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ABSTRACT

This is the eighth report describing the progress of the ETS-Head Start Longitudinal Study. The study began in 1969 with the collection of data on over 1800 children ranging from 4 through 8 years in age. Data collection on these children and their families, communities and schools is planned to continue through spring of 1972. This report describes: (1) interrelationships among certain cognitive, perceptual and personal-social behaviors of the children in the first two years of the study, and (2) similarity of the structural findings obtained in both years. A chapter on sample characteristics provides tables and statistics which indicate both the composition of the three-site longitudinal sample and the extent to which it differs from the initial four-site sample. A chapter on methodology describes how the test data were gathered and the various processing operations and methods of analysis. Findings from the various structural analyses of the test data, including comparisons by major subject classifications, are presented. The general results of the analysis to date are summarized, and plans for further analysis are given. (Author/KM)

ED 078011

PR-72-18

DISADVANTAGED CHILDREN AND THEIR FIRST SCHOOL EXPERIENCES

ETS-Head Start Longitudinal Study

Structural Stability and Change in the Test Performance of Urban Preschool Children

Virginia C. Shipman

September 1972

EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY

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Report under

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Preface

This is the eighth report describing the progress of the Longitudinal Study conducted under Contract OEO 4206 and Grants H-8256 and CG-8256. The first report (PR-68-4) discussed theoretical considerations and measurement strategies proposed for the study of disadvantaged children and their first school experiences. The second (PR-69-12) and third (PR-70-2) reports described operations during the first two years of the Study. In 1969 mothers were interviewed and children tested prior to their enrollment in Head Start or any other preschool program; in 1969-70 these measures were repeated and extensive observation of those children attending preschool programs in Portland, St. Louis and Trenton took place. In Lee County, where Head Start is a kindergarten level program, a brief version of the test battery was administered. The fourth report (PR-70-20) gave a detailed description of the initial longitudinal sample in Portland, St. Louis and Trenton prior to enrollment in school. It was based on the first analyses of 16 of the 33 instruments administered during 1969, including a parent interview and medical examination designed to elicit information about family and environmental characteristics. The fifth report (PR-71-19) continued the description of the initial sample, incorporating data from Lee County, and described the interrelationships among individual measures of the child's performances prior to school entry, accompanied by brief descriptions of the tasks and scores used. The seventh report (PR-72-13) presented results of structural analyses of the initial home interview and described the relationship of demographic indexes of socioeconomic status to maternal behaviors and attitudes.

The present report is the second describing data collected during the Head Start year in our three urban sites (i.e., the second year of the Study).

The first one, PR-71-20 (Emmerich, 1971), dealt with the structure and development of personal-social behaviors in preschool settings in Portland, St. Louis and Trenton. The present report provides the first analyses of interrelationships among individual measures of the child's performance toward the end of the Head Start year (Year 2), comparing these results with those obtained in Year 1. Thus, this is the first study report on longitudinal findings on individually administered test instruments. Subsequent reports will deal with analyses of change scores on individual measures, relating these data to socio-cultural determinants assessed by measures of home and preschool environments. Interpretation of such findings will be facilitated by knowledge of developmental trends in structural relations, presented in this report.

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I am grateful to Michael Minor for his detailed description of the sample, to Albert Beaton and John Barone for the description of the statistical procedures employed and to Susan Simosko for her assistance in describing the data collection procedures.

Particular thanks go to John Barone who coordinated data analysis activities and to Norma Hvasta, Judith Ohls and Emily White who programmed the analyses reported here; thanks, too, are due the women who painstakingly coded all the data under the able supervision of Joan Tyson.

Also, the continuing encouragement, understanding, and constructive criticism provided by the Office of Child Development, particularly by Dr. Lois-ellin Datta, Mr. Richard Orton, Dr. Thelma Zener and Dr. Edward Zigler, have contributed greatly to the form and substance of the study.

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and Mr. Conrad McLean and Mrs. Sharon Creech, Trenton, New Jersey. All contributed knowledge of their communities and varied technical and administrative skills that were invaluable for organizing and coordinating testing activities in the field. I owe gratitude as well to the many testers, test center and playroom supervisors, and drivers, without whose efforts data could not have been collected. Their hard work, enthusiasm, and patience were a continuing source of encouragement to those of us who knew the frustrations they experienced working within a complex organizational structure that was not always geared to their needs. In addition to the valuable program and field coordination provided by Joseph Boyd and Samuel Barnett, a large debt must be acknowledged to Anne Bussis, Rosalea Courtney, Karla Goldman, Jean Orost, Patricia Warren and Phyllis Ward who assisted me in tester training. Gratitude must also be expressed for the monitoring and field consultation provided by ETS Regional Office staff: Junius Davis, Roderick Ironside, Chandra Mehotra, Daniel Norton, Santelia Knight, Robert Lambert and George Temp.

Deepest gratitude, however, goes to the children and their families who participated in the study. Together we hope to contribute to a better understanding of the young child's development.

Virginia C. Shipman

Princeton, New Jersey
September 15, 1972

Structural Stability and Change in the Test Performance of Urban Preschool Children

Chapter 1

Introduction

The ETS-Head Start Longitudinal Study is addressed to two main questions: 1) What are the components of early education that are associated with the cognitive, personal and social development of disadvantaged children? 2) What are the environmental and background processes that moderate these associations?

The age range chosen for study was the developmental span of approximately 4 through 8 years of age--or from two years prior to entrance into the first grade through completion of third grade. This period is thought to be particularly important because it is a time during which many abilities consolidate and the child makes the social transition from familiar home surroundings to the world of school, peers, and unfamiliar adults. The first data were collected in the spring and summer of 1969 on over 1800 children, the majority falling between the ages of three years nine months (3-9) and four years eight months (4-8). All were s[illegible]led to be enrolled in first grade in the fall of 1971. Data collection on these children and their families, communities and schools is planned to continue through spring of 1974.

The present report describes 1) interrelationships among certain cognitive, perceptual and personal-social behaviors of the children in the first two years of the study as assessed by those measures administered in both years and 2) similarity of the structural findings obtained in both years. Previously reported structural analyses of the Year 1 child test data yielded a general ability dimension, a stylistic response tempo dimension, and factors apparently tapping task-specific styles and behaviors. Present analyses were directed toward investigating the extent of structural stability and change between Years 1 and 2.

In comparing Year 1 and Year 2 data, we also asked the questions posed in an earlier report (Shipman, 1971) on the structure of the Year 1 child test data: To what extent do indexes of perceptual-cognitive functioning in the preschool child represent differentiated processes? How do cognitive styles and competencies interrelate? Within the particular age period represented, are differential results obtained by age, sex, preschool attendance or social status of the child? The major question asked, however, was the extent to which the pattern of interrelationships among variables remained similar from Year 1 to Year 2. Important clues to interpretability of changes in mean level associated with environmental (e.g., preschool experiences and family influences) and developmental differences depend upon the extent to which the same construct is involved. Thus, in addition to contributing to our understanding of the young child, answers to such questions have obvious implications for interpretation of particular test findings obtained in various assessment situations.

The next chapter, Sample Characteristics, provides tables and statistics which indicate both the composition of the three-site longitudinal sample and the extent to which it differs from the initial four-site sample. Chapter 3, Methodology, presents a brief discussion of how the test data were gathered as well as a statement about the various processing operations and the methods of analysis pertinent to this report. Chapter 4, Results and Discussion, presents the findings from the various structural analyses of the test data, including comparisons by major subject classifications. Chapter 5, Conclusions, summarizes and discusses the general results of the analysis to date and presents a statement of plans for further analysis.

Chapter 2

Sample Characteristics

Four regionally distinct communities were selected which 1) had a sufficient number of children in school and in the Head Start program, 2) appeared feasible for longitudinal study given expressed community and school cooperation and expected mobility rates and 3) offered variation in preschool and primary grade experiences. The study sites finally chosen were Lee County, Alabama; Portland, Oregon; St. Louis, Missouri; and Trenton, New Jersey. Within these communities, elementary school districts with a substantial proportion of the population eligible for Head Start were selected for participation. For the most part, schools in the target districts are located near Head Start centers. It is in these school districts that the sample is expected to be enrolled when they reach third grade in the fall of 1973. In each school district an attempt was made to include all children of approximately 3 1/2 to 4 1/2 years of age in the initial testing and data collection of 1969, although some children were excluded from the sample, e.g., children from families whose primary language was not English, or those with severe physical handicaps.

The following is an overview of the salient demographic characteristics of the initial four-site sample (for a more complete description of this population the reader is referred to Project Report 71-19):

1. The number of subjects at different sites varies, with Lee County and Portland together constituting about 60% of the sample.
2. The sample is 62% black.
3. Boys make up 53% of the sample. For the four sites they make up 54.5% of the black sample and 50.5% of the white sample.
4. For the three sites in which children had the opportunity to attend Head Start in Year 2 of the study, 37.2% of the sample attended Head

Start, 11% attended other preschool programs, and 61.8% had no known attendance in Head Start or other preschool programs. In Lee County, where Head Start is a kindergarten level program, 41.7% of the initial sample attended Head Start, 19.1% attended other preschool programs and 39.3% had no known attendance in Head Start or other preschool programs.

5. Substantially more blacks than whites attended Head Start. While this varies by site, in the total sample only 5.1% of the children who attended Head Start are white.

6. The parents of the white children generally have had more years of formal education than the black parents, except in St. Louis where the reverse is true.

7. Although the fathers of both blacks and whites tend to be in blue-collar positions, a disproportionately large number of blacks are so classified.

8. Educational and occupational data were obtained for substantially fewer fathers than mothers. Moreover, the percentage difference between the number of fathers and the number of mothers for whom data were obtained was greater for blacks than for whites, and for children who attended Head Start than for others.

The major focus of this report is a comparison of the structure of cognitive-perceptual performances in preschool children tested in Year 1 and Year 2 (an interval of approximately eight and a half months). Hence, the following analyses were confined to a longitudinal sample, that is, to those children who fulfilled initial qualifications for inclusion in the study and about whom at least one unit of test information had been collected in both 1969 and 1970. Thus, this population is a subsample of the initial four-site sample described above and reported in PR-71-19. The purpose of this chapter will be to present some of the major demographic characteristics of this longitudinal sample and report disproportionalities in terms of single and multiple classifications. It should be recognized that the investigators regard the following characteristics as demographic variables only and discourage simplistic or sterotypic psychological interpretation of these biological and cultural statuses.

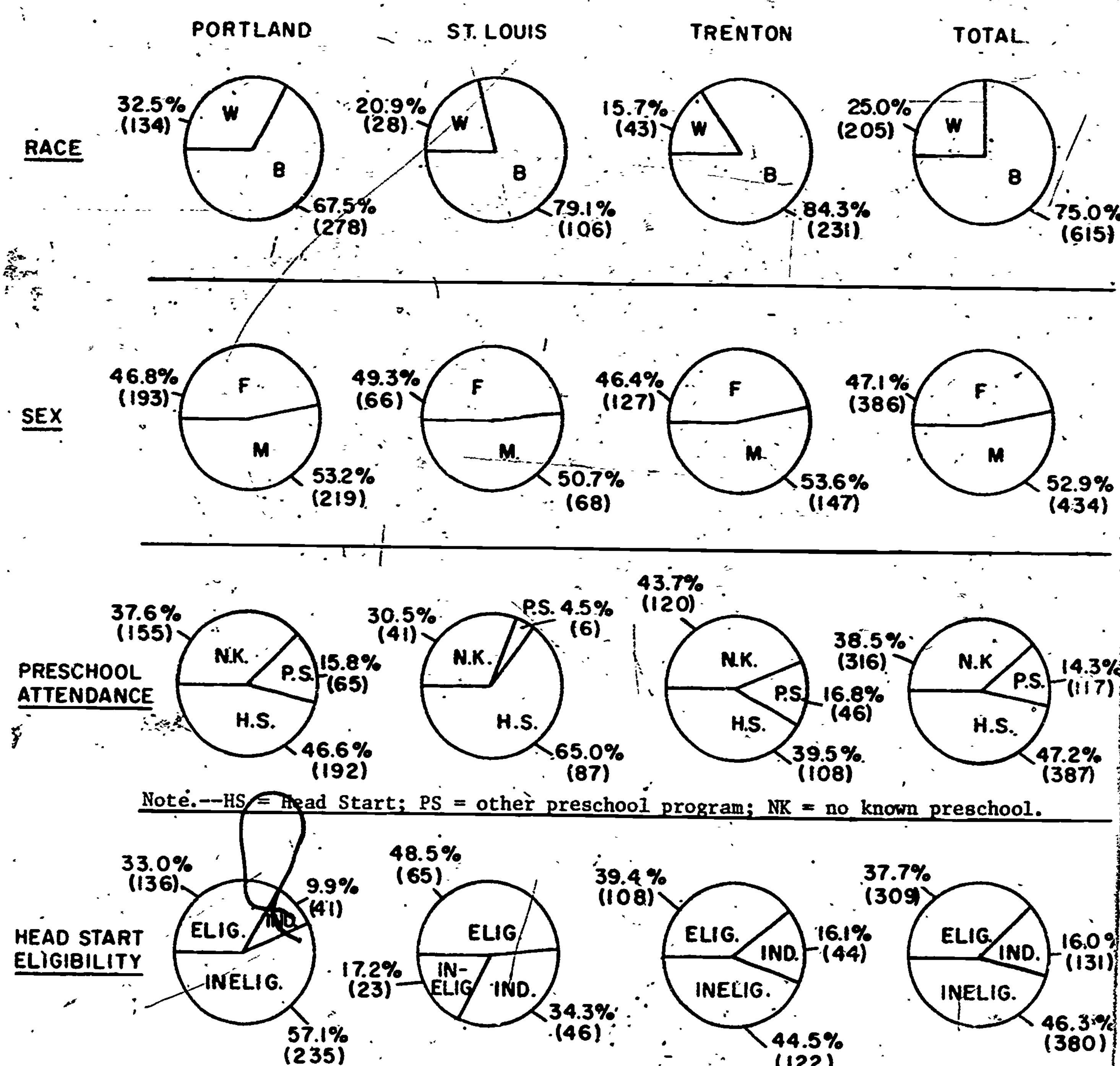
Basic longitudinal sample: The Year 2 sample included children from four sites: Trenton, Lee County, Portland, and St. Louis. Because of limited resources and because most of the children did not enroll in preschool programs until the third year of the study when Head Start was available, data-gathering procedures during Year 2 in Lee County were limited to a fraction of the tests. This site therefore was eliminated from the comparative analyses described in this report. The remaining three-site urban longitudinal sample consists of 820 children. In some cases data available for these children are incomplete. As can be seen in Figure 1, there are some fairly substantial differences in sample size by site. The Portland children constitute 50.2% of the urban longitudinal sample, whereas the Trenton and St. Louis sites comprise only 33.4% and 16.4% of this sample, respectively. In contrast to the initial three-site urban sample, Portland and Trenton represent higher percentages of the longitudinal sample (50.2 vs. 45.7 and 33.4 vs. 33, respectively), whereas the percentage of St. Louis subjects is less (16.4 vs. 21.3), due to the much greater sample attrition at that site.

Racial composition: The racial composition within each site and for the three-site total is shown in Figure 1. The total sample is 75% black and 25% white;

Figure 1

Children in Each Site Classified by Race, Sex, Preschool Attendance and Head Start Eligibility

(Year 1-2 Longitudinal Urban Sample)



Note.--HS = Head Start; PS = other preschool program; NK = no known preschool.

Note.--IND = indeterminate economic eligibility for Head Start.

however, the percentage of black children varies from 67.5 to 84.3 within the three sites. (This increase in the percent of black children for the longitudinal sample is primarily due to deletion of Lee County subjects, although the percentage of black children in each of the three urban sites is higher for the longitudinal sample than in the initial sample.)

Sex differences: As one might expect, there are small differences in the numbers of boys and girls from site to site (Figure 1). The total sample is 52.9% boys and 47.1% girls. The number of boys and girls is about equal in St. Louis, but there is a disproportionately large percentage of boys in both Trenton (53.6) and Portland (53.2). These percentages are similar to those obtained for the initial sample.

Preschool attendance: The sample statistics for attendance in Head Start and other preschool programs are shown in Figure 1. The children are divided into three groups. The first consists of children who attended Head Start during 1969-70. Information specifying attendance was obtained from community Head Start registers. The second group, other preschool (PS), consists of children who are known to have attended other preschool or nursery programs during 1969-70. Children who were not on Head Start or other preschool lists are in the "no known" (NK) category. It is likely that most of these children attended neither Head Start nor other preschool programs, but this category also includes children who may have moved out of the community and were enrolled in Head Start elsewhere and those who were enrolled in Head Start outside the general area. As the children in the "no known" category are followed up, some of them may be reassigned to the Head Start or other preschool categories; therefore, numbers for the latter categories should be considered minimal estimates. Across the three urban sites, 47.2% of the children attended Head Start, 14.3% attended other preschool programs, and 38.5% had no known attendance in Head Start or other preschool programs. The percentage of children in the Head Start category within each site ranges from 39.5 to 65.0, and the percentage in the preschool category varies from 4.5 to 16.8.

As would be expected, in contrast to the initial sample, the percentage of children in the "no known" category is substantially less for the longitudinal sample. The only other significant change is in the percentage of children in St. Louis who attended Head Start (65% in the longitudinal sample vs. 37.7% in the initial sample), reflecting, in part, the greater ease in locating and contacting parents of children attending Head Start than those in no preschool program.

Eligibility: Figure 1 shows the sample classified according to family economic eligibility under the 1969 Head Start poverty guidelines for varying size households ($3000 for a family of three, with increments of $600 per additional person). Eligibility data were obtained as part of the interview with the mother or mother-surrogate at the testing center in the spring of the Head Start year. When the respondent was unable or unwilling to provide income information, eligibility was coded as indeterminate (Ind.). Of the total sample, 46.3% are ineligible; 37.7% are eligible; and 16.0% are of indeterminate eligibility. Within each site, however, the percentage of eligible children varies dramatically from 33 in Portland to 48.5 in St. Louis. These diverse percentages of eligible children not only yield information about the discrepant socioeconomic statuses of the various site populations, but also confound otherwise seemingly straightforward analyses.

Cross-classification by major variables: Appendix A contains a complete cross-classification of the sample by five major demographic variables: site, race, sex, preschool attendance, and Head Start eligibility. Although there are several empty cells, fortunately, those subpopulations of particular interest contain a sufficient number of children for analysis. Consequently, it is possible to estimate a mean value for each cell of black or white children by Head Start or by no known preschool program for any measured variable. Of course, the means for the largest cell (Portland eligible black males in the Head Start category) will be much better estimated than the means for the smallest cells (e.g., St. Louis's one eligible white female in the Head Start category).

Sex by race classification: Frequently reported differences in performance level between the sexes require an explication of possible disproportional distributions of boys and girls across the two racial populations (Table 1). Overall, boys are a substantial majority in the black sample and a slight minority in the white sample. This relationship is not consistent over the three sites: in Trenton, the proportion of boys is slightly over 50% for both black and white samples; in Portland, a large percentage of the black population are boys, whereas the majority of the white population are girls; and in St. Louis, the sample of blacks is 50% male, whereas the white sample is 53.2% male.

Preschool attendance by race classification: Table 2 presents the basic statistics classified by race, for children who attended Head Start or other preschool programs or were not known to have attended a preschool program. The information is separated by site. There are 57 white children who attended Head Start. This is 7.0% of the total sample or about 28% of the white sample. Conversely, a much larger number (330) of blacks in the sample attended Head Start. This racial difference is especially marked in Trenton where only 1.8%

Table 1

Sex by Race, Classified by Site

	Portland			St. Louis	
	Black	White		Black	White
Girls	117 (28.4)*	76 (18.4)	Girls	53 (39.6)	13 (9.7)
Boys	161 (39.1)	58 (14.1)	Boys	53 (39.6)	15 (11.2)

	Trenton			Total	
	Black	White		Black	White
Girls	110 (40.1)	17 (6.2)	Girls	280 (34.1)	106 (12.9)
Boys	121 (44.2)	26 (9.5)	Boys	335 (40.9)	99 (12.1)

Table 2

Preschool Attendance by Race, Classified by Site

	Portland			St. Louis	
	Black	White		Black	White
H.S.	161 (39.1)*	31 (7.5)	H.S.	66 (49.3)	21 (15.7)
N.K.	82 (19.9)	73 (17.7)	N.K.	35 (26.1)	6 (4.5)
P.S.	35 (8.5)	30 (7.3)	P.S.	5 (3.7)	1 (.7)

	Trenton			Total	
	Black	White		Black	White
H.S.	103 (37.6)	5 (1.8)	H.S.	330 (40.2)	57 (7.0)
N.K.	88 (32.1)	32 (11.7)	N.K.	205 (25.0)	111 (13.5)
P.S.	40 (14.6)	6 (2.2)	P.S.	80 (9.8)	37 (4.5)

*Number in parentheses is percent.

of the white children but 37.6% of the black children attended Head Start. Thus, Head Start in Trenton must be considered essentially a black program. The Head Start programs in Portland and St. Louis are attended by 7.5 and 15.7% of the white children, respectively. These samples are relatively close to estimates from marginal percents and appear to be large enough for selected analyses.

Eligibility by race classification: Table 3 displays the study population classified according to Head Start economic eligibility and race membership. Of the total sample, 32.5% are eligible blacks, 29.7% are ineligible blacks, 16.6% are ineligible whites and 5.1% are eligible whites. The Trenton and Portland samples reflect similar patterns; that is, the percentage of eligible and ineligible blacks are approximately equal, and a disproportionate percentage of whites are ineligible. However, the St. Louis population is quite different; the percentage of eligible blacks (40.3%) is much greater than ineligible blacks (14.2%), and the majority of whites are eligible.

Preschool attendance by sex classification: Table 4 shows the percentage and number of children who attended Head Start, other preschool programs, or neither, classified by sex. Overall, there are a greater number of boys (211) than girls (176) in Head Start. This is a consistent pattern across the three sites; however, the difference in numbers varies from four in Trenton to 16 in Portland. Trenton and Portland have more boys than girls in the "no known" category; however, in St. Louis, there is a greater percentage of girls in this category. The proportion of boys and girls within the "other preschool" category is approximately equal across the three sites.

Eligibility by sex: Table 5 shows the longitudinal population classified by sex, Head Start eligibility, and site. Of the three-site sample, 23.7% are

Table 3

Eligibility X Race, Classified by Site

	Portland		St. Louis	
	Black	White	Black	White
Elig.	111 (26.9)	25 (6.1)	54 (40.3)	11 (8.2)
Inelig.	134 (32.6)	101 (24.5)	19 (14.2)	4 (3.0)
Ind.	33 (8.0)	8 (1.9)	33 (24.6)	13 (9.7)

	Trenton		Total	
	Black	White	Black	White
Elig.	102 (37.2)	6 (2.2)	267 (32.6)	42 (5.1)
Inelig.	91 (33.2)	31 (11.3)	244 (29.7)	136 (16.6)
Ind.	38 (13.9)	6 (2.2)	104 (12.7)	27 (3.3)

Table 4

Preschool Attendance X Sex, Classified by Site

	Portland		St. Louis	
	Girls	Boys	Girls	Boys
H.S.	88 (21.4)	104 (25.2)	36 (26.9)	51 (38.1)
N.K.	75 (18.1)	80 (19.5)	27 (20.1)	14 (10.4)
P.S.	30 (7.3)	35 (8.5)	3 (2.2)	3 (2.2)

	Trenton		Total	
	Girls	Boys	Girls	Boys
H.S.	52 (19.1)	56 (20.4)	176 (21.5)	211 (25.7)
N.K.	55 (20.0)	65 (23.7)	157 (19.1)	159 (19.4)
P.S.	20 (7.3)	26 (9.5)	53 (6.5)	64 (7.8)

Table 5

Head Start Eligibility X Sex, Classified by Site

	Portland Girls	Portland Boys		St. Louis Girls	St. Louis Boys
Elig.	65 (15.8)	71 (17.2)	Elig.	24 (17.9)	41 (30.6)
Inelig.	108 (26.2)	127 (30.9)	Inelig.	14 (10.5)	9 (6.7)
Ind.	20 (4.8)	21 (5.1)	Ind.	28 (20.9)	18 (13.4)

	Trenton Girls	Trenton Boys		Total Girls	Total Boys
Elig.	45 (16.4)	63 (23.0)	Elig.	134 (16.3)	175 (21.4)
Inelig.	64 (23.4)	58 (21.1)	Inelig.	186 (22.7)	194 (23.7)
Ind.	18 (6.6)	26 (9.5)	Ind.	66 (8.0)	65 (7.9)

ineligible boys, 22.7% are ineligible girls, 21.4% are eligible boys, 16.3% are eligible girls, and 15.9% are of indeterminate eligibility. However, across the three sites, there appears to be no consistent pattern: 1) in Portland the percentages follow an order similar to that of the three-site total, but the percent of ineligible boys is higher (30.9); 2) the St. Louis sample is quite different from the other subpopulations, with the largest percent (30.6) of children being eligible boys, the smallest percent (6.7) ineligible boys, and over one third of the children of indeterminate eligibility; 3) in Trenton there are a disproportionate percent (23.4) of ineligible girls, and more boys are eligible (23%) than ineligible (21%).

Preschool attendance by eligibility: Overall, approximately two thirds of those families who were within OEO poverty guidelines did send their children to Head Start (Table 6). This pattern was consistent within all three sites. The above estimate is an underestimate to the extent that some of the children in the no known preschool attendance category may have attended Head Start, and undoubtedly, a percentage of those in the indeterminate eligibility category were actually eligible. However, a review of the interviews revealed that many of the heads of household in Head Start families in which income information was not obtained held jobs that appeared unlikely to provide wages above the guidelines. About a third of the children from families at higher income levels also attended Head Start. Thus, there was some socioeconomic diversity in the programs sampled in the study, and low-income children were not completely segregated from their more advantaged neighbors. In looking at these percentages, the reader is cautioned to remember that these families were in many different Head Start programs, and families economically ineligible may, therefore, be a smaller percentage of a particular program's enrollment. More-

Table 6

Preschool Attendance X Head Start Eligibility, Classified by Site

Portland

	Elig.	N Elig.	Ind.	Total
HS	89 (21.6)*	86 (20.9)	17 (4.1)	192 (46.6)
NK	38 (9.2)	96 (23.3)	21 (5.1)	155 (37.6)
PS	9 (2.2)	53 (12.9)	3 (0.7)	65 (15.8)
Total	136 (33.0)	235 (57.1)	41 (9.9)	412 (100.0)

St. Louis

	Elig.	N Elig.	Ind.	Total
HS	47 (35.1)	12 (9.0)	28 (20.9)	87 (65.0)
NK	18 (13.4)	9 (6.7)	14 (10.4)	41 (30.5)
PS	0 (0.0)	2 (1.5)	4 (3.0)	6 (4.5)
Total	65 (48.5)	23 (17.2)	46 (34.3)	134 (100.0)

Trenton

	Elig.	N Elig.	Ind.	Total
HS	61 (22.3)	29 (10.6)	18 (6.6)	108 (39.5)
NK	42 (15.3)	59 (21.5)	19 (6.9)	120 (43.7)
PS	5 (1.8)	34 (12.4)	7 (2.6)	46 (16.8)
Total	108 (39.4)	122 (44.5)	44 (16.1)	274 (100.0)

Total

	Elig.	N Elig.	Ind.	Total
HS	197 (24.0)	127 (15.5)	63 (7.7)	387 (47.2)
NK	98 (12.0)	164 (20.0)	54 (6.6)	316 (38.6)
PS	14 (1.7)	89 (10.9)	14 (1.7)	117 (14.3)
Total	309 (37.7)	380 (46.3)	131 (16.0)	820 (100.0)

*Numbers in parentheses refer to percentages over, income data were obtained in the spring of the Head Start year, whereas enrollment was in the fall. Given the greater instability of job opportunities for the poor, and the very low income defining eligibility, the line between "eligible" and "ineligible" for many of the families in this study may be fine indeed.

<u>Age at time of testing</u>: A description of the child's age at time of testing is complicated by the fact that testing occurred over a several month period. However, in Year 1 the majority of children were administered a common battery of instruments on the first day and then given three batteries during the re t of the week; in Year 2 they were tested over a three-day period. However, those children who missed part of the complete battery were tested during the following months whenever possible. Since no significant age differences were found among tests administered, those instruments administered to the largest number of children were selected for computation of age at time of testing. (Motor Inhibition was utilized the first year, and in the second year, the Johns Hopkins Perceptual Test was employed.) Average age, classified by site, race, sex, and preschool attendance is shown in Table 7. The children in St. Louis were on the average about two months older than were the children in other sites because testing began later and was extended in St. Louis in order to increase the sample size in this site. In Year 1 there is also a very slight trend for children who later enrolled in some preschool program (Head Start or other) to be older than those in no known preschool program. However, there are no significant age differences between the three preschool groups in the second year. Small age differences during this period may be psychologically and physiologically important and, hence, the above trends warrant attention during analyses

Table 7

Child's Age* at Time of Testing, Classified by Race,

Sex, Preschool Attendance and Site

	Portland				St. Louis				Trenton				Total			
	Year 1		Year 2		Year 1		Year 2		Year 1		Year 2		Year 1		Year 2	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
Black	274	49.8	269	58.7	103	52.1	103	60.5	225	49.8	230	57.5	602	50.2	602	58.5
White	134	49.9	13.	59.0	28	51.6	25	59.7	41	50.1	43	57.2	203	50.2	200	58.7
Girls	191	49.8	190	58.6	64	51.3	62	59.6	125	49.9	127	57.6	380	50.1	379	58.4
Boys	217	49.9	211	58.9	67	52.7	66	61.0	141	49.8	146	57.4	425	50.3	423	58.7
HS	191	49.9	187	58.3	85	51.9	84	59.8	106	50.3	108	57.9	382	50.4	379	58.5
NK	154	49.8	153	59.2	40	51.9	38	61.0	115	49.4	119	56.9	309	50.0	310	58.6
PS	63	49.8	61	59.0	6	53.8	6	63.2	45	50.0	46	57.9	114	50.1	113	58.7
Total	408	49.8	401	58.8	131	52.0	128	60.3	266	49.9	273	57.5	805	50.2	802	58.6

*in months.

and subsequent interpretation. It should be noted that due to the need for an extended testing period in Year 1, retesting generally occurred after an eight and a half month interval.

Mother's education: For this report, only one index of socioeconomic status is presented--mother's education. As described in an earlier report (Shipman, 1972a), educational level reflects to a considerable extent differences in resources available in the home for both the white and black families in the initial sample; occupational level, however, appears to have differential meaning. Since information on father's education was available for substantially fewer children, mother's educational level is presented. Data on mother's education are available for 753 of the 820 children. The index of mother's education is determined by the highest grade attended as reported in the 1969 parent interview. Mean values for the different sites classified by race sex and preschool attendance are shown in Table 8. Mothers of children in the Portland sample have the highest average grade attended, 11.6, less than a half year under high school graduation. The Trenton average is 10.5 grades, and the St. Louis sample is lowest with an average of 9.6 grades. The mothers of Head Start children have almost two years less schooling than the mothers of children in other preschool programs, and about a half year less schooling than the mothers of the children in the no known preschool category. In general, the mothers of the white children have approximately a year and a quarter more schooling than the mothers of black children, but this pattern is not consistent throughout the sites. In Trenton and Portland, the white mothers have more schooling, but in St. Louis, the mothers of the black children have, on the average, over a year more formal education. Within the girl-boy comparisons, across all sites, the mothers of girls have a higher educational level, but the difference is negligible.

Table 8

Mother's Education Classified by Race, Sex, Preschool Attendance and Site

	Portland		St. Louis		Trenton		Total	
	N	Mean	N	Mean	N	Mean	N	Mean
Black	274	11.20	76	9.86	217	10.38	567	10.71
White	129	12.50	17	8.65	40	11.57	186	11.95
Girls	188	11.62	47	9.64	124	10.81	359	11.08
Boys	215	11.61	46	9.63	133	10.34	394	10.95
HS	187	11.21	62	9.42	99	9.94	348	10.99
NK	152	11.45	27	9.93	115	10.62	294	10.95
PS	64	13.19	4	11.00	43	11.88	111	12.61
Total	403	11.62	93	9.63	257	10.57	753	11.01

Summary

There are, as indicated, a number of disproportionalities in the various classifications of importance: 1) the Portland sample constitutes over 50% of the longitudinal population, 2) there are three times as many blacks as whites in the sample, 3) 53% of the sample are boys, 4) 61.5% of the children attended Head Start or other preschool programs, 5) a substantially greater percentage (85.3) of the Head Start children are black, 6) approximately two thirds of the white population (vs. approximately half the black families) are economically ineligible for Head Start, 7) a substantial percent (54.5) of Head Start children are boys, 8) the children in St. Louis are two months older than the Trenton and Portland children, and 9) the mothers of children in Head Start have over two years less formal education than other mothers.

Differences in the number of children in various classifications is a necessary part of the type of design used in the study. It would inevitably be impossible in such a study to identify and select equal or proportional cell sizes because of the very large number of classification variables; but even if the number of classification variables were to be kept small, the differential attrition over the life of the study would still result in an unbalanced sample. Such disproportionalities complicate interpretation of general means, for one must be concerned that an apparent effect is not due to important differences among other variables that are not cancelled out in computing a general mean. Consequently, there is a need for caution in the interpretation of analyses since any factors associated with demographic characteristics are disproportionately represented. Of the disproportionalities explicated above, three appear particularly critical for the comparative analyses of this report: 1) the majority of children are from Portland,

2) the confounding of race and socioeconomic status as indicated by the higher percentage of ineligible whites and by the lower educational level of black mothers, and 3) the disproportionate number of blacks in Head Start programs.

Chapter 3

Methodology

Data Collection*

"Research procedures used with any given population should reflect sensitive recognition of the conditions existing within that population."[1] This, throughout the many phases of data collection, was to be a basic premise of the Longitudinal Study.

While earliest plans for conducting field operations were centered at ETS regional offices, it soon became apparent that full-time, on-site staff would be required and interviewing began of candidates for local coordinators. A coordinator had to be a person with strong ties and high acceptance in the community who was, at the same time, capable of the managerial and organizational demands of the job. Each needed to have detailed knowledge of community resources and ability to communicate effectively with others.

In hiring local coordinators and later, local women as interviewers, testers and observers, the study was following the assumption that to successfully gather reliable relevant data it is essential to have as much community support and input as possible. In the past all too many minority communities had been alienated or had become openly hostile to the numerous surveys and studies which, while good intentioned, failed to include community participation and involvement.

The Longitudinal Study endeavored to avoid these reactions by emphasizing the importance and necessity of community involvement. Local coordinators were responsible for the initial screening of all local (part-time) project

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[1] Summary Report, 1971.

*See ETS, PR-69-12, "From Theory to Operations," and ETS, PR-70-2, "Operations in the Head Start Year" for a more detailed account of Year 1 and Year 2 data collection procedures, respectively.

personnel, day-by-day management of project operations, and public relations within the community and city. In addition, they were active participants in joint decisions with ETS Princeton staff regarding the final hiring (and occasional firing) of local personnel. All coordinators received intensive briefings about the study and continuing support whenever necessary from ETS professional staff. Major briefing sessions were held at the Princeton office, but discussions and the working through of problems more frequently took place at the local sites during periodic visits by Princeton and regional office staff. During the second year of the study, local technical advisors were hired to serve multiple capacities--as advisors, monitors of data collection efforts, and public relations officers for the study--thereby diminishing the reliance on Princeton office staff to solve many of the problems which inevitably arise in a study of this type.

Prior to and in conjunction with the hiring of the local coordinators, communication with leaders of the community in each site was initiated. Formal leaders, represented by the community action officials and leaders of established organizations, were informed about the study at the time their city became a serious site candidate. Other people who did not occupy formal leadership positions but who were influential in the community also were consulted. At the same time, cooperation and understanding of the study were sought from school administrators and boards. Written intents (not merely consents) to participate in the study were sent to ETS by both community agencies and local school boards. This facilitated further support and involvement which was of utmost importance to the success of data collection and thus to the success of the study.

Enumeration and Parent Interviews

The first phase of data collection, household canvassing and parent interviews, was sub-contracted to Audits and Surveys (A&S) by ETS. A&S's task was first to locate all eligible children within the geographic areas being studied and then to complete a 90-minute interview with each child's mother or mother surrogate. An eligible child was one who, on the basis of his birthdate, was expected to enter first grade in the fall of 1971.

Cooperation through the use of local media and through contact with key community leaders was effectively sought. Interviewers were recruited from the community, with A&S staff responsible for both training and supervision. Interview supervisors and the local coordinators worked in close cooperation, and, where feasible, shared the same field office. For a detailed description of interviewing procedures, including a discussion of some of the logistical problems that arose, the reader is referred to Project Report 70-20.

Individual Testing - Year 1

Training: General training and testing procedures were the same in each site. In Year 1, prior to the arrival of the ETS training team, the local coordinator preselected the tester trainees, all of whom were female, choosing approximately 30% more than the number who eventually would be hired. Depending on a variety of factors (such as resources in the community, the local coordinator's preferences, publicity concerning the project, and intra-community relations), trainee characteristics varied both within and between sites. The usual educational credentials were not required, but experience in working with young children was considered highly desirable, as was the ability to read well and speak with ease. The adequacy of the tester's affective reactions to children and her ability to learn the tasks were the two focal criteria for final selection. Most of the trainees were housewives who had limited work experience, and most were black.

On-site training was undertaken at staggered two-week intervals, beginning in March, 1969. Several trainers were sent to each site from the Princeton office. After receiving a general orientation in the local coordinator's office, trainees broke into smaller groups and began practice on one of the simpler tasks with a trainer. The tasks were first demonstrated (live and video tape), and then the trainees practiced by administering them to each other and later to children volunteered by other trainees and their friends. The first tasks demonstrated were those in the Day 1 battery (see Table 8). To reduce the number of tasks that she would be required to learn, each trainee was assigned one of the three remaining batteries. Observations and brief written tests were used to assess the trainee's knowledge of the tasks.

During the third week trainees moved to the actual testing centers. An ETS staff trainer was assigned to each center to ensure adequacy of physical arrangements and testing supplies, and to function temporarily as a center supervisor so that trainees could concentrate on improving their testing skills. The local coordinators arranged for practice subjects who would be comparable to sample subjects and provided for their transportation to and from the center. During the fourth (and sometimes fifth) week of testing practice, the trainees were observed by ETS staff--in all cases this included the project director and a senior member of the professional research team--in order to evaluate performance and to select those women who seemed best prepared to be center supervisors, testers, or play-area supervisors. In those cases where an individual was not selected, every attempt was made to structure the situation as a growth experience instead of a failure and to maintain the person's interest and involvement in the study.

Once evaluations were completed, each center operated one or two weeks

Table 8

The Measures and Testing Sequence Used in Year 1

Day 1	Estimated Time in Minutes
First-Day-of-School Question (mother)	2
Mother-Child Interaction Tasks:	
Hess & Shipman Toy Sorting Task	15
Hess & Shipman Eight-Block Sorting Task	30
Hess & Shipman Etch-a-Sketch Interaction Task	15
Motor Inhibition Test	10
*ETS Matched Pictures Language Comprehension Task I	5
Battery A	
Preschool Inventory (Caldwell)	20
*Vigor I (Running)	3
*Spontaneous Numerical Correspondence	10
*Massad Mimicry Test I	12
*TAMA General Knowledge Test I	5
*Risk-Taking 1 and 2	20
Picture Completion (WPSSI)	5
Battery B	
Sigel Object Categorizing Test	20
Mischel Technique	2
Johns Hopkins Perceptual Test	10
*Open Field Test	10
*ETS Story Sequence Task, Part 1	10
Seguin Form Board Test	10
Matching Familiar Figures Test	15
Battery C	
Fixation Time	16
*Vigor 2 (Crank-turning)	2
Brown IDS Self-Concept Referents Test	10
Preschool Embedded Figures Test	15
Children's Auditory Discrimination Inventory	10
Peabody Picture Vocabulary Test, Forms A & B	15
*Boy-Girl Identity Task	5
*ETS Enumeration I	7

*Tests developed for ETS - Head Start Longitudinal Study.
For a description of these tasks the reader is referred to Structure and Development of Cognitive Competencies and Styles Prior to School Entry, PR-71-19 (Shipman, 1971) and Technical Report Series, PR-72-27 (Shipman, 1972b).

more for a dry run. A trainer from ETS's Princeton office remained at each center to provide general assistance and additional instruction in testing. Once actual testing began, monitoring of center operations (except at Trenton) was assumed by ETS regional office personnel with the assistance of Princeton office staff; the Princeton office staff itself monitored Trenton operations.

Since most of these were not off-the-shelf tasks, and also had never been given by paraprofessional testers, it was important to allow for the flexibility of refining test manuals, formats and procedures to facilitate actual field operations. To this end, the first two sites (Lee County and Portland) were used during training for continued simplification and clarification of testing and scoring procedures based on trainer and trainee experience and suggestions.

Similarly, the grouping of tasks into batteries had been arranged to take into consideration the need to balance type of response (active vs. passive, verbal vs. nonverbal), to maintain constancy of certain sequencing (e.g., Johns Hopkins Perceptual Test before Matching Familiar Figures, since the former involves practice on the matching responses demanded on both tasks), to offer a variety of stimuli, and to provide the child with something to take home each day (a photograph, bag of toys, coloring book, Tootsie Roll). In addition, the batteries also had to be representative of the various domains. The first week of dry-run cases in each site piloted the adequacy of the sequencing. After experiences in the first two sites, minor adjustments were made to permit more equivalent testing time and level of test administration difficulty across batteries. Trainees and trainers were encouraged to discuss the merits of the various modifications, and not until it was time to test actual sample children were procedures stabilized for final production of manuals and answer sheets. From such cooperative efforts were derived not only more adequate measurement techniques, but also valuable community-based feedback on research procedures.

(Table 8 shows the final order of the tests in the Year 1 batteries.)

Testing: Testing centers were located in churches or community recreation facilities in or near the districts where the children lived. Each center provided at least six individual testing rooms or partitioned spaces and a larger play and rest area; most also included kitchen facilities. Each center, operating five days a week, was staffed by nine persons--a center supervisor, a play area supervisor, a driver, and six testers--with each child being scheduled for a four-day testing sequence, usually of 1 1/2 hour duration daily, and the fifth day scheduled for makeups. A rigid schedule was not always possible or desirable, however. For example, centers sometimes operated in the early evenings and on Saturdays for the convenience of working mothers; if necessary, staffs were transferred to new locations to accomodate the children in other sample school districts within a community; and in the testing situations, testers were instructed to wait until the children were ready, with breaks taken when necessary.

Individual Testing - Year 2

The marked increase in data collection activities in the second year required a complex and demanding schedule. Given that fact and the experience of the first year, at each site, as previously mentioned, a technical advisor (usually a member of the psychology or education department of a local university), was hired. As consultants to the project they worked closely with the local coordinators, monitoring data collection procedures and offering support and assistance as needed.

Training: Similar training and testing procedures were followed during the second year of operations, though with the advantage of a year's experience and the rehiring of several women from the previous year, activities were considerably smoother and more efficient. The project director, with the assistance of several experienced trainers, trained the local technical directors and their chosen head trainer (all of whom had graduate training in psychology or education past the master's degree plus relevant testing experience) at a joint two-week training session in Princeton. They, in turn, spent two weeks at their respective sites training three additional local trainers (in most cases, former testers), who then assisted them in training 30-33 trainees selected by the technical director from those recruited by the local coordinator. During this time the project director made several visits to each site to monitor tester training and provide additional consultation and advice; tester selection, however, was made by the local technical director.

Task Modification: Several modifications of the Year 2 measures resulted from an intensive three-day meeting in August 1969 with two community representatives from each of the four sites to discuss the appropriateness of the measures proposed for testing 4 1/2-year-old children in their respective locales. For example, the Peabody Picture Vocabulary Test was modified to make the items more meaningful for the population under study in terms of racial and regional characteristics and activities pictured. The Sex Role Constancy Task was renamed the Boy-Girl Identity Task, a title less controversial and less technical. During December and January manuals and answer sheets were put into final form, utilizing suggestions from this meeting and from previous trainers and testers. Wording was simplified further, format made more uniform, and special comments referring to frequent errors made in administration and recording were included whenever possible. These changes and the greatly increased monitoring of testing together with local checking of answer sheets provided by the technical director and head tester trainer facilitated greatly the preparation of the Year 2 data. It should be noted that most Year 1 tasks tester was therefore trained on one battery, and children were randomly assigned to a battery sequence. Since parent interviews were also being administered by ETS at the testing center, some testers were also trained as interviewers to supplement those women specifically assigned to each center as interviewers.

Field Operations

Considering the scope and innovative nature of the study, data collection during the first two years went surprisingly well. Problems arose, of course. While they loomed as potential crises at the time, coping and dealing with these problems provided valuable learning experiences for everyone and generated the kind of pride and esprit de corps which comes from cooperative group effort.

Despite initial predictions during the first year that all testing would be completed by early July, centers continued in operation throughout the summer in an attempt to test the desired number of children. Several factors contributed to delays: difficulty in locating all the families who were interviewed, longer training periods than anticipated, and some reluctance on the part of parents. Increased project publicity and personal visits by the

Table 10

Estimated Communalities, Reliabilities, and Stability Coefficients for Selected Scores in Years 1 & 2

	Score	Year 1 Com.[a]	Year 1 Rel.[b]	Year 2 Com.	Year 2 Rel.	Corr.
1	Hess and Shipman Eight-Block Sorting Task: Total Score	.34		.49		.36
2	Cooperation Rating: Eight-Block Sorting Task	.26		.48		.35
3	Motor Inhibition Test: Average Time, Trial 2, for the Walking and Drawing Subtests	.27	.67	.28	.68	.39
4	Preschool Inventory (Caldwell): Adjusted Total Score (minus Form Reproduction items 52-55)	.62	.92	.73	.93	.66
5	Preschool Inventory (Caldwell): Total Elaborations	.59		.42		[illegible]
6	Form Reproduction: Adjusted Total Score (1st 6 items)	.43	.61	.45	.52	.51
7	Vigor 2 (Crank Turning): Average Number of Turns	.25	.86	.49	.85	[illegible]
8	Spontaneous Numerical Correspondence: Total Correct	.44	.61	.34	.66	[illegible]
9	Spontaneous Numerical Correspondence: Configuration Matching	.39	.56	.50	.46	[illegible]
10	Massad Mimicry: Nonsense Words, Total Sounds (standardized)	.53	.91	.40	.91	.26
11	Massad Mimicry: Meaningful Phrases, Final Sounds (standardized)	.58	.63	.49	.77	.21
12	Risk-taking 2: Derived Score (0=toy only; 1=bag, trial 2; 2=bag, trial 1)	[illegible]		.62		[illegible]
13	Sigel Object Categorization: Total Grouping Responses	[illegible]	[illegible]	.36	.90	[illegible]
14	Sigel Object Categorization: Average Time to Response (Log 10)	[illegible]	[illegible]	.39	.71	[illegible]
15	Sigel Object Categorization: Total Correct Object Labels	.46	.62	.48	.44	[illegible]
16	Mischel Technique: Choice (0=smaller now; 1=larger later)	.42		.76		[illegible]
17	Johns Hopkins Perceptual Test: Total Correct	.39	.76	.40	.73	.27
18	Open Field Test: Mean Play Complexity	[illegible]	[illegible]	.61	.52	.19
19	Open Field Test: # Periods Child Talks to Tester (1=if any)	[illegible]	[illegible]	.36	.72	.17
20	Open Field Test: # Periods Child Talks to Self (1=if any)	.31	[illegible]	.35	.75	[illegible]
21	Open Field Test: Number of Simple Sentences	.43		.57		.21
22	ETS Story Sequence Task: Total Score, Test Items 1 + 2	.38	.50	.28	.37	.28
23	Seguin Form Board: Fastest Time for Correct Placement (Log 10)	[illegible]		.54		.55
24	Matching Familiar Figures: Mean Log (X+1) of Response Times	.49	.90	.61	.91	.22
25	Matching Familiar Figures: Mean Errors Per Valid Item	.43	.70	.51	.71	.43
26	Fixation: Series 1+2, Mean Sum of Trials 1-6	.62	.81	.37	.72	.22
27	Brown Self Concept Task: Self Concept Score (# positive (1)/# Coded 0 or 1)	.39		[illegible]		[illegible]
28	Brown Self Concept Task: Smiling (1) vs Non-Smiling (0) [illegible]	[illegible]		[illegible]		[illegible]

ETS Story Sequence Tasks, Parts 1 & 2	20
Massad Mimicry II	10
Risk-Taking 2	5

Battery B

Sigel Object Categorizing Test	20
Vigor 2 (Crank-turning)	5
Fixation Time	20
Naming Category Instances	15
Rest-Play	(5)
*Peabody Picture Voc. Test, ETS Adaptation, Forms A & B	20
Spontaneous Numerical Correspondence	5
Gumpgookies	25
Seguin Form Board	5
*Brown IDS Self-Concept Referents Test	15

Battery C

TAMA General Knowledge Test II	10
*Cooperative Preschool Inventory (Caldwell)	20
Form Reproduction	5
Mischel Technique	2
*Johns Hopkins Perceptual Test	15
*ETS Matched Pictures II	10
Open Field Test	(10)
Relevant Redundant Cue Concept Acquisition Task	15
Social Schemata	15
*Matching Familiar Figures Test	15
*Enumeration II	5
ETS Spatial Egocentrism Task	15

*Also administered Year 2 in Lee County.

.20. Except for a spontaneous verbalization factor and the differentiation of the perceptual speed factor, there was no clear evidence for the emergence of new factors in Year 2.

Table 10 presents the communality estimates based on 13 factors for each score along with the estimated reliability where available for Year 1 and Year 2, respectively. The estimates in Table 10 are based on the total longitudinal sample. Brief descriptive labels for the scores included are provided; task descriptions and a more detailed explanation of the scores used are presented in Project Reports 71-19 and 72-27. For all scores, coefficient alpha was the index of reliability and was obtained for the total sample of children tested in Year 1 and Year 2, respectively. With few exceptions, estimated communalities were moderate to low, with considerable reliable but unique variance remaining.

Tables [illegible] and [illegible] present [illegible] for the first thirteen [illegible] rotated principal components [illegible] the longitudinal sample [illegible] [illegible] [illegible] local coordinator or testing staff helped to combat the latter problem. Also, there was greater turnover in testing staff than had been anticipated because of the temporary nature of the job, because of previous summer or other family commitments, and also due to various private emergencies which arose more frequently since many of our testers lacked personal support and back-up resources. The high turnover rate made it necessary to introduce training activities again in the summer, although actual training time was shortened since the trainee could obtain more individual attention and the trainer could share his duties with regional office and local center staff.

In Year 2 training went more smoothly and was accomplished in approximately 3 to 4 weeks. Except for slight variations in time required in the beginning to recruit trainees and later to schedule children, field activities in each site occurred during approximately the same period (i.e., February through May)

Throughout the study, it has been especially important to take into account the unique local characteristics as well as the more general difficulties in disadvantaged areas. It is felt that the use of neighborhood staff and services was vital in contributing jobs, money and concern to these areas, instead of merely coming in to suck out data. Considerable time and attention from ETS and local study personnel was devoted to allaying the fears and distrust many ghetto residents display towards being interviewed and studied

Despite the many difficulties encountered, however, the study continued operating and reliable data were collected during these first two years. The initial rationale of community-based data collection proved itself many times over and the success of these early years is surely attributable to taking the time and effort to gain the support, involvement and encouragement of local residents.

Data Processing

Various processing operations required for Year 1 and Year 2 child test data included scoring and coding of the raw data, construction and maintenance of the data base, and the design, programming, and execution of various internal and cross-domain analyses. Many of these analyses will not be discussed in this report. Some of these, the initial descriptive analyses of instruments, were reported in Project Reports 70-20 and 71-19; some were useful as preliminary analyses described in this report but are not of sufficient general interest to be reported in detail; and some will be reported in greater detail in future reports (e.g., in the technical reports of the individual measures). A detailed account of the design and preparation of the data base also was presented earlier (PR-70-20 and PR-71-19).

Coding

Typically, data were coded by one person, checked in detail by a second, then spot-checked by a third person prior to keypunching. Those tasks requiring prior scoring wer scored by several raters to establish reliability and, following resolution of scorer differences, coded at the Princeton Office. Each answer sheet was checked for tester error in administration (e.g., allowing the mother to be present, or incurring interruptions on the Fixation Test within a sequence), for recording errors (e.g., not rounding to .2 second on timed tasks or not circling the final response of a multiple response), and for comments that might affect the scoring. Given the inexperience of our testers, considerable time had to be spent preparing the data for coding. Such time, however, was valuable in providing greater familiarity with the actual responses made to a given task and clues to understanding the processes involved.

Analyses of Individual Instruments

In addition to obtaining descriptive statistics on derived scores by age, sex, race and preschool experience breakdowns within and across sites, supplementary analyses have been run on all of the instruments involved in this report. Since instruments differ widely in content, style and presentation, a wide variety of internal analyses were required. For all scores that were composites derived from right-wrong items, tables of item difficulty, biserial correlations of the items with the score, and KR-21 reliability coefficients were computed. For other types of composite scores the alpha coefficient of reliability (KR-20 for dichotomously scored items) was computed. Other secondary analyses were designed by researchers responsible for particular instruments, using such techniques as analysis of variance, product-moment correlations and partial correlations, regression and factor analysis, reliability studies for scores, scorers, and testers, contingency tables, frequency distributions and percentile tables, and several non-parametric rank statistics. Many of these secondary analyses involved transformations of variables, including logarithmic transformations of several positively skewed time scores. The common purpose of these internal analyses was to derive and evaluate comprehensive scores which would represent as well as possible the total information in the test.

In the analysis program--as well as in the file maintenance program--label checks, data checks, variable checks, program checks, and input control-card checks were all carefully planned to prevent the possibility of incorrect use of data, labels, or programs in a given computer run.

Data Analysis Procedures

The purpose of the present analyses is to understand interrelationships among the many variables assessed in the longitudinal sample of children during the first two years of the study. We expected, of course, that children would change on the variables measured and reported here; however, the simple study of mean change would be incomplete without a substantial investigation of interrelationships among variables, for the interactions may indicate complex relationships that affect the interpretation of individual status or change. Earlier analyses of the Year 1 data revealed a general ability factor, a response tempo factor, and considerable task-specific non-error variance. The major question posed for this report was whether there was structural continuity or change in Year 2. Thus, we investigated the patterns of responses to see how responses on some variables are related to responses on others and whether patterns of response change. We also performed some initial analyses of the correlates of these factors in order to delineate what external conditions may be related to a child's behavior.

The analyses described below were performed on three groups of individuals:

1. Children available at the first testing period only.
2. Children available both at the initial testing period and in the spring of the Head Start year.* This is the longitudinal sample; the analyses for these children are the focus of this report.
3. Children who entered the sample during the Head Start year. This sample, however, proved to be too small for meaningful comparison of structural findings.

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*Since Head Start in Lee County is a kindergarten level program, all analyses were limited to the three urban sites.

Data for the longitudinal sample were subjected to separate analyses for each year and also for both years combined for the composite sample and separately by race within site, by preschool attendance categories (controlled for Head Start eligibility criteria), and by mother's level of education.

This section will be divided into separate discussions of three types of analysis: Factor Analysis, Sequential Block Analysis, and Extension Variable Analysis.

Factor Analysis

Factor analysis is a technique used to attempt to identify underlying constructs that can explain the observed interrelationships among scores. The factor analyst presumes that there is a small number of underlying dimensions which generate the correlations among various measures and that, therefore, the correlation matrix can be decomposed into a sub-tantially smaller factor matrix which contains the essential information in the original correlation matrix. Real data do not fit the model exactly, but factor analysis does define major factors which nearly approximate the correlation matrix.

The factor analyses performed here consisted of the following steps:

1. Correlation Analysis

The correlation matrix was computed from the data on each group of children. Since not all children were measured on all variables, a missing data correlation matrix was computed. The missing data correlation method computes the correlation between each pair of variables using only those subjects for whom both measures are available. After this correlation matrix was computed, it was used in later data analyses as if it were based on complete data. This method of handling missing data correlation assumes that the correlation for the available subgroup is a reasonable estimate of the correlation for all subjects if the data were available. This method has the property that the correlation matrix may not be gramian. (An attempt was made to factor analyze within-group matrices by partialling the group membership variables from the correlations However, due to the paucity of data for several of the groups, non-gramian properties of the adjusted correlation matrices precluded any further analyses at the present time.)

2. Communalities Estimation

Communalities were estimated by a two-stage procedure. First, the correlation matrix with unities in the diagonal was factored using the principal components method, and the appropriate number of factors was selected by inspection as the number with roots greater than unity. Second, the communalities were estimated as the sums of squares of the factor loadings across this number of factors.

3. Factor Analysis

The correlation matrix with communality estimates was then factored using the principal axis method. The number of factors was selected by observing the number of roots greater than unity in each of the group principal components analysis. The number of factors ranged from 11-15, and 13 was selected as the number of factors to be used in subsequent rotations. This number of factors, although slightly greater than the number of roots greater than unity for the total group in Year 1 and Year 2, appeared a more logical cutting place. It corresponded to an apparent break in the size of the eigenvalues for the Year 2 data and generally yielded more interpretable rotations than other choices for the number of factors.

4. Rotation

The principal axes were rotated to an analytical approximation of orthogonal simple structure using the normal Varimax method (Kaiser, 1956). The Varimax factors were then rotated to an oblique approximation to simple structure using the Promax method (Hendrickson, J. K. and P. O. White, 1964) with the power of 4.0.

5. Matching Factor Solutions

The factor solutions obtained for the group analyses were compared by specifying one of the factor solutions as a target matrix (e.g., Year 1 13-factor Varimax solution for the composite sample) and performing least squares, orthogonal procrustes rotations (Cliff, 1966) on selected solutions (e.g., Year 2 13-factor Varimax solution for the composite sample) in an attempt to match the target loadings. Simultaneous rotations of the Year 1 and Year 2 Varimax rotations to maximize the similarity of the two factor solutions was also performed. Coefficients of congruence (Tucker, 1951) between Year 1 and corresponding Year 2 factors were then computed. The coefficients of congruence provide an objective index of the similarity between Year 1 and Year 2 factors.

Sequential Block Analysis

Sequential block analysis is a variation of factor analysis proposed by Tucker and Messick. This method will be discussed only briefly here since it was described in some detail in the Interim Report (1968). The purpose of sequential block factor analysis as used here is to investigate the change in factor structure over time in a longitudinal sample. Essentially, the procedure develops factors at the later time period which are orthogonal to the factors at the earlier time period. The second set of factors, then, represents dimensions of change in subjects over the intervening time period.

The sequential block procedure is as follows:

1. Compute Correlation Matrix

   The correlation matrix was computed as in the above section on factor analysis; the correlation matrix has twice as many variables since the variables measured at the initial time and the variables measured at the later time are both included in the same correlation matrix. Correlations between variables are provided, therefore, both within and across time periods.

2. Factor Analysis, Set I

   A factor analysis is then performed on the first set of variables using the technique of the previous section. Factoring a partition of the large matrix computes the correlations between the factors created from the first set of variables and the raw variables collected at the second measurement stage.

3. Partial Correlation

   The correlations of the variables measured the second time are then adjusted for their relationship to the factors of the first time by partialing out the initial factors. The residuals are, therefore, orthogonal to the first set of factors. Results for the residuals are nearly the same as the partial correlation of the second set of measures with the first set partialed out.

4. Factoring of Residual Correlations

The residual correlation matrix is then factored as in a standard factor analysis. The diagonal entries of the residual correlation matrix were the original communality estimates based on Year 2 alone less that part of the communality accounted for by the Year 1 factors. Since these factors are uncorrelated with the initial factors, they may be considered factors of change.

Extension Analysis

Extension analysis (Dwyer, 1937) is a method of estimating the correlations of factors with variables not considered in the factor analysis. Extension analysis is used when a variable is not permitted to affect the determination of factors, but when the variable's relation to a factor structure is of interest. In this study, factored variables are measures of a child's behavior. Thus, for example, we would not want to have attendance at Head Start help determine the orientation of factors. On the other hand, we wish to know the correlation of variables such as Head Start attendance, sex, and geographic location with the factors. Other scores placed in extension were those which were obtained at one time period only, had markedly reduced Ns, or were experimentally interdependent with scores used in the factor analysis. On binary variables such as race and sex, a significant correlation indicates a significant difference in mean factor score for the two groups involved; with continuous variables, a significant correlation indicates a significant linear trend.

The procedures for extension analysis are as follows:

1. Compute Correlations

In this case, the correlations between the extension variables and the original variables are computed using the techniques above. The correlation matrix is rectangular.

2. Compute Factor Loadings of Extension Variables

Correlations between the extension variables and the least squares estimates of the factor scores were computed (Dwyer, 1937). Tucker's (1971) modification of Dwyer's technique for correlated factors was used to obtain the correlations of the extension variables with the reference vectors of the Promax solution.

Chapter 4

Results and Discussion

Overview of Structural Findings

As described in the previous section on data analysis procedures, following reduction to logically distinct scores for each task administered in both years, principal axes factor analyses using communalities in the diagonal were obtained for Year 1 and Year 2 test data. These analyses were performed for the longitudinal sample and for the Year 1 only and Year 2 only samples as well as for major subject classifications; i.e., by preschool attendance controlled for Head Start eligibility, by race within site and by mother's education level (less than 10 years of schooling, 10-12 years, and more than 12 years). To facilitate interpretation, 13-factor Varimax and Promax rotations were also obtained. For these various analyses, additional scores (e.g., Year 1 only and Year 2 only measures and demographic indexes) were included in extension analyses to study the relationships of these variables to factors derived from the main set of variables. In addition to these factor analyses, sequential block factor analyses, simultaneous rotation of Year 1 and Year 2 matrices to simple structure, and rotation of Year 2 data to Year 1 target matrices were performed to investigate structural stability and change across years.

The main findings of the factor analyses of the data for the longitudinal sample can be summarized as follows. 1) In both years there was clear evidence for a general dimension accounting for much of the common variance among cognitive tasks; as reflected in higher factor loadings in Year 2, the organization of information-processing skills and unidimensionality of the cognitive-perceptual domain appeared greater in Year 2. 2) A second, orthogonal dimension relating to the child's speed of responding to a multiple choice task was obtained in Year 1; however, changes in the composition of this factor in Year 2 suggested the emergence of a reflectivity dimension distinct from perceptual speed in Year 2. 3) A spontaneous verbalization factor orthogonal to verbal competence emerged in Year 2. 4) Additional factors that appeared were apparently tapping task-specific styles and behaviors (e.g., a factor principally defined by measures from the Open Field Task; a factor defined by two scores on the Boy-Girl Identity Task; a Spontaneous Numerical Correspondence factor; a Fixation Task factor), particularly those personal-social behaviors being assessed (e.g., risk-taking, ability to delay gratification, smiling, self-esteem). 5) Clearly distinct sub-clusters of tasks were not obtained; instead, considerable non-error specific variance was revealed for the many tasks used in the study. These findings were strikingly consistent across statistical methods and across subject classifications. Although there were slight differences in rotated solutions, given the saliency of the first factor and the small remaining common variance, results were very similar. It should also be noted that results reported here for the Year 1 longitudinal sample are essentially identical to those reported in Project Report 71-19 (Shipman, 1971) for the total initial sample which included Lee County children and those children not retested in Year 2.

The main finding of those analyses comparing the pattern of interrelationships among variables across years was the striking similarity of the structure of the test data obtained in Year 1 and Year 2, despite the low to moderate correlation of measures across time periods. (The correlations between Year 1 and Year 2 repeated measures are reported in Table 10; they ranged from .06 to .66.) After partialling out the first 13 Year 1 factors from the Year 2 data, there were only three correlations between Year 1 and Year 2 scores at or above

Table [illegible]

First Thirteen Principal Components for Longitudinal Sample [illegible]

Score*	1	2	[illegible]	[illegible]	5	[illegible]	[illegible]
1	.57**	[illegible]	[illegible]	[illegible]	-[illegible]	[illegible]	-[illegible]
2	-.45	[illegible]	[illegible]	[illegible]	.26	[illegible]	[illegible]
3	.49	.15	[illegible]	-[illegible]	.15	[illegible]	[illegible]
4	[illegible]	-.06	[illegible]	[illegible]	[illegible]	[illegible]	-.04
5	.18	18	[illegible]	-[illegible]	-[illegible]	[illegible]	12
6	.63	-.12	-.18	[illegible]	.26	[illegible]	[illegible]
7	.42	.15	-.26	-.06	-[illegible]	.10	.06
8	.32	-.32	-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	.31	-.36	-.17	.23	.10	.12	-[illegible]
10	.36	-.06	.04	-.09	-[illegible]	.07	.36
11	.40	.02	.12	-.31	-.46	.05	-.38
12	-.01	-.20	-.11	-.04	.03	.09	-[illegible]
13	.52	.09	.16	-.06	.04	-.04	.02
14	.17	.64	-[illegible]	.33	[illegible]	[illegible]	-[illegible]
15	.27	-.08	.15	.30	.01	.33	-[illegible]
16	-.06	.06	-.1[illegible]	-.33	[illegible]	[illegible]	.41
17	.54	-.11	.12	-.25	.13	[illegible]	.23
18	-.03	.30	-.43	-[illegible]	[illegible]	-.12	-[illegible]
19	[illegible]	.28	.17	-.20	-[illegible]		[illegible]
20	[illegible]	.40	-[illegible]	-[illegible]	[illegible]	[illegible]	[illegible]
21	-.04	.32	.26	[illegible]	[illegible]	[illegible]	[illegible]
22	.51	-.23	[illegible]	[illegible]	[illegible]		[illegible]
23	-.64	.20	.11	.10	-[illegible]	.12	[illegible]
24	.05	.60	-[illegible]	[illegible]	[illegible]	.30	-[illegible]
25	-.61	.06	-[illegible]	[illegible]	-[illegible]	.18	-[illegible]
26	.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-[illegible]
27	[illegible]	.07	-[illegible]	[illegible]	-[illegible]	-[illegible]	[illegible]
28	[illegible]	.29	-[illegible]	-[illegible]	-[illegible]	[illegible]	[illegible]
29	.30	.01	-.35	.01	-[illegible]	[illegible]	[illegible]
30	.32	[illegible]	-[illegible]	[illegible]	[illegible]	[illegible]	-[illegible]
31	.34	.30	-.33	.01	-[illegible]	[illegible]	[illegible]
32	.26	[illegible]	.24	[illegible]	[illegible]	[illegible]	-[illegible]
33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.19	-[illegible]
34	.26	[illegible]	.07	-.37	[illegible]	.43	[illegible]
35	.27	-[illegible]	-.10	-.42	[illegible]	.42	-[illegible]
36	[illegible]	[illegible]	-.35	[illegible]	-[illegible]	-[illegible]	[illegible]
37	.39	[illegible]	[illegible]	.01	[illegible]	-[illegible]	[illegible]
***	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.[illegible]

*See Table 10 for score description

**Loadings equal to or greater than .30 in absolute value are underlined

***Eigenvalues. Although missing data correlations were used in these analyses, [illegible] negative eigenvalues were obtained

Table 11 (Continued)

First Thirteen Principal Components for Longitudinal Sample (Year 1)

Score*	8	9	10	11	12	13
1	.13	-.05	-.20	.03	.04	-.23
2	-.10	.12	.26	-.05	-.31**	.13
3	.03	.13	-.08	-.07	.20	.10
4	.02	.11	08	.04	.01	-.06
5	.12	-.11	.22	-.63	.09	-.19
6	-.01	.08	-.09	.11	-.03	-.04
7	.17	-.09	.11	-.01	.33	-.08
8	-.14	.06	.09	.12	.10	.04
9	.10	.21	.05	.21	.08	.21
10	-.10	-.08	-.03	.19	.00	.05
11	-.14	.07	-.05	.11	-.12	.08
12	.54**	-.27	.35	.20	.07	-.38
13	.27	.25	.06	.03	-.23	.12
14	.05	.07	-.17	.12	-.05	-.11
15	.02	-.25	.30	-.09	.02	.38
16	-.17	-.33	-.03	.37	-.06	.10
17	.03	-.15	.05	-.09	-.16	-.04
18	-.07	.09	.24	-.18	-.01	.19
19	-.01	.34	.18	.19	.02	-.20
20	.04	.13	.22	.08	.21	.10
21	.06	-.01	-.10	.06	.03	-.01
22	-.08	.10	.30	.01	-.11	-.02
23	.02	.09	.11	.01	-.06	.02
24	.04	-.15	-.02	.20	-.09	-.11
25	-.02	.24	-.08	-.12	.08	.01
26	-.05	-.49	-.08	.02	.14	.16
27	.34	-.37	-.05	-.04	-.43	.26
28	.29	.02	-.11	.01	.43	.46
29	-.01	.05	-.14	-.32	-.08	-.04
30	-.22	-.15	.17	.12	-.07	-.10
31	-.15	-.29	.14	-.10	-.19	.09
32	-.10	.12	-.11	-.04	.01	-.10
33	-.06	-.02	.09	-.03	-.12	.06
34	.23	.01	-.40	-.04	-.21	.05
35	.05	-.17	-.29	-.11	-.03	-.03
36	-.22	-.14	-.16	-.10	.03	-.13
37	-.45	.02	-.01	-.06	.17	-.04
***	1.13	1.12	1.08	1.02	.97	.97

*See Table 10 for score description.
**Loadings equal to or greater than .30 in absolute value are underlined.
***Eigenvalues: Although missing data correlations were used in these analyses, no negative eigenvalues were obtained.

Table 12

First Thirteen Principal Components for Longitudinal Sample (Year 2)

Score*	1	2	3	4	5	6	7
1	.64**	.17	-.03	.03	-.13	-.26	-.14
2	-.39	-.03	11	-.20	.23	.27	.01
3	.45	.06	.21	.23	.09	-.16	-.13
4	.85	.01	-.07	.04	.01	.01	.04
5	.12	.62	.07	.03	.08	-.09	.14
6	.63	-.12	19	-.19	-.01	.01	-.13
7	.34	.19	-.23	.00	-.19	.24	-.[illegible]3
8	.51	-.21	.16	-.16	.08	.03	-.11
9	.40	-.26	-.01	.09	-.05	.14	-.08
10	.42	-.17	-.13	-.03	.11	.09	.49
11	.64	.00	-.11	.06	-.05	-.11	.34
12	.01	-.06	.26	-.20	.23	.22	-.14
13	.57	.15	-.11	.01	-.22	-.10	-.09
14	-.03	-.22	.41	.37	.26	.24	-.1[illegible]
15	.32	-.04	-.33	.14	.05	.38	-.02
16	-.02	.01	.25	-.08	.08	-.31	-.05
17	.58	-.02	.14	-.10	.25	.02	-.03
18	-.09	.18	.20	.13	-.60	.24	.02
19	.10	.61	.01	.07	.18	.10	.27
20	-.02	.66	.15	.02	.05	.07	.06
21	-.23	.31	-.28	-.02	.31	-.19	-.34
22	.52	-.08	.00	.15	-.01	.14	.14
23	-.66	.04	.09	.23	.02	-.15	.23
24	.21	.23	.35	.30	.01	.03	-.21
25	-.68	.01	-.06	.00	-.10	-.03	.14
26	.12	-.14	-.12	.37	-.24	-.40	-.14
27	.14	-.15	-.19	.05	-.28	.17	.04
28	.16	.20	.00	-.24	-.16	.39	-.14
29	.51	-.05	.08	-.33	.09	.01	.03
30	-.16	-.13	.28	.57	.06	.22	.00
31	.34	-.07	.00	.11	-.22	.17	.25
32	.63	.10	.05	.13	.10	-.18	.06
33	.75	.16	-.02	.04	-.09	.00	-.05
34	.25	.04	.47	-.14	-.23	-.17	.05
35	-.09	-.06	.42	-.37	-.31	-.08	.16
36	.49	-.28	.00	.01	.20	-.01	-.01
37	.57	.04	-.03	.08	.24	-.04	.23
***	7.12	1.91	1.46	1.40	1.37	1.27	1.20

*See Table 10 for score description.
**Loadings equal to or greater than .30 in absolute value are underlined.
***Eigenvalues: Although missing data correlations were used in these analyses, no negative eigenvalues were obtained.

Table 12 (Continued)

First Thirteen Principal Components for Longitudinal Sample (Year 2)

Score*	8	9	10	11	12	13
1	.07	-.08	-.13	.05	.00	-.05
2	-.36**	.04	.41	.06	-.08	-.01
3	-.18	.03	-.13	.18	.13	.10
4	-.04	.05	-.01	.02	-.05	-.10
5	.04	-.07	.16	.02	.26	.21
6	.11	-.04	.03	-.04	.03	-.07
7	.01	.18	.05	.17	.28	-.16
8	.02	-.11	.11	-.11	.20	-.15
9	-.11	-.06	.28	-.04	.30	.43
10	-.13	.20	.07	.01	-.06	-.17
11	-.10	.06	-.07	.05	.08	.04
12	.37	-.16	-.29	.46	-.14	.12
13	.11	.11	.02	-.05	.09	-.01
14	.06	.06	-.29	-.05	.05	.03
15	.25	.10	.26	.12	-.26	-.18
16	-.27	-.24	.22	.61	.00	-.28
17	-.07	-.17	.17	-.12	-.11	-.09
18	-.03	-.33	.07	-.10	.09	-.27
19	.03	-.13	-.06	.00	.02	.03
20	.12	-.01	.07	.05	.03	.12
21	-.07	.33	.15	[illegible]	-.14	.25
22	.13	.07	-.10	.09	.16	-.03
23	-.01	.06	-.17	.02	-.03	.03
24	-.20	-.10	.07	-.37	-.41	.01
25	.09	.08	-.06	.08	.23	.13
26	.22	-.02	.13	.06	-.28	.13
27	-.56	-.14	-.26	.20	-.12	.37
28	-.18	.32	-.34	.04	-.21	-.02
29	.08	-.21	-.06	-.20	-.09	.19
30	-.02	.27	.19	.10	.10	-.04
31	.24	-.11	.23	.23	-.29	.34
32	-.18	.11	-.14	-.05	.09	-.07
33	-.08	.07	.01	.10	-.05	-.02
34	.02	.40	.10	.09	-.07	.11
35	.08	.38	.11	-.04	-.04	.04
36	.07	.05	.03	-.07	.20	-.02
37	.00	.05	-.09	.02	-.14	-.05
***	1.12	1.08	1.08	1.04	1.02	.98

*See Table 10 for score description.
**Loadings equal to or greater than .30 in absolute value are underlined.
***Eigenvalues: Although missing data correlations were used in these analyses, no negative eigenvalues were obtained.

of the total variance. Subsequent components accounted for 4.0% or less of the variance. Twelve components had eigenvalues of 1.0 or above. Using communalities in the diagonal, the root for the first principal axis for the total sample was 5.7; it accounted for 26.4% of the common variance in Year 1, whereas the first root was 6.7 and accounted for 30.4% of the common variance in Year 2. Tables 13 and 14 present the 13-factor Varimax solution for the longitudinal sample using communalities in the diagonal for Year 1 and Year 2 data, respectively. The task-specific nature of the 5th through 13th rotated factors may be seen quite clearly. (For further comparison, the 13-factor Promax solution using communalities in the diagonal is presented in Appendix B [Tables B-1 and B-3] with intercorrelations among factors reported in Tables B-2 and B-4.)

Year 1 Factor Analyses

Since the present findings are essentially identical to those described earlier (Shipman, 1971), only a summary of the results will be presented here.

The first component seemed to be best defined as "g" or information-processing skills which contribute to level of performance on all of these tasks. It was best represented by performance on the Preschool Inventory and Peabody Picture Vocabulary Test (PPVT) which correlated .58 for this longitudinal sample. The Preschool Inventory was developed to measure achievement in areas regarded as critical for successful kindergarten performance. Although dependent upon the level and variety of stimulation provided in the environment, to some extent performance on these tasks is an index of the child's general ability to process information from the environment. Both tests have been found to be highly sensitive to environmental impoverishment. Included in measures of "g," of course, are such "non-cognitive" aspects as ease and willingness to relate and assert oneself in the testing situation,

Table 13

Varimax Thirteen Factor Solution* (Year 1)

Score**	1	2	3	4	5	6	7
1	.51***	.07	.18	.05	-.07	-.08	.02
2	-.43	.04	-.17	.12	-.03	.07	.02
3	.42	.11	.08	.13	-.10	.09	.06
4	.71	.02	.14	.19	.10	-.02	.22
5	.11	.01	-.00	.05	-.00	-.05	.05
6	.63	.04	.01	-.03	.11	.00	.06
7	.36	.11	.09	.06	.07	.09	-.01
8	.36	-.07	-.11	-.14	.30	-.07	.33
9	.34	-.21	-.04	-.14	.20	-.02	.23
10	.23	-.02	.67	-.05	.00	-.04	.02
11	.23	-.06	.69	.19	.01	.04	.03
12	.00	-.03	.00	-.03	.03	.02	.03
13	.43	-.01	.01	.36	-.02	-.01	.04
14	.09	.71	-.05	.04	.08	-.02	-.09
15	.13	-.01	.05	-.03	-.10	-.02	.65
16	-.02	-.03	-.05	.05	-.03	-.02	-.09
17	.54	-.17	.00	.15	-.14	.01	-.05
18	-.06	.19	-.02	.08	.06	.73	.02
19	.19	.10	.07	.48	.06	-.06	-.04
20	.01	.11	.03	.34	-.02	.23	-.17
21	-.15	.20	.00	.20	.02	-.51	.07
22	.46	-.25	.04	.27	.00	.01	.16
23	-.65	.10	-.06	.04	.00	-.04	.01
24	.02	.68	-.02	.02	-.12	.05	.00
25	-.59	.01	-.05	-.11	.22	-.01	-.06
26	.12	.03	-.03	-.07	-.77	-.05	.08
27	.15	.03	-.02	.01	.00	-.01	.05
28	.10	.09	.04	.07	-.02	-.02	.03
29	.49	.03	.02	-.08	.17	.11	-.08
30	-.05	.45	.02	.18	.03	.08	.18
31	.23	.10	.22	-.07	.15	.03	.23
32	.48	.18	.13	.23	-.15	-.09	.03
33	.62	.20	.15	.27	-.09	-.03	.28
34	.22	.00	.00	.15	.01	-.06	.02
35	-.22	-.03	.00	-.17	.01	.14	-.04
36	.51	.04	.08	-.25	.17	-.02	.01
37	.37	.05	.01	.08	-.06	.03	.09
	5.01	1.55	1.15	1.08	.99	.94	.92

*Using communalities in the diagonal.
**See Table 10 for score description.
***Loadings equal to or greater than .30 in absolute value are underlined.

Table 13 (Continued)

Varimax Thirteen Factor Solution* (Year 1)

Score**	8	9	10	11	12	13
1	.09	.06	-.12	.02	.09	-.01
2	-.02	-.05	.00	.01	-.08	-.10
3	.05	-.06	-.14	.01	.01	.10
4	.02	.04	-.09	.01	.02	.02
5	.01	.02	-.10	.74***	-.03	.07
6	-.01	.00	-.03	-.08	.00	.04
7	-.06	.10	.11	.09	.14	.18
8	.03	.03	.05	-.08	-.24	.02
9	-.08	.09	-.16	-.27	-.02	.08
10	-.11	.04	-.01	.01	-.02	.06
11	.13	-.05	-.03	-.01	.02	.00
12	.01	.85	.00	.02	.02	-.03
13	.04	.02	-.15	-.03	.16	.10
14	-.04	-.08	-.07	.01	.09	.11
15	-.02	.02	-.08	.04	.07	.02
16	.04	.01	.63	-.10	-.01	.03
17	.03	.03	.11	.10	.06	.00
18	.02	-.05	.03	.02	.08	.05
19	.01	-.03	.05	.04	-.02	.02
20	-.04	-.02	.21	.09	-.01	.22
21	-.04	-.11	.08	.12	.12	.12
22	-.03	.02	.02	.03	-.07	-.07
23	-.03	-.02	-.05	.03	-.04	-.03
24	-.04	.05	-.03	-.02	.03	.01
25	.03	-.08	-.07	.01	-.03	.00
26	-.01	-.03	.02	.01	-.04	.02
27	-.03	.03	.00	-.04	.60	.03
28	.05	-.03	.03	.05	.03	.77
29	-.02	-.10	.03	.13	.27	.03
30	.13	-.04	.25	.12	-.13	-.01
31	-.02	-.04	.30	.16	.27	.00
32	.01	-.11	-.17	.06	.00	-.01
33	.00	-.07	-.06	.09	.13	.01
34	.71***	-.01	-.01	-.01	.09	.06
35	.53	.04	.09	.04	-.18	-.01
36	-.08	-.06	.13	.06	.10	-.03
37	-.05	-.15	.05	.02	-.10	-.04
	.88	.85	.81	.78	.77	.76

*Using communalities in the diagonal.

**See Table 10 for score description.

***Loadings equal to or greater than .30 in absolute value are underlined.

Table 14

Varimax Thirteen Factor Solution* (Year 2)

Score**	1	2	3	4	5	6	7
1	.57***	.11	-.14	.15	.31	.03	.02
2	-.34	-.01	.04	-.04	-.54	-.10	.04
3	.44	.09	.17	.05	.13	-.04	.02
4	.82	.03	-.03	.11	.09	.02	-.02
5	.08	.63	-.03	.06	.05	.01	.01
6	.60	-.09	-.08	.11	-.01	.09	.13
7	.25	.07	-.00	.65	.04	.01	-.05
8	.50	-.11	-.04	.04	-.07	.04	.07
9	.35	-.08	.09	.09	-.03	.01	.03
10	.44	-.06	.03	-.17	-.14	-.02	.03
11	.62	.09	-.03	-.08	.11	.03	.03
12	.01	.03	.05	-.01	-.03	-.03	.02
13	.49	.10	-.10	.21	.20	.04	.07
14	.04	-.11	.53	-.06	-.06	.04	-.05
15	.24	-.05	.04	.21	-.02	-.02	-.20
16	.02	.00	-.01	-.03	-.02	.01	.04
17	.57	.01	-.07	-.03	-.12	-.01	-.03
18	-.18	.14	-.02	.19	.06	.69	.05
19	.09	.56	-.03	-.06	-.04	.00	-.09
20	-.06	.57	-.02	.07	.00	-.01	.06
21	-.26	.17	-.09	.20	.05	-.63	-.05
22	.48	.02	.11	.05	.08	.07	.00
23	-.60	.06	.20	-.28	.08	-.02	.00
24	.18	.13	.13	-.06	.06	.04	.03
25	-.65	.03	.06	-.08	-.01	.00	.04
26	.04	-.17	.01	-.02	.53	-.05	.00
27	.08	-.11	-.05	.03	.00	.05	-.07
28	.12	.04	-.05	.32	-.19	.00	.18
29	.49	-.01	-.25	-.08	.08	.03	.05
30	-.15	-.01	.65	.02	.01	.02	.04
31	.22	.08	-.04	-.10	.19	.10	.13
32	.63	.11	.07	.02	.11	-.04	.01
33	.68	.15	-.04	.20	.13	.01	.07
34	.22	.05	.08	.02	.07	.00	.56
35	-.10	.07	-.07	-.04	-.07	.06	.64
36	.48	-.15	.05	.00	-.01	-.03	-.03
37	.57	.10	.03	-.10	.04	-.06	-.05
	6.27	1.33	.97	.96	.94	.93	.90

*Using communalities in the diagonal.
**See Table 10 for score description.
***Loadings equal to or greater than .30 in absolute value are underlined.

Table 14 (Continued)

Varimax Thirteen Factor Solution* (Year 2)

Score**	8	9	10	11	12	13
1	-.04	.02	.05	.02	.07	-.02
2	.10	.01	.16	-.08	.10	.09
3	-.10	.07	.10	.02	.06	.03
4	.16	.06	-.01	-.06	.02	-.05
5	.06	-.03	.00	-.03	-.01	.10
6	.02	-.08	.00	.12	.07	.09
7	.04	.02	-.01	-.02	-.07	.03
8	-.02	-.04	-.02	.09	.03	.23
9	.08	.15	-.07	-.04	-.03	.56
10	.26	.06	-.02	-.17	-.17	-.14
11	.10	.15	-.01	-.14	-.16	-.03
12	.05	.00	.05	.78***	-.05	-.04
13	.06	.00	-.05	-.08	-.01	.01
14	-.15	-.03	-.08	.21	.11	-.01
15	.56***	-.09	-.06	.00	-.01	-.08
16	-.06	.00	.87	.05	-.01	-.01
17	.05	-.06	.06	.05	.18	.10
18	.02	.04	.02	-.10	.16	.03
19	.02	.00	.00	.00	.02	-.14
20	-.01	-.05	.00	.04	.09	-.04
21	-.03	-.02	.01	-.08	.13	.02
22	.11	.05	-.04	.03	-.09	.02
23	-.13	.02	.00	-.05	-.07	-.15
24	-.01	.02	-.02	-.05	.73	-.05
25	-.10	.00	-.04	-.04	-.25	.01
26	.16	.00	.07	-.08	.12	.08
27	.01	.84	.00	-.01	.01	.04
28	.05	.21	-.13	.09	.09	-.38
29	.00	.00	-.10	.15	.08	.09
30	.13	-.03	.04	-.09	.03	.07
31	.53	.13	-.03	.11	.02	.18
32	-.09	.06	.01	-.10	.01	-.06
33	.12	.11	.03	-.04	.06	-.03
34	-.03	-.01	.05	.01	.03	.03
35	-.01	-.05	-.01	.01	-.01	-.04
36	.03	-.05	-.04	.02	-.06	.12
37	.11	.02	-.02	.00	-.02	-.09
	.89	.88	.86	.85	.83	.71

*Using communalities in the diagonal.
**See Table 10 for score description.
***Loadings equal to or greater than .30 in absolute value are underlined.

attention, persistence and task orientation. A common cognitive component is the ability to understand and follow directions. These aspects of "g" may, however, be age-specific.

Inspection of Table 11 reveals the diversity of tasks contributing to the first component. Out of twenty-three tasks, seventeen had at least one score with a loading of .30 or higher. As might be expected, the most general task in the test battery, the Preschool Inventory, had the highest loading (.78), but the following all had loadings of .50 or higher*: verbal measures--receptive vocabulary (Peabody A), comprehension of sequence (ETS Story Sequence), classification skill (Sigel Grouping responses, Eight-Block Sorting Task score); perceptual measures--auditory discrimination (Children's Auditory Discrimination Inventory, when nonsense item is correct response), form discrimination and matching (Johns Hopkins Perceptual Test score, Matching Familiar Figures Test errors and Preschool Embedded Figures Test score); and perceptual-motor measures--visual-motor coordination (Seguin Form Board), form reproduction (Form Reproduction Test). Although inspection of the 13-factor Varimax solution in Table 13 suggests some differentiation of this information-processing factor according to perceptual skills (factor 1) and specific verbal skills (factors 3 and 7), it can be seen in Appendix B (Table B-2) that when rotated to an oblique solution these factors are substantially correlated.

The second Varimax or Promax factor describing the overall correlational structure appears to represent a response tempo dimension; as defined by oblique rotation (Table B-1), this factor was nearly orthogonal to the first factor. The correlation between the first and second Promax factors was -.01. It was

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*The TAMA General Knowledge Test, a nonverbal general information measure, and a productive vocabulary measure using the Peabody Picture Vocabulary Test, Form B, both placed in extension analysis because of a reduced size sample, were also shown to have moderately high correlations with this factor.

best represented by the mean latency scores on the Sigel Object Categorizing Test and the Matching Familiar Figures Test (r=.46). The only other variable with a loading of .30 or greater on the second Varimax factor was the average time to first response on the Preschool Embedded Figures Test (loading = .45). Thus, response tempo, frequently used to measure the cognitive style of reflection-impulsivity, appeared as a consistent individual difference variable; however, for this sample during this age period response tempo was not related to performance level on the first factor. Similarly, latency and adequacy of response were not correlated within tasks (r = .11 with grouping responses on the Sigel and -.07 with errors on the Matching Familiar Figures Test). Response latency, therefore, did not have the same implication for performance as has been found with older and/or more advantaged subjects (Messer, 1970; Eska and Black, 1971), since it did not reflect individual differences in the degree to which the child considers the adequacy of his response.

Although speed of responding emerged as a factor in the overall analyses, the lack of relationship of the latency measures to other purported measures of impulsivity (inability to inhibit a response or to delay gratification) suggests that impulsivity is not a unitary trait or generalized dimension in this population at this age. Other controlling mechanisms appeared as task-defined factors (e.g., the two variables that define factor 6 in Table 13 are Open Field Test measures; the Risk Taking score defines factor 9; the Mischel delay score, factor 10). Such results could be interpreted as reflecting special abilities limited to one task and/or incomplete sampling of the processes represented by tasks.

Attentional variables are among those that cut across relatively arbitrary distinctions between cognitive and personal-social functioning. Lewis and his associates (Lewis et al., 1970; Lewis, 1971) have found attention to be an index of early cognitive functioning. Not only may attention be a precursor of subsequent cognitive functioning, but individual differences in attention are likely to have direct effects on learning. Moreover, attention can be "non-cognitively" determined by the intentions and desires of the subject. As indicated earlier, the Fixation Test score used in the structural analysis appeared as a task-defined factor (factor 5 in the Varimax rotation reported in Table 13). However, its lack of relationship to other measures and the only moderate correlation across stimuli within the task prevent us from interpreting these findings further at this time.

The test battery did not include enough measures specifically designed to tap personal-social behaviors to delineate factors in the affective and social domains. Smiling and the self-concept score defin[illegible] test-specific factors (Varimax factors 12 and 13, respectively, in Table 13). Given the present "state of the art" in valid measurement of these variables for this age, however, it is doubtful that other results would be obtained with more extensive measurement in test-like settings. As can be seen in Table B-2, in the Promax 13-factor solution, the factor defined by the self-concept score is slightly correlated (.25) with the first factor, suggesting a cognitive task component or the importance of general intellectual competency as a critical component in positive self-evaluation. The self-concept score may be partly a measure of understanding or competency may be the function of or lead to greater self-esteem; the present data do not enable us to determine which is the more appropriate interpretation. The correlation with the first factor would have been higher if the sco[illegible] had not been adjusted for items for which the child could not or would not make a choice. A score for number of omitted items was included in the extension analyses [illegible]

the first factor. Similarly, the ratings [illegible] child's [illegible]

the mother-child interaction session mapped [illegible]

and reflected the attitudinal, non-cognitive [illegible] measures [illegible]

This result suggests that the [illegible] task [illegible] and [illegible]

the mother in the interaction situation was [illegible]

with the tester.

Year 1 Extension Analyses

Investigation of the results of the extension analyses revealed that child's age, race (coded 1 for black children and 0 for white children), mother's education, occupation of head of household, and [illegible] eligibility (coded 1 for noneligible and [illegible] eligible) correlated significantly with the first Varimax factor ([illegible] and [illegible], respectively). Thