-0.13	-0.15*
Relationship quality	-0.43*	0.03	-0.05
Problemsolving	-0.42*	-0.09	-0.04
Positive reinforcement			
Method effect ( $M_5$ )			
Child report	-0.31*	-0.49*	-0.15
Parent report	-0.05	-0.35*	-0.04
Staff impressions	-0.19*	-0.53*	-0.05

NOTE:  $N = 192$

\* $p < 0.05$

In addition, problemsolving was found to be negatively related to family coercion, suggesting that parents who practice problemsolving skills tended to exhibit less coercive behavior. Parent and child ratings were specific to the videotaped problemsolving task in which the observation scores were derived.

Several significant correlation coefficients between the two external variables and method factors were also observed. In particular, family coercion was found to be related negatively to two of the three method factors (child report and staff report). Authority conflict was related negatively to parent and staff report. These findings indicated that variance specific to the reporting perspectives of parents and staff were correlated with observed family conflict as well as subsequent discipline contacts with the school and police.

## DISCUSSION

The idea that parenting practices contribute to adolescent problem behavior has been around for some time (McCord 1992). The scrutiny of parenting practices within a scientific paradigm has a much shorter history. Which parenting practices are critical to social development and which should be targeted in interventions designed to reduce or prevent adolescent problem behavior? Much of the literature on parenting effects on adolescent delinquency and substance use relies exclusively on child, parent, or staff impressions, as these are the most economical measures. This report is the first example of using a CFA approach to MTMM data on parenting to rigorously evaluate the relative importance of traits versus methods in accounting for covariation. The authors suggest that taking a confirmatory approach to studying an MTMM data set on parenting is informative to development and intervention research that focuses on families.

Results from this study provided support for the construct validity of the parenting constructs. Limit setting did not survive the basic test of convergent validity. This finding is consistent with results reported by Patterson and colleagues (1992), who eventually relied on home observation indicators that included nattering, the parents' abusive behavior toward their son, and staff impressions of even-handed and consistent discipline practices. In this study, the child and parent reports did not correlate highly with these direct observation indicators. Current results revealed that the retest stability (see table 1) of the coder impressions of limit setting was quite low, indicating problems in reliability. With respect to staff impressions, one

problem may have been that the coders could not make good judgments regarding the parents' limit-setting practices by watching them in problemsolving discussions.

The four remaining constructs showed reasonable convergent and discriminant validity within the MTMM framework. The correlations among the four constructs were quite high ( $M = 0.660$ , based on  $M_3$ ), suggesting that parents who score highly on one dimension tended to score highly on all dimensions of the parenting constructs. In fact, the level of correlation suggests a “G-factor” for parenting. If so, the debates in the literature regarding the specific parenting practices and family experiences that give rise to socialization outcomes such as antisocial behavior are not warranted, as one parenting practice appears to be roughly equal to another. There is a limited sense in which this conclusion is valid. Skillful parenting certainly requires attention to relationship issues in daily family life. Although parent training interventions do not often couch the intervention procedures in the language of relationships, if one looks closely at the actual parenting skills, relationship skills are essential to short- and long-term success. For example, when advising parents on limit setting, it is recommended that parents avoid personal criticism, lecturing, or expressions of contempt (Dishion and Patterson, in press; Forgatch and Patterson 1989; Patterson and Forgatch 1990).

When it comes to the field of family intervention, the debate regarding the optimal targeting of parenting practices is more than academic. Recommending that parents express more love to their child as an antidote to problem behavior is quite different than suggesting different behavior management practices. A family management intervention model hypothesizes that the pattern of parent-child interactions need revision vis-a-vis the issue of contingency (Dishion and Kavanagh, in press; Patterson et al. 1992). Based on the pattern of convergent and external validity, the authors speculate that parent monitoring is a construct that has potential as an intervention target. This construct has repeatedly been shown to correlate with adolescent problem behavior and substance use, and these findings have been extended to multiethnic and urban samples (Chilcoat et al. 1995). Inspection of the level of correlation between parent monitoring and relationship quality ( $r = 0.63$ ) reveals that for effective supervision, a positive relationship between parents and their teenager is requisite.

## Methodological Implications

There were substantial method effects in the CFA that must be taken into account when modeling these 12 indicators to define parenting practices. In this study, the method effects were conceptualized simply as those accompanying the reporting agent. Thus, each reporting agent brings to the global ratings an internal coherence that is not attributable to the behavior that they are being asked to rate. Combining the method and trait constructs was referred to as the “relativistic theory of measurement.” The central idea is that the variation within each indicator is attributable to both the behavioral phenomenon and the measurement tool, in this instance reports of the participating parents and children, and that of the research assistants.

