Chapter 15
Research on Developmental Psychology

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Developmental psychology was a major area of research at ETS from the late 1960s to the early 1990s, a natural extension of the work in cognitive, personality, and social psychology that had begun shortly after the organization's founding in 1947, consistent with Henry Chauncey's vision of investigating intellectual and personal qualities (see Stricker, Chap. 13, this volume). For a full understanding of these qualities, it is essential to know how they emerge and evolve. Hence the work in developmental psychology complemented the efforts already under way in other fields of psychology.

A great deal of the research in developmental psychology was conducted at ETS's Turnbull Hall in the Infant Laboratory, equipped with physiological recording equipment and observation rooms (e.g., Lewis 1974), and in a full-fledged Montessori school outfitted with video cameras (e.g., Copple et al. 1984). Hence, as Lewis (n.d.) recalled, the building "had sounds of infants crying and preschool children laughing" (p. 4). Other research was done in homes, schools, and hospitals, including a multisite longitudinal study of Head Start participants (e.g., Brooks-Gunn et al. 1989; Laosa 1984; Shipman 1972).

A handful of investigators directed most of the research, each carrying out a distinct program of extensive and influential work. This chapter covers research by Irving Sigel, on representational competence; Luis Laosa, on parental influences, migration, and measurement; Michael Lewis, on cognitive, personality, and social development of infants and young children; and Jeanne Brooks-Gunn, on cognitive,

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personality, and social development from infancy to adolescence. Other important research was conducted by Gordon Hale (e.g., Hale and Alderman 1978), on attention; Walter Emmerich (e.g., Emmerich 1968, 1982), on sex roles and personality development; and Nathan Kogan (e.g., Wallach and Kogan 1965) and William Ward (e.g., Ward 1968), on creativity. (The Kogan and Ward research is included in Kogan, Chap. 14, this volume.) In the present chapter, Kogan describes Sigel's research, and Stricker takes up Laosa's; Lewis and Brooks-Gunn discuss their own work.

15.1 Representational Competence and Psychological Distance

Representational competence was the focus of Sigel's research program. Roughly defined by Sigel and Saunders (1983), representational competence is the ability to transcend immediate stimulation and to remember relevant past events and project future possibilities. Also indicative of representational competence in preschoolers was the understanding of equivalence in symbol systems, whereby an object could be rendered three-dimensionally in pictorial form and in words.

The level of a child's representational competence was attributed in large part to parental beliefs and communicative behaviors and to family constellation (number of children and their birth order and spacing). Earlier research by Sigel and collaborators emphasized ethnicity and socioeconomic status (SES; see Kogan 1976). SES was retained in many of the ETS studies in addition to a contrast between typical children and those with communicative–language disabilities.

A conceptual model of the Sigel team's research approach is presented in a chapter by McGillicuddy-DeLisi et al. (1979): Mothers' and fathers' backgrounds determined their parental belief systems. Belief systems, in turn, influenced parental communication strategies, which then accounted for the child's level of cognitive development. It was a nonrecursive model, the child's developmental progress (relative to his or her age) feeding back to alter the parental belief systems. In terms of research design, then, parental background was the independent variable, parental belief systems and child-directed communicative behavior were mediating variables, and children's representational competence was the dependent variable. The full model was not implemented in every study, and other relevant variables were not included in the model. In most studies, family constellation (e.g., spacing and number of children), SES, the nature of the parent–child interaction task, the child's communicative status (with or without language disability), and the gender of the parent and child were shown to yield main or interaction effects on the child's representational competence.

In the view of Sigel and his associates, the critical component of parental teaching behavior was *distancing* (Sigel 1993). Parental teachings could reflect high- or low-level distancing. Thus, in a teaching context, asking the child to label an object was an example of low-level distancing, for the child's response was constrained to

a single option with no higher-thinking processes invoked in the answer. By contrast, asking the child to consider possible uses of an object was an example of high-level distancing, for the child was forced to go beyond the overt stimulus properties of the object to adopt new perspectives toward it. In brief, the concept of distancing, as reflected in parental teaching behavior, referred to the degree of constraint versus openness that the parent imposed on the child. Sigel's principal hypothesis was that higher-level distancing in child-directed communication by an adult would be associated with greater representational competence for that child. Correspondingly, low-level distancing by an adult would inhibit the development of a child's representational competence.

An additional feature of Sigel's research program concerned the nature of the task in the parent–child interaction. Two tasks were selected of a distinctively different character. For the storytelling task, age-appropriate edited versions of children's books were used, with parents instructed to go through a story as they typically would do at home. The other task required paper folding, with the parent required to teach the child to make a boat or a plane.

15.1.1 Influence of Parental Beliefs and Behavior on Representational Competence

Having outlined the conceptual underpinning of Sigel's research program along with the nature of the variables selected and the research designs employed, we can now proceed to describe specific studies in greater detail. We begin with a study of 120 families in which the target child was 4 years of age (McGillicuddy-DeLisi 1982; Sigel 1982). Family variables included SES (middle vs. working class) and single-child versus three-child families. For the three-child families, there was variation in the age discrepancy between the first and second sibling (more than 3 years apart vs. less than 3 years apart), with the restriction that siblings be of the same sex. Each mother and father performed the storytelling and paper-folding tasks with their 4-year-old child. Proper controls were employed for order of task presentations. A total of 800 parent and child observations were coded by six raters with satisfactory interrater reliability.

The presentation of the research was divided into two parts, corresponding to the portion of the analytic model under investigation. In the first part (McGillicuddy-DeLisi 1982), the influence of the demographic variables, SES and family constellation, on parental beliefs was examined, and in turn the influence of parental beliefs for their prediction of overt parental behaviors in a teaching situation was explored. The second part, the child's representational competence, was treated separately in the Sigel (1982) chapter. Note that the assessment of beliefs was focused exclusively on the parents' views of how a preschool child acquired concepts and abilities, hence making such beliefs relevant to the parental strategies employed in facilitating the child's performance in a teaching context.

Parental beliefs were assessed in an interview based on 12 vignettes involving a 4-year-old and a mother or father. The interviewer asked the parent whether the child in the vignette had the necessary concepts or abilities to handle the problem being posed. Further inquiry focused more generally on parents' views of how children acquire concepts and abilities. Analysis of these data yielded 26 parental belief variables that were reliably scored by three coders. ANOVA was then employed to determine the influence of SES, family constellation, gender of child, and gender of parent on each of the 26 belief variables. Beliefs were found to vary more as a function of SES and family constellation than of gender of parent or child. More specifically, parents of three children had views of child development that differed substantially from those of single-child parents. For the parents of three children, development involved attributes more internal to the child (e.g., reference to self-regulation and impulsivity) as opposed to greater emphasis on external attributes (e.g., direct instruction) in single-child parents. The results as a whole constituted an intriguing mosaic, but they were post hoc in the absence of predictions derived from a theoretical framework. Of course, the exploratory nature of such research reflected the dearth at that time of theoretical development in the study of child-directed parental beliefs and behaviors.

Consider next the observed relationships between parental beliefs and teaching behaviors. Having shown that SES and family constellation influenced parental beliefs, the question of interest was whether such beliefs provided useful information about parents' teaching behaviors beyond what might be predicted from SES and family constellation. To answer the question, stepwise regressions were carried out with SES and family constellation entered into the analysis first, followed by the belief variables. Separate regressions—four in all—were conducted for mothers' and fathers' performance on the storytelling and paper-folding tasks, the dependent variables.

Demonstration of belief effects on teaching behaviors would require that multiple correlations show significant increments in magnitude when beliefs were entered into the regression analysis. Such increments were observed in all four regressions, indicating that parents' beliefs about their children's competencies were predictive of the way they went about teaching their children on selected tasks. Noteworthy is the evidence that the significant beliefs varied across the two tasks and that this variation was greater for mothers than for fathers. In other words, mothers appeared to be more sensitive to the properties of the task facing the child, whereas fathers appeared to have internalized a set of beliefs generally applied to different kinds of tasks. Mothers would seem to have a more differentiated view of their children's competencies and hence were more attuned to the nature of the task than were fathers.

Thus far, we have considered the relations among family demographics, parental beliefs, and teaching strategies. The missing link, the child's cognitive performance, was examined in the Sigel (1982) chapter, where it was specifically related to parental teaching behaviors. The child's responses to the storytelling and paper-folding tasks were considered (e.g., extent of engagement and problem solutions), as was the child's performance on tasks independent of parental instructions. These latter

tasks included Piagetian conservation and imagery assessments and the Sigel Object Categorization Task (Sigel and Olmsted 1970). The major hypothesis was that the parents' uses of distancing strategies in their teaching behaviors would be associated with enhanced cognitive performances in their children—representational competence.

To address this hypothesis, stepwise regressions were analyzed. The results confirmed the basic hypothesis linking parental child-directed distancing to the child's representational competence. This general observation, however, conceals the specificity of the effects. Thus mothers and fathers employed different teaching strategies, and these strategies, in turn, varied across the storytelling and paper-folding tasks. Of special interest are those analyses in which the mothers' and fathers' teaching behaviors were entered into the same regression equation. Doing so in sequence often pointed to the complementarity of parental influences. In concrete terms, the multiple correlations sometimes demonstrated significant enhancements when both parents' teaching strategies entered into the analysis compared to the outcome for the parents considered separately. This result implied that the children could intellectually profit from the different, but complementary, teaching strategies of mothers and fathers.

15.1.2 Impact of a Communicative Disability

Sigel and McGillicuddy-DeLisi (1984) were able to recruit families who had a child with a communicative disability (CD), making it possible to compare such families with those where the child was not communicatively disabled (non-CD). It was possible to match the CD and non-CD children on SES, family size, gender, age, and birth order. Again, mothers' and fathers' distancing behaviors were examined in the task context of storytelling and paper folding.

In the case of the child's intellectual ability, assessed by the Wechsler Preschool and Primary School Scale of Intelligence (WPPSI; Wechsler 1949b), parental effects were largely confined to the CD sample. Low parental distancing strategies were tightly associated with lower WPPSI scores. Of course, we must allow for the possibility that the parent was adjusting his or her distancing level to the perceived cognitive ability of the child. In contrast, the child's representational competence, as defined by the assessments previously described in Sigel (1982), was linked with parental distancing behaviors in both CD and non-CD samples, with the magnitude of the relationship somewhat higher in the CD sample.

Of course, these associations could not address the causality question: The parent might be affecting the child or reacting to the child or, more likely, the influence was proceeding in both directions. Sigel and McGillicuddy-DeLisi (1984) argued that low-level distancing strategies by parents discouraged active thinking in the child; hence it was no surprise that such children did not perform well on representational tasks that required such thinking. They were optimistic about CD children, for high-level parental distancing seemed to encourage the kind of representational

thinking that could partially compensate for their communicative disabilities (Sigel 1986).

15.1.3 Belief-Behavior Connection

Working with a subsample of the non-CD families described in the previous section, Sigel (1992) plunged into the controversial issue of the linkage between an individual's beliefs and actual behavior instantiating those beliefs. He also developed a measure of behavioral intentions—a possible mediator of the belief–behavior connection. Although the focus was naturally on parental beliefs and behaviors, similar work in social psychology on the belief and behavior connection (e.g., Ajzen and Fishbein 1977), where major advances in theory and research had occurred, was not considered.

Three categories of variables were involved: (a) parents' beliefs about how children acquired knowledge in four distinct domains (physical, social, moral, and self); (b) the strategies that parents claimed they would use to facilitate the children's acquisition of knowledge in those domains; and (c) the behavioral strategies employed by the parents in a teaching context with their children. The first two categories were assessed with a series of vignettes. Thus, in the vignette for the physical domain, the child asks the parent how to use a yardstick to measure the capacity of their bathtub. The parents' view about how children learn about measurement constituted the belief measure; the parents' statements about how they would help their child learn about measurement constituted the self-referent strategy measure. For the third category, the parents taught their child how to tie knots, and the strategies employed in doing so were observed. Note that the knots task involved different content than was used in the vignettes.

Parental beliefs regarding children's learning were categorized as emphasizing cognitive processing (e.g., children figuring out things on their own) or direct instruction (e.g., children learning from being told things by adults). Parental intended teaching strategies were classified as distancing, rational authoritative (e.g., parent gives reasons with commands), or direct authoritative (e.g., parent offers statement or rule without rationale). Parental behavioral strategies were scored for high-level versus low-level distancing.

The three variable classes—parental beliefs, parental intended teaching strategies, and parental behavioral strategies—were intercorrelated. Substantial relationships were observed between parental beliefs about learning (cognitive processing vs. direct instruction) and the strategies the parent intended to employ. As anticipated, cognitive processing was associated with distancing strategies, and direct instruction was linked to authoritative strategies. Of course, both the beliefs and self-referent strategies were derived from the same vignettes used in the parental interview, suggesting the likely influence of method variance on the correlational outcomes. When the foregoing variables were related to the parents' behavioral strategies in teaching the knots task, the magnitude of the correlations dropped

precipitously, though the marginally significant correlations were in the predicted direction. Sigel (1992) attributed the correlational decline to variation across domains. Thus the belief–strategy linkages were not constant across physical, social, and moral problems. Aggregation across these domains could not be justified. Obviously, the shifting task content and context were also responsible for the absence of anticipated linkages. Conceivably, an analytic procedure in which parents' intended strategies were cast as mediators between their beliefs and their behavioral strategies would have yielded further enlightenment.

15.1.4 Collaborative Research

The large majority of Sigel's publications were either solely authored by him or coauthored with former or present members of his staff at ETS. A small number of papers, however, were coauthored with two other investigators, Anthony Pellegrini and Gene Brody, at the University of Georgia. These publications are of particular interest because they cast Sigel's research paradigm within a different theoretical framework, that of Vygotsky (1978), and they introduced a new independent variable into the paradigm, marital quality.

In the case of marital quality, Brody et al. (1986) raised the possibility that the quality of the marital relationship would influence mothers' and fathers' interactions with their elementary-school age children. More specifically, Brody et al., leaning on clinical reports, examined the assumption that marital distress would lead to compensatory behaviors by the parents when they interact with their children in a teaching context. Also under examination was the possibility that mothers and fathers would employ different teaching strategies when interacting with the children, with the nature of such differences possibly contingent on the levels of marital distress.

Again, storytelling and paper-folding tasks were used with the mothers and fathers. Level of marital distress was assessed by the Scale of Marriage Problems (Swenson and Fiore 1975), and a median split was used to divide the sample into distressed and nondistressed subgroups. Observation of parental teaching strategies and the child's responsiveness was accomplished with an event-recording procedure (Sigel et al. 1977) that yielded interrater reliability coefficients exceeding .75 for each of the eight behaviors coded. ANOVAs produced significant Marital Problems × Parent interactions for seven of the eight behavioral indices. Nondistressed mothers and fathers did not differ on any of the behavioral indices. By contrast, distressed mothers and fathers differed in their teaching strategies, the mothers' strategies being more effective: more questions, feedback, and suggestions and fewer attempts to take over the child's problem-solving efforts.

Fathers in the distressed group "behave in a more intrusive manner with their school-aged children, doing tasks for them rather than allowing them to discover their own solutions and displaying fewer positive emotions in response to their children's learning attempts" (p. 295). Mothers in distressed marriages, by contrast,

responded with more effective teaching behaviors, inducing more responsive behavior from their children. Hence the hypothesis of compensatory maternal behaviors in a distressed marriage was supported. The psychological basis for such compensation, however, remained conjectural, with the strong likelihood that mothers were compensating for perceived less-than-satisfactory parenting by their husbands. Finally, Brody et al. (1986) offered the caveat that the outcomes could not be generalized to parents with more meager educational and economic resources than characterized the well-educated parents employed in their study.

In two additional studies (Pellegrini et al. 1985, 1986), the Sigel research paradigm was applied, but interpretation of the results leaned heavily on Vygotsky's (1978) theory of the zone of proximal development. Pellegrini et al. (1985) studied parents' book-reading behaviors with 4- and 5-year-old children. Families differed in whether their children were communicatively disabled. MANOVA was applied, with the parental interaction behavior as the dependent variable and age, CD vs. non-CD status, and parent (mother vs. father) as the independent variables. Only CD vs. non-CD status yielded a significant main effect. Parental behaviors were more directive and less demanding with CD children. Furthermore, stepwise regression analysis examined the link between the parental interaction variables and WPPSI verbal IQ. For non-CD children, high cognitive demand was significantly associated with higher IQ levels; for CD children, the strongest positive predictor of IQ was the less demanding strategy of verbal/emotional support.

In general, parents seemed to adjust the cognitive demands of their teaching strategies to the level of the children's communicative competences. In Vygotskyan terms, parents operated within the child's zone of proximal development. Other evidence indicated that parents engaged in scaffolding to enhance their children's cognitive–linguistic performances. Thus parents of non-CD children manifested more conversational turns in a presumed effort to elicit more language from their children. Similarly, more parental paraphrasing with non-CD children encouraged departures from the literal text, thereby fostering greater depth of interaction between parent and child. In sum, parental scaffolding of their children's task-oriented behavior activated the potential for children to advance toward more independent problem solving as outlined in Vygotsky's theory.

We turn, finally, to the second study (Pellegrini et al. 1986) influenced by Vygotsky's theory. The research paradigm was similar to studies previously described. Again, gender of parent, children's CD vs. non-CD status, and the tasks of book reading and paper folding constituted the independent variables, and the teaching strategies of the parents comprised the dependent variables. In addition, the extent of task engagement by the child was also examined. MANOVA was employed, and it yielded a significant main effect for the child's communicative status and for its interaction with the task variable. ANOVAs applied to the separate teaching variables indicated that (a) parents were more directive and less demanding with CD children than with non-CD children; (b) parents were more demanding, gave less emotional support, and asked fewer questions with the paper-folding task than with the book-reading task; and (c) communicative status and task variable interacted: A CD versus non-CD difference occurred only for the book-reading task,

with parents of CD children asking more questions and making lower cognitive demands.

The teaching strategy measures were factor analyzed, and the resulting four orthogonal factors became the predictor variables in a regression analysis with children's rated task engagement as the criterion variable. For the paper-folding task, parents of both CD and non-CD children used high-demand strategies to keep their children engaged. For the book-reading task, parents of CD and non-CD children differed, with the CD parents using less demanding strategies and the non-CD parents using more demanding ones.

Pellegrini et al. (1986) had shown how ultimate problem-solving outcomes are of less significance than the processes by which such outcomes are achieved. Adult guidance is the key, with non-CD children requiring considerably less of it to remain engaged with the task than was the case for CD children. Hence the children's competence levels alert the parents to how demanding their teaching strategies should be. Pellegrini et al. further recommended the exploration of the sequence of parental teaching strategies, as parents found it necessary on occasion to switch from more demanding to less demanding strategies when the child encountered difficulty (see Wertsch et al. 1980). In sum, the findings strongly support the Vygotsky model of parents teaching children through the zone of proximal development and the adjustment of parental teaching consistent with the competence level of their children.

15.1.5 Practice

An important feature of Sigel's research program was linking research to practice (Renninger 2007). As Sigel (2006) noted,

> efforts to apply research to practice require acknowledging the inherent tensions of trying to validate theory and research in practical settings. They require stretching and/or adapting the root metaphors in which we have been trained so that collaborations between researchers and practitioners are the basis of research and any application of research to practice. (p. 1022)

The research on representational competence and psychological distance has had widespread impact, notably for early childhood education (Hyson et al. 2006) and cognitive behavior therapy (Beck 1967).

15.2 Parental Influences, Migration, and Measurement

Laosa's empirical work and his position papers spanned the psychological development of children, particularly Hispanics. His methodological contributions included test theory, especially as it relates to the assessment of minority children, and a standardized measure of parental teaching strategies. The major foci of Laosa's

work to be considered here are parental influences on children's development, the consequences of migration for their adjustment and growth, and the measurement of their ability.

15.2.1 Parental Influences

Parental influence on children's intellectual development has been a topic of long-standing interest to developmental psychologists (e.g., Clarke-Stewart 1977). A particular concern in Laosa's work was Hispanic children, given the gap in their academic achievement. His early research concerned maternal teaching. Unlike much of the previous work in that area, Laosa made direct observations of the mothers teaching their children, instead of relying on mothers' self-reports about interactions with their children, and distinguished between two likely SES determinants of their teaching: education and occupation. In a study of Hispanic mother–child dyads (Laosa 1978), mother's education correlated positively with praising and asking questions during the teaching and correlated negatively with modeling (i.e., the mother working on the learning task herself while the child observes). However, mother's occupation did not correlate with any of the teaching variables, and neither did father's occupation. Laosa speculated that the education-linked differences in teaching strategies account for the relationship between mothers' education and their children's intellectual development found in other research (e.g., Bradley et al. 1977). Subsequently, Laosa (1980b) also suggested that the more highly educated mothers imitate how they were taught in school.

In a follow-up study of Hispanic and non-Hispanic White mother–child dyads (Laosa 1980b), the two groups differed on most of the teaching variables. Non-Hispanic White mothers praised and asked questions more, and Hispanic mothers modeled, gave visual cues, directed, and punished or restrained more. However, when mothers' education was statistically controlled, the differences between the groups disappeared; controlling for mothers' or fathers' occupation did not reduce the differences.

In a third study, with the Hispanic mother–child dyads (Laosa 1980a), mother's field independence, assessed by the Embedded Figure Test (Witkin et al. 1971) and WAIS Block Design (Wechsler 1955), correlated positively with mother's asking questions and praising, and correlated negatively with mother's modeling. The correlations were reduced, but their pattern was similar when mother's education was statistically controlled. Laosa suggested that asking questions and praising are self-discovery approaches to learning that reflect field independence, whereas modeling is a concrete approach that reflects field dependence; hence mothers were using strategies that foster their own cognitive style in their children. Mother's teaching strategies, in fact, correlated modestly but inconsistently with the children's field independence, as measured by the Children's Embedded Figures Test (Witkin et al. 1971), WISC Block Design (Wechsler 1949a), and Human Figure Drawing (Harris 1963), another measure of field independence. Most of the teaching strategies had

scattered correlations with the Children's Embedded Figures Test and Block Design: positive correlations with asking questions and praising (field-independent strategies) and negative correlations with modeling, punishing or restraining, and giving visual cues (field-dependent strategies).

In Laosa's later research, a recurring topic was the impact of parents' education on their children's intellectual development; this line of work was presumably motivated by the influence of education in his maternal-teaching studies. Laosa (1982b) viewed parental education as impacting the parent–child interaction and presented a conceptual model of this interaction as the mediator between parent education and the child's development. He reported further analyses of the samples of Hispanic and non-Hispanic White mother–child dyads.

In one analysis, non-Hispanic White mothers and fathers read to their children more than did Hispanic parents. When parents' education was statistically controlled, the group difference disappeared, but controlling for parents' occupation did not reduce it. In addition, non-Hispanic mothers had higher *realistic* educational aspirations for their children ("*realistically*, how much education do you think your child will receive?"); this difference also disappeared when mothers' education was controlled but not when their occupation was controlled.

In another analysis, mother's education correlated positively in both the Hispanic and non-Hispanic White groups with mother's reading to the child, but father's education was uncorrelated with father's reading to the child in either group. Parent's occupation did not correlate with reading in the two groups. In both groups, mother's education also correlated positively with mother's educational aspirations for the child, but mother's occupation was uncorrelated.

Also, in an analysis of the Hispanic group, mother's education correlated positively with the child's ability to read or write before kindergarten, though father's education was uncorrelated. Parent's occupation was also uncorrelated with literacy. In addition, parent's education correlated positively with their use of English with the child; parent's occupation also correlated positively but weakly with English use.

Laosa argued that the set of findings, in total, suggests that the lower educational level of Hispanic parents produced a discontinuity between their children's home and school environments that adversely affected academic achievement.

He explored the consequences of these parental influences on the test performance of 3-year-olds in two studies. In the first study (Laosa 1982a), which targeted non-Hispanic White children, a path analysis was employed to assess the relationships, direct and indirect, between a host of family influences (e.g., mother's education and occupation, mother's reading to the child, nonparents in the household reading to the child, mother's teaching strategies) and performance on the Preschool Inventory (Caldwell 1970), a test of verbal, quantitative, and perceptual-motor skills for kindergarten children. A Mother's Socioeducational Values factor (defined by mother's education and occupation and mother's reading to child) was the strongest determinant of test performance. Less powerful determinants included nonparents in the household (probably older siblings) reading to the child and mother's use of modeling in teaching. Laosa highlighted two important and unanticipated findings:

the apparent influence of siblings and the substantial and positive influence of modeling, contrary to the conventional wisdom that verbal teaching strategies, such as asking questions, are superior to nonverbal ones, such as modeling.

In the second study (Laosa 1984) of Hispanic and non-Hispanic White children, the groups differed in their means on three of the five scales of the McCarthy Scales of Children's Abilities (McCarthy 1972): Verbal, Quantitative, and Memory. When a Sib Structure/Size factor (later-born child, many siblings) was statistically controlled, the group differences were unaffected. But when either a Language factor (mother uses English with child, child uses English with mother) or an SES factor (parents' education, father's occupation, household income) was controlled, the differences were reduced; when both factors were controlled, the differences were eliminated. The findings led Laosa to conclude that these early ethnic-group differences in ability were explainable by differences in SES and English-language usage.

15.2.2 Migration

In a series of white papers, Laosa reviewed and synthesized the extant research literature on the consequences of migration for children's adjustment and development, particularly Hispanic children, and laid out the salient issues (Laosa 1990, 1997, 1999). One theme was the need for—and the absence of—a developmental perspective in studying migration: "what develops, and *when, how,* and *why* it develops" (Laosa 1999, p. 370). The pioneering nature of this effort is underscored by the observation almost two decades later that migration is neglected by developmental psychology (Suárez-Orozco and Carhill 2008; Suárez-Orozco et al. 2008).

In a 1990 paper, Laosa proposed a multivariate, conceptual model that described the determinants of the adaptation of Hispanic immigrant children to the new society. Key features of the model were the inclusion of variables antedating immigration (e.g., sending community), moderator variables (e.g., receiving community), and mediating variables (e.g., child's perceptions and expectations) between the stresses of immigration and the outcomes.

In a complex, longitudinal survey of Puerto Rican migrants in New Jersey schools, Laosa (2001) found that the majority of the student body were Hispanic in 46% of the schools and were native speakers of Spanish in 31%. Additionally, the majority of the student body was eligible for free lunch in 77% of the schools and was from families on public assistance in 46%. Laosa concluded that the migrants faced considerable segregation by ethnicity or race as well as considerable isolation by language in high-poverty schools, factors with adverse consequences for the students' social and academic development.

15.2.3 Measurement

The measurement and evaluation of children's ability and achievement, particularly the unbiased assessment of minority children, has long been beset by controversies (see Laosa 1977; Oakland and Laosa 1977). These controversies were sparked in the 1960s and 1970s by the Coleman report (Coleman et al. 1966), which suggested that average differences in the academic performance of Black and White students are more affected by their home background than by their schools' resources, and by Jensen's (1969) review of research bearing on genetic and environmental influences on intelligence. He concluded that genetics is a stronger influence, which many observers interpreted as suggesting that the well-established disparity between Black and White children in their average scores on intelligence tests is largely genetic in origin. The upshot was widespread concerns that these tests are biased and calls for banning their use in schools. These arguments were reignited by *The Bell Curve* (Herrnstein and Murray 1994), which concluded that intelligence is mainly heritable. As Laosa (1996) noted, "thus, like a refractory strain of retrovirus, the issues tend to remain latent and from time to time resurge brusquely onto the fore of public consciousness" (p. 155).

In a 1977 paper, Laosa summarized the earlier controversies and other criticisms of testing and discussed alternatives to current testing practices that had been developed in response. The alternatives included constructing "culture-fair" tests "whose content is equally 'fair' or 'unfair' to different cultural groups" (p. 14), translating tests from English, using norms for subgroups, adjusting scores for test takers with deprived backgrounds, devising tests for subgroups (e.g., the BITCH, a vocabulary test based on Black culture; Williams 1972), using criterion-based interpretations of scores (i.e., how well a student achieves a specific objective) instead of norm-based interpretations (i.e., how well he or she does on the test relative to others), employing tests of specific abilities rather than global measures like IQ, and making observations of actual behavior. Laosa cautioned that these alternatives may also be problematic and would need to be carefully evaluated.

In a companion piece, Laosa, joined by Thomas Oakland of the University of Texas, Austin (Oakland and Laosa 1977), provided a comprehensive account of standards for minority-group testing that had been formulated by professional organizations, the government, and the courts. They argued for the need to consider these standards in testing minority-group children.

Laosa (1982c), in a subsequent paper on measurement issues in the evaluation of educational programs, specifically Head Start, delineated the concept of population validity and its applicability to program evaluation. Population validity deals with the question, "Do the results yielded by a given assessment technique have the same meaning when administered to persons of different sociocultural backgrounds?" (p. 512). Laosa discussed threats to population validity: familiarity (performance is influenced by familiarity with the task), communication, role relations (performance is influenced by the test taker's relationship with the tester), and situational (e.g., physical setting, people involved).

In another paper, Laosa (1991) explicated the links between population validity, cultural diversity, and professional ethics. As an illustration, he described a study by Bradley et al. (1989) of children in three ethnic groups, Black, Hispanic, and non-Hispanic White, matched on their HOME inventory (Caldwell and Bradley 1985) scores, a measure of the home environment. The HOME inventory scores correlated appreciably with performance on the Bayley Scales of Infant Development (Bayley 1969) and the Stanford–Binet Intelligence Test (Terman and Merrill 1960) for the Black and non-Hispanic White children but not for the Hispanic children. Laosa suggested that this finding highlights the importance of evaluating test results separately for different ethnic groups.

Laosa pointed out that population validity is a scientific concern in basic research and an ethical issue in applied work, given the inability to predict the results in different populations from the one studied. He also noted that when population differences are observed, two questions need to be answered. One, relevant to applied work, is, Which populations react differently? The other question, pertinent to scientific research, but rarely asked, is, Why do they differ?

In his last paper on measurement issues, Laosa (1996), responding to *The Bell Curve* controversy, made several general points about test bias. One was that bias reflects the absence of population validity. He noted that this view accords with the Cole and Moss (1989) definition of bias: "Bias is differential validity of a given interpretation of a test score for any definable, relevant group of test takers" (p. 205).

Another point was that the definition of predictive bias in the then current third edition of the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education 1985) is insufficient. According to the *Standards*, predictive bias is absent if "the predictive relationship of two groups being compared can be adequately described by a common algorithm (e.g., regression line)" (p. 12). Laosa took up the argument that intelligence tests cannot be considered to be unbiased simply because their predictions are equally accurate for different races or social classes, noting Campbell's rejoinder that the same result would occur if the tests simply measured opportunity to learn (D. T. Campbell, personal communication, May 18, 1995).

The last point was that the consequences of test use also need to be considered (Messick 1989). Laosa cited Linn's (1989) example that requiring minimum high school grades and admissions test scores for college athletes to play during their freshman year can affect what courses minority athletes take in high school, whether they will attend college if they cannot play in their freshman year, and, ultimately, their education and employment.

15.3 Cognitive, Personality, and Social Development of Infants and Young Children

Lewis studied infant's cognitive attention and language ability, infants' and young children's physiological responses during attention, and infants' social and emotional development. He also formulated theories of development as well as theories about the integration of children's various competencies.

15.3.1 Social Development

Social development was a major interest, in particular, the mother–child interaction and the role this interaction played in the child's development. This work on social development revolved around four themes: (a) the mother–child relationship, (b) the growth of the child's social knowledge, (c) social cognition or the nature of the social world, and (d) the social network of children.

For example, in a 1979 volume (Lewis and Rosenblum 1979), *The Child and Its Family,* Lewis challenged the idea that the child's mother was the only important figure in the infant's early life and showed that fathers and siblings, as well as grandparents and teachers, were also key influences. And in a 1975 volume, on peer friendship in the opening years of life (Lewis and Rosenblum 1975), Lewis disputed the Piagetian idea that children could not form and maintain friendships before the age of 4 years. The finding that infants are attracted to and enjoy the company of other infants and young children, and that they can learn from them through observation and imitation, helped open the field of infant daycare (Goldman and Lewis 1976; Lewis 1982b; Lewis and Schaeffer 1981; Lewis et al. 1975). Because the infant's ability to form and maintain friends is important for the daycare context, where groups of infants are required to play together, this work also showed that the learning experience of young children and infants involved both direct and indirect interactions, such as modeling and imitation with their social world of peers, siblings, and teachers (Feiring and Lewis 1978; Lewis and Feiring 1982). This information also had an important consequence on hospital care; until this time, infants were kept far apart from each other in the belief that they could not appreciate or profit from the company of other children.

Another major theme of the research on social development involved infants' social knowledge. In a series of papers, Lewis was able to show that infants could discriminate among human faces (Lewis 1969); that they were learning about their gender (Lewis and Brooks 1975); that they were showing sex-role-appropriate behaviors (Feiring and Lewis 1979; Goldberg and Lewis 1969; Lewis 1975a); that they were learning about how people look, for example, showing surprise at the appearance of a midget—a child's height but an adult's face (Brooks and Lewis 1976); and that they were detecting the correspondence between particular faces and voices (McGurk and Lewis 1974). All of these results indicated that in the first

2 years, children were learning a great deal about their social worlds (Brooks-Gunn and Lewis 1981; Lewis 1981b; Lewis et al. 1971).

The most important aspect of this work on social development was the child's development of a sense of itself, something now called consciousness, which occurs in the second and third years of life. In the Lewis and Brooks-Gunn (1979a) book on self-recognition, *Social Cognition and the Acquisition of Self,* Lewis described his mirror self-recognition test, a technique that has now been used across the world. Results with this test revealed that between 15 and 24 months of age, typically developing children come to recognize themselves in mirrors. He subsequently showed that this ability, the development of the idea of "me," along with other cognitive abilities gives rise to the complex emotions of empathy, embarrassment, and envy as well as the later self-conscious emotions of shame, guilt, and pride (Lewis and Brooks 1975; Lewis and Brooks-Gunn 1981b; Lewis and Michalson 1982b; Lewis and Rosenblum 1974b).

These ideas, an outgrowth of the work on self-recognition, led to Lewis's interest in emotional development. They also resulted in a reinterpretation of the child's need for others. While children's attachment to their mothers was thought to be the most important relationship for the children, satisfying all of their needs, it became clear that others played an important role in children's social and emotional lives. His empirical work on fathers (Lewis and Weinraub 1974) and peers (Lewis et al. 1975) led to the formulation of a social network theory (Feiring and Lewis 1978; Lewis 1980; Lewis and Ban 1977; Lewis and Feiring 1979; Weinraub et al. 1977).

15.3.2 Emotional Development

Lewis's interest in social development and in consciousness led quite naturally to his research on emotional development, as already noted (Lewis 1973, 1977b, 1980; Lewis and Brooks 1974; Lewis et al. 1978; Lewis and Michalson 1982a, b; Lewis and Rosenblum 1978a, b). Two volumes framed this work on the development of emotional life (Lewis and Rosenblum 1974b, 1978b) and were the first published studies of emotional development. These early efforts were focused on the emotions of infants in the first year of life, including fear, anger, sadness, joy, and interest. To study emotional life, Lewis created experimental paradigms and devised a measurement system. So, for example, paradigms were developed for peer play (Lewis et al. 1975), social referencing (Feinman and Lewis 1983; Lewis and Feiring 1981), stranger approach (Lewis and Brooks-Gunn 1979a), mirror recognition (Lewis and Brooks-Gunn 1979a), and contingent learning (Freedle and Lewis 1970; Lewis and Starr 1979). A measurement system was created for observing infants' and young children's emotional behavior in a daycare situation that provided scales of emotional development (Lewis and Michalson 1983). These scales have been used by both American and Italian researchers interested in the effects of daycare on emotional life (Goldman and Lewis 1976).

15.3.3 Cognitive Development

Lewis's interests in development also extended to the study of infants' and children's cognitive development, including attentional processes, intelligence, and language development (Dodd and Lewis 1969; Freedle and Lewis 1977; Hale and Lewis 1979; Lewis 1971b, 1973, 1975b, 1976a, b, 1977a, 1978a, 1981a, 1982a; Lewis and Baldini 1979; Lewis and Baumel 1970; Lewis and Cherry 1977; Lewis and Freedle 1977; Lewis and Rosenblum 1977; Lewis et al. 1969a, 1971; McGurk and Lewis 1974).

Lewis first demonstrated that the Bayley Scales of Infant Development (Bayley 1969), which were—and still are—the most widely used test of infant intelligence, had no predictive ability up to 18 months of age (Lewis and McGurk 1973). In an effort to find an alternative, Lewis turned to research on infants' attentional ability, which he had begun at the Fels Research Institute, and developed it further at ETS. This work used a habituation–dishabituation paradigm where the infant was presented with the same visual stimulus repeatedly and then, after some time, presented with a variation of that stimulus. Infants show boredom to the repeated event, or habituation, and when the new event is presented, the infants show recovery of their interest, or dishabituation (Kagan and Lewis 1965; Lewis et al. 1967a, b). Infants' interest was measured both by observing their looking behavior and by assessing changes in their heart rate (Lewis 1974; Lewis et al. 1966a, b; Lewis and Spaulding 1967). He discovered that the infants' rate of habituation and degree of dishabituation were both related to their subsequent cognitive competence, in particular to their IQ. In fact, this test was more accurate than the Bayley in predicting subsequent IQ (Lewis and Brooks-Gunn 1981a, c; Lewis et al. 1969; Lewis and McGurk 1973).

This research on attentional processes convinced Lewis of the usefulness of physiological measures, such as heart rate changes, in augmenting behavior observation, work which he also began at the Fels Research Institute and continued and expanded at ETS (Lewis 1971a, b, 1974; Lewis et al. 1969, 1970, 1978; Lewis and Taft 1982; Lewis and Wilson 1970; Sontag et al. 1969; Steele and Lewis 1968).

15.3.4 Atypical Development

Lewis's research on normal development, especially on attentional processes as a marker of central nervous system functioning, led to an interest in atypical developmental processes and a program of research on children with disabilities (Brinker and Lewis 1982a, b; Brooks-Gunn and Lewis 1981, 1982a, b, c; Fox and Lewis 1982a, b; Lewis 1971c; Lewis and Fox 1980; Lewis and Rosenblum 1981; Lewis and Taft 1982; Lewis and Wehren 1982; Lewis and Zarin-Ackerman 1977; Thurman and Lewis 1979; Zarin-Ackerman et al. 1977). Perhaps of most importance was the development of an intervention strategy based on Lewis's work with typically

developing children, the Learning to Learn Curriculum. Infants with disabilities were given home- and clinic-based interventions where their simple motor responses resulted in complex outcomes and where they had to learn to produce these outcomes, which served as operants—in effect, an applied-behavior-analysis intervention strategy (Brinker and Lewis 1982a, b; Lewis 1978a, b; Thurman and Lewis 1979).

15.3.5 Theories

Lewis formulated several influential theories about infant development. These included (a) a reconsideration of attachment theory (Weinraub and Lewis 1977) and (b) the infant as part of a social network (Weinraub et al. 1977). He also began work on a theory of emotional development (Lewis 1971b; Lewis and Michalson 1983).

15.3.6 The Origin of Behavior Series

Lewis and Leonard Rosenblum of SUNY Downstate Medical Center organized yearly conferences on important topics in child development for research scientists in both child and animal (primate) development to bring together biological, cultural, and educational points of view. These conferences resulted in a book series, *The Origins of Behavior* (later titled *Genesis of Behavior*), under their editorship, with seven highly cited volumes (Lewis and Rosenblum 1974a, b, 1975, 1977, 1978a, 1979, 1981). The initial volume, *The Effect of the Infant on the Caregiver* (Lewis and Rosenblum 1974a), was so influential that the term *caregiver* became the preferred term, replacing the old term *caretaker.* The book became the major reference on the interactive nature of social development—that the social development of the child involves an interaction between the mother's effect on the infant and the effect of the infant on the mother. It was translated into several languages, and 15 years after publication, a meeting sponsored by the National Institutes of Health reviewed the effects of this volume on the field.

15.4 Cognitive, Personality, and Social Development From Infancy to Adolescence

Brooks-Gunn's work encompassed research on the cognitive, personality, and social development of infants, toddlers, and adolescents, primarily within the framework of social-cognitive theory. Major foci were the acquisition of social knowledge in young children, reproductive processes in adolescence, and perinatal influences on

children's development. These issues were attacked in laboratory experiments, other cross-sectional and longitudinal studies, and experimental interventions. (A fuller account appears in Brooks-Gunn 2013.)

15.4.1 Social Knowledge in Infants and Toddlers

In collaboration with Lewis, Brooks-Gunn carried out a series of studies on the development of early knowledge about the self and others in infancy and toddlerhood. They investigated how and when young children began to use social categories, such as gender, age, and relationship, to organize their world and to guide interactions (Brooks and Lewis 1976; Brooks-Gunn and Lewis 1979a, b, 1981) as well as the development of self-recognition as a specific aspect of social cognition (Lewis and Brooks-Gunn 1979b, c; Lewis et al. 1985). This developmental work was embedded in genetic epistemology theory as well as social-cognitive theory, with a strong focus on the idea that the self (or person) only develops in relation to others and that the self continues to evolve over time, as does the relation to others.

The studies demonstrated that social knowledge develops very early. Infants shown pictures of their parents, strange adults, and 5-year olds and asked, Who is that? were able to label their parents' pictures as mommy and poppy, labeling their fathers' pictures more accurately and earlier than their mothers' (Brooks-Gunn and Lewis 1979b). Shown pictures of their parents and strange adults, infants smiled more often and looked longer at their parents' pictures (Brooks-Gunn and Lewis 1981). And when infants were approached by strangers—5-year-old boys and girls, adult men and women, and a midget woman—the children discriminated among them on the basis of age and height, smiling and moving toward the children but frowning and moving away from the adults and, compared to the other adults, watching the midget more intently and averting their gaze less (Brooks and Lewis 1976).

15.4.2 Reproductive Events

15.4.2.1 Menstruation and Menarche

Brooks-Gunn's interest in the emergence of social cognition broadened to its role in the development of perceptions about reproductive events, at first menstruation and menarche. Her focus was on how social cognitions about menstruation and menarche emerge in adolescence and how males' and females' cognitions differ. Brooks-Gunn and Diane Ruble, then at Princeton University, began a research program on the salience and meaning of menarche and menstruation, especially in terms of definition of self and other in the context of these universal reproductive events

(Brooks-Gunn 1984, 1987; Brooks-Gunn and Ruble 1982a, b, 1983; Ruble and Brooks-Gunn 1979b). They found that menstruation was perceived as more physiologically and psychologically debilitating and more bothersome by men than by women (Ruble et al. 1982). In addition, their research debunked a number of myths about reproductive changes (Ruble and Brooks-Gunn 1979a), including the one that menarche is a normative crisis experienced very negatively by all girls. In fact, most girls reported mixed emotional reactions to menarche that were quite moderate. These reactions depended on the context the girls experienced: Those who were unprepared for menarche or reached it early reported more negative reactions as well as more symptoms (Ruble and Brooks-Gunn 1982).

15.4.2.2 Pubertal Processes

Brooks-Gunn's research further broadened to include pubertal processes. With Michelle Warren, a reproductive endocrinologist at Columbia University, she initiated a research program on pubertal processes and the transition from childhood to early adolescence. Brooks-Gunn and Warren conducted longitudinal studies of girls to chart their emotional experiences associated with pubertal changes and the socialization practices of families. The work included measurement of hormones to better understand pubertal changes and possible emotional reactions. The investigations followed girls who were likely to have delayed puberty because of exercise and food restriction (dancers training in national ballet companies as well as elite swimmers and gymnasts) and girls attending private schools—many of the girls were followed from middle school through college (Brooks-Gunn and Warren 1985, 1988a, b; Warren et al. 1986, 1991).

The private-school girls commonly compared their pubertal development and had no difficulty categorizing their classmates' development (Brooks-Gunn et al. 1986). Relatedly, the onset of breast development for these girls correlated positively with scores on measures of peer relationships, adjustment, and body image, but pubic hair was uncorrelated, suggesting that breast growth may be a visible sign of adulthood, conferring enhanced status (Brooks-Gunn and Warren 1988b).

The context in which the girls were situated influenced their reactions. In a context where delayed onset of puberty is valued (the dance world—most professional ballerinas are late maturers), dancers with delayed puberty had higher scores (relative to on-time dancers) on a body-image measure (Brooks-Gunn, Attie, Burrow, Rosso, & Warren, Brooks-Gunn et al. 1989; Brooks-Gunn and Warren 1985). (They also had lower scores on measures of psychopathology and bulimia; Brooks-Gunn and Warren 1985.) In contrast, in contexts where delayed onset is not valued (swimmers, private-school students/nonathletes), delayed and on-time girls did not differ in their body images (Brooks-Gunn, Attie et al., Brooks-Gunn et al. 1989; Brooks-Gunn and Warren 1985).

Two publications in this program, in particular, were very widely cited, according to the Social Science Citation Index: Attie and Brooks-Gunn (1989), on eating

problems, and Brooks-Gunn et al. (1987), on measuring pubertal status, with 389 and 323 citations through 2015, respectively.

15.4.2.3 Adolescent Parenthood

Given Brooks-Gunn's research interest in menarche and other pubertal processes, it is not surprising that she moved on to research on pregnancy and parenthood, events that presage changes in self-definition as well as social comparisons with others. Brooks-Gunn joined Frank Furstenberg, a family sociologist at the University of Pennsylvania, in a 17-year follow-up of a group of teenage mothers who gave birth in Baltimore in the early 1970s (Furstenberg et al. 1987a, b, 1990). They charted the trajectories of these mothers as well as their children, who were about the age that their mothers had been when they gave birth to them. The interest was in both how well the mothers were doing and how the mothers' life course had influenced their children.

In brief, the teenage mothers differed widely in their life chances: About one third were on welfare and three quarters had jobs, usually full-time ones. Characteristics of the mothers' family of origin and of their own families (e.g., higher levels of education) and their attendance at a school for pregnant teenagers predicted the mothers' economic success.

The outcomes for their teenage children were "strikingly poor" (Brooks-Gunn 1996, p. 168). About one third were living with their biological father or stepfather. Half had repeated at least one grade in school, and most were sexually active. Maternal characteristics were linked to the children's behavior. Children of mothers who had not graduated from high school were 2.4 times as likely as other children, and children of unmarried mothers were 2.2 times as likely, to have repeated a grade. And children of unmarried mothers were 2.4 times as likely to have been stopped by the police, according to their mothers.

The Furstenberg et al. (1987b) monograph chronicling this study, *Adolescent Mothers in Later Life,* won the William J. Goode Book Award from the American Sociological Association's Sociology of the Family Section and is considered one of the classic longitudinal studies in developmental psychology.

Brooks-Gunn and Lindsay Chase-Lansdale, then at George Washington University, also began a study of low-income, Black multigenerational families (grandmother/grandmother figure–young mother–toddler) in Baltimore to investigate family relationships, via home visits (Chase-Lansdale et al. 1994). One issue was the parenting by the grandmother and mother, as observed separately in videotaped interactions of them aiding the child in working on a puzzle. The quality of parenting depended on whether they resided together and on the mother's age. Mothers' parenting was lower in quality when they lived with grandmothers. (Residing with the grandmothers and sharing child caring may be stressful for the mothers, interfering with their parenting.) Grandmothers' parenting was *higher* in quality when they lived with younger mothers than when they lived apart, but it was *lower* in quality when they lived with older mothers rather than apart. (Coresiding grandmothers may be more willing to help

younger mothers, whom they view as needing assistance in parenting, than older mothers, whom they see as capable of parenting on their own.)

15.4.3 Perinatal Influences

Another line of research expanded beyond teenage parents to look at perinatal conditions, such as low birth weight and pregnancy behavior (e.g., smoking, no prenatal care), that influence parenting and children's development. Poor families and mothers with low education were often the focus of this research, given the differential rates of both early parenthood and adverse perinatal conditions as a function of social class.

In a joint venture between ETS, St. Luke's–Roosevelt Hospital, and Columbia University's College of Physicians and Surgeons, Brooks-Gunn studied low-birth-weight children and their parents, many from disadvantaged families because of the greater incidence of low-birth-weight children in these families. The work led to her thinking about how to ameliorate cognitive, emotional, and academic problems in these vulnerable children (Brooks-Gunn and Hearn 1982).

Brooks-Gunn joined Marie McCormick, a pediatrician then at the University of Pennsylvania, in a 9-year follow-up of low-birth-weight infants from previous multisite studies (Klebanov et al. 1994; McCormick et al. 1992). The focus was on very low birth weight infants, for more of them were surviving because of advances in neonatal intensive care.

At age 9, the low-birth-weight children did not differ from normal-birth-weight children on most aspects of classroom behavior, as reported by their teachers, but they had lower attention/ language skills and scholastic competence and higher daydreaming and hyperactivity; these differences were most pronounced for extremely low birth weight children. This pattern of differences resembles attention deficit disorder (Klebanov et al. 1994). The low-birth-weight children also had lower mean IQs and, at home, more behavioral problems, as reported by their mothers. The adverse health status of these children underscores the importance of efforts to reduce the incidence of premature births (McCormick et al. 1992).

15.4.4 Interventions With Vulnerable Children

15.4.4.1 Low-Birth-Weight Children

Brooks-Gunn and McCormick also collaborated on two other research programs involving interventions with biologically vulnerable children, the majority of whom were poor. One program focused on reducing the incidence of low-birth-weight deliveries by providing pregnant women with child-rearing and health information.

This program used a public health outreach model to locate pregnant women who were not enrolled in prenatal care; the intervention was located at Harlem Hospital. This effort was a logical extension of Brooks-Gunn's work on adolescent mothers in Baltimore (Brooks-Gunn et al. 1989; McCormick et al. 1987, 1989a, b).

The women in the program were very disadvantaged: One fifth were adolescents, three quarters were single, and half had not graduated from high school. The birth weight of their infants was unrelated to traditional risk factors: mother's demographic (e.g., education) and psychosocial characteristics (e.g., social support). This outcome suggests that low birth weight *in poor populations* is largely due to poverty per se. Birth weight *was* associated with the adequacy of prenatal care (Brooks-Gunn et al. 1988; McCormick et al. 1987).

The outreach program was extensive—four local people searching for eligible women over the course of a year, each making roughly 20 to 25 contacts daily—but recruited only 52 additional women, at a cost of about $850 each. The labor-intensive and expensive nature of this outreach effort indicates that more cost-effective alternatives are needed (Brooks-Gunn et al. 1988, 1989).

The other program involved the design and implementation of an early intervention for premature, low-birth-weight infants: enrollment in a child development education center and family support sessions. This program was initiated in eight sites and included almost 1000 children and their families; randomization was used to construct treatment and control groups. These children were followed through their 18th year of life, with the intervention from birth to 3 years of age being evaluated by Brooks-Gunn (Infant Health and Development Program 1990). The 3-year-olds in the intervention group had higher mean IQs and fewer maternally reported behavior problems, suggesting that early intervention may decrease low-birth-weight infants' risk of later developmental disability.

15.4.4.2 Head Start

Brooks-Gunn also carried out a notable evaluation of Head Start, based on data from an earlier longitudinal study conducted at ETS in the 1970s. The ETS–Head Start Longitudinal Study, directed by Shipman (1972, 1973), had canvassed poor school districts in three communities in an effort to identify and recruit for the study all children who were 3 ½ to 4 ½ years old, the Head Start population. The children were then assessed and information about their families was obtained. They were reassessed annually for the next 3 years. After the initial assessment, some children had entered Head Start, some had gone to other preschool programs, and some had not enrolled in any program. Clearly families chose whether to enroll their children in Head Start, some other program, or none at all (by processes that are difficult if not impossible to measure). But, by having the children's assessments and familial and demographic measures at age 3, it was possible to document and control statistically for initial differences among children and families in the three groups. Children's gains in ability in these groups could then be compared.

In several studies of two communities (Lee et al. 1988, 1990; Schnur et al. 1992), Brooks-Gunn and her collaborators investigated differences in the children's gains in the Head Start and other groups as well as preexisting group differences in the children's demographic and cognitive characteristics. Black children enrolled in Head Start made greater gains on a variety of cognitive tests than their Black peers in the other groups by the end of the program (Lee et al. 1988) and diminished gains after 2 years (Lee et al. 1990). (The gains for the small samples of White children did not differ between the Head Start and other groups in the initial study; these children were not included in the follow-up study.) These findings imply that Head Start may have some efficacy in improving participants' intellectual status. The Head Start children were the most disadvantaged (Schnur et al. 1992), seemingly allaying concerns that Head Start does not take the neediest children (Datta 1979).

15.5 Conclusion

As this review documents, ETS was a major center for basic and applied research in developmental psychology for decades. The number and quality of investigators (and their prodigious output) made for a developmental psychology program that rivaled the best in the academic community.

The research was wide ranging and influential, spanning the cognitive, personality, and social development of infants, children, and adolescents, with an emphasis on minority, working-class, and disabled individuals; addressing key theoretical, substantive, and methodological issues; using research methods that ran the gamut: laboratory and field experiments, correlational studies, surveys, and structured observations; and impacting theory, research, and practice across developmental psychology.

In common with ETS's research in cognitive, personality, and social psychology (Stricker, Chap. 13, and Kogan, Chap. 14, this volume), this achievement was probably attributable to the confluence of ample institutional and financial support, doubtless due to the vision of Chauncey, who saw the value of a broad program of psychological research.

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