The problem of method effects has been acknowledged and discussed in previous research (Bagozzi and Yi 1990; Bank et al. 1990; Fiske 1986, 1987). From a traditional psychometric perspective, measurement method effects are interpreted in terms of sources of systematic bias (Fiske 1987) or criterion contamination (Brogden and Taylor 1950). Bagozzi and Yi’s (1990) definition is typical of this position: “As an artifact of measurement, method variance can bias results when researchers investigate relations among constructs measured with the common method” (p. 547). The same argument was made in Cook and Campbell’s (1979) discussion of monomethod bias. Bank and colleagues (1990) extended this discussion to the MTMM data, when one method tends to dominate across constructs, referring to this as the “glop problem” in structural equation modeling.

The findings from the present study raise questions of how to interpret these measurement method effects. One interpretation is that they reflect different overall perspectives on parenting practices. Each agent has expectations based on his or her life experience, unique context, or reporting biases. For example, parents’ interpretation of the self-report items may well depend on their own parenting practices or their own response style (e.g., high social desirability). By the same token, staff impression scores may be biased with respect to broadband personality attributions made about the parents, cultural expectations, as well as behavior observed in the assessment setting. In either case, this aspect of method bias can be considered “noise” when studying the relationship between parenting and adolescent problem behavior.

An alternative view of the method effects is that the variance is theoretically meaningful. The fact that the child and parent methods



correlated, as did the parent and staff impressions (while child and staff methods did not), suggests that shared perspectives yield similar reporting tendencies. Method effects may not be noise but theoretically meaningful. If, for example, it were found that the child's perceptions of parenting practices had long-term predictive utility over and above the observed parenting practices, this would suggest that a child's positive reporting bias is developmentally significant, perhaps an indicator of the quality of the parent-child relationship.

### Future Research Needs

Research scientists in the field clearly state that construct development is an iterative process (Nunnally 1978). Patterson and colleagues (1992) link advances in psychometric studies and model development to intervention trials. The authors suggest that reliance on global reports of parenting practices will lead to highly intercorrelated parenting constructs, with a good percentage of their covariation attributable to method variance. When aggregating method and trait variance, the theoretical meaning of each in subsequent modeling is confused. These analyses suggest that continued study of the interrelation between measurement method and parenting practices is needed.

In general, direct observations are underutilized in developmental and intervention research. One of the critical advantages of observational data in developmental research is the ability to study the microsocial processes underlying socially significant child and adolescent outcomes (Patterson 1982). Laboratory assessments of parent-child interaction may be particularly useful to this end. The advantage of structured assessments is that sequences of interest can be elicited by the design of the task. The parenting constructs studied in this report are better suited for direct assessments rather than by global reports (e.g., limit setting, positive reinforcement, problemsolving, and perhaps monitoring).

The key idea in limit setting is that the parent does not contribute to the coercion process by using aversive tactics to set limits, but consistently follows through with consequences when limits are violated (Patterson 1982).

Positive reinforcement is potent when it contingently matches new behaviors that a child is learning or positive behavior that is replacing previous bad habits. Problemsolving has been successfully measured in

a laboratory setting by Forgatch and Stoolmiller (1994), who report an assessment of problemsolving that has considerable content validity and is based on the participant's ratings of how well the parent and child solved specific problems. Similarly, parent monitoring is a process of establishing procedures and rules regarding norms of behavior along with supervising to ensure that those norms are followed. It may also be that staff impressions of monitoring are useful because of the complex set of skills required to supervise adolescents, which vary from family to family. A single parent may use a different approach to supervising her young adolescent compared with a two-parent family, where one parent is available after school. However, children in both families may be equally monitored. Because of the high level of predictive validity of the monitoring construct and the importance of the parenting practice it measures during adolescence, this construct is critical for developmental and intervention science. In contrast, the relationship quality construct may best be measured by the participants' global impressions. Positive indications of a healthy parent-child relationship are that the child feels the parents are fair, the parents are satisfied with the child's level of cooperation, and the family enjoys recreational time together.

In this sense, all measures are not equal in the assessment of parenting practices. Thus, method and trait variance are conceptually related. The authors concur with the clear and insightful discussion of Fiske (1987), that the construct validation process is crucial and not an inconvenient annoyance to be surmounted in a quick pilot study to evaluate whether a single measure of parenting has internal consistency or predictive validity.

Understanding the full range of validity issues, including criterion and predictive validity, is critical, not only to advances in understanding the influence of families on adolescent problem behavior but also to advances in intervention science. A particularly relevant problem in intervention science is the measurement of change. Measures are needed that accurately reflect the ebb and flow of human behavior in the course of natural development as well as change that occurs in response to interventions. Direct observations are one solution to this problem. In addition, any assessment that includes the temporal dimension to behavior is relevant to the issue of change. Overreliance on the personality assessment strategy has had a deleterious impact on measurement strategies of the sensitivity to change. For example, many of the measures included in this chapter provided the typical response format "always" through "never." Whether these are measured on a

5- or 10-point scale, this assessment strategy lacks a temporal specificity. It would be difficult for anyone to tell when there had been meaningful change from one assessment probe to another. Based on the analyses in this chapter, as well as the body of research on adolescent problem behavior, the authors suggest that further development is needed of measures of parent monitoring that are sensitive to change.

The solution to these problems, as suggested by Fiske (1987), is to be more specific in the conceptualization and instrumentation of parenting constructs. Given this perspective and the findings from these analyses, the authors hope to be part of a new movement in the behavioral sciences that invests more energy, talent, and resources in the conceptualization and measurement of independent and dependent variables in the study of social development and its manipulation within the context of prevention.

## NOTES

1. The initial CFA analyses based on the five dimensions of parenting practices model failed to converge to a solution. Examination of the EQS output showed an improper solution for one parameter estimate; that is, the correlation between the two latent constructs of monitoring and limit setting was found to exceed unity in both the  $M_1$  and  $M_3$  models. This may be due to the similar measures used in operationalizing the two constructs. On the basis of statistical and substantive grounds, the authors decided to drop the limit-setting construct. All subsequent analyses (i.e., the Campbell-Fiske and CFA approaches) were based on four constructs: monitoring, relationship quality, problemsolving, and positive reinforcement.
2. Two variables in the model tested were controlled for possible confounding effects: gender and family status. Control for gender was achieved by creating a gender factor in the  $M_3$  model, and the factor was allowed to be correlated with each of the four parenting practice (trait) factors. The factor, as a dichotomous variable (1 = male, 2 = female), had its loading fixed to one. Inspection of the correlations between gender and all four trait factors indicated no statistically significant relationships, suggesting no gender differences on any of the four parenting practices constructs. In addition, EQS Lagrange Multiplier Test for the observed indicators of parenting practices factors on gender factor were all minimal and nonsignificant, suggesting that the items worked similarly for boys

and girls. Control for family status (i.e., single parent, bioparent, stepparent) was accomplished by creating two dummy variables and estimated in the  $M_3$  model. The first dummy variable used the single parent as a reference group, and the second dummy variable used the bioparent as a reference group. Creation of these two variables led to the comparison of the reference group with the remaining two groups. Parameter estimates (i.e., the correlations between family status and all four trait factors) showed no statistical significancies except for the relationship quality construct,  $0.20, t = 2.28, p < 0.05$ , which suggested that the single-parent family tended to exhibit better relationship quality than the biofamily and stepfamily parents.

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## APPENDIX

The authors had complete information on the two external variables from 195 participants and incomplete information from 25 participants for an N of 220. Using the EQS multisample approach to missing data enabled incorporation of all 220 cases in the analysis for the  $M_4$  model. As such, subsample 1 included 195 cases with no missing data, and subsample 2 included 25 cases missing data from the family coercion variable.

The multisample procedures to missing data involve tests of two major hypotheses: missing at random (MAR) and missing completely at random (MCAR) (Little and Rubin 1987). Briefly, data are considered MAR if the pattern of missing data is not dependent on values of X (a single variable). Furthermore, data are said to be observed at random (OAR) if the pattern of missing data is independent of values of other observed variables (e.g., Y, Z). Both MAR and OAR conditions constitute what Rubin (1976) defined as MCAR. A satisfaction of MAR and MCAR is considered to have an ignorable missing-data mechanism. As such, those with missing values on the X variable are assumed to be a random subsample of the original sample.

Following the analytic procedures described by Muthen and colleagues (1987), Allison (1987), and Duncan and Duncan (1995), the

hypothesis that data are MCAR was tested. The test specified an unrestricted  $H_1$  model that involves imposing equality constraints on common parameters (i.e., means, intercepts, variances, and covariances of the observed variables) across the subgroups. If these common parameters may be treated as invariant, then the MCAR hypothesis is considered to be supported. If, however, the  $H_1$  model is rejected, indicating that MCAR is not tenable, a less stringent hypothesis, MAR, is then pursued. This is referred to as the “restricted  $H_0$  model,” which is itself a model of substantive interest. Refer to Duncan and Duncan (1995) for details on MCAR and MAR hypothesis testing.

The model fitting for the  $H_1$  model yielded a chi-square value of  $\chi^2(90)$  (N = 220) = 95.68,  $p > 0.32$ , and fit indices of TLI = 0.99 and CFI = 0.97. The results indicated that MCAR was tenable, and therefore, the mechanism that is causing the missing data is considered ignorable. Consequently, maximum-likelihood estimation would exhibit no sample bias.

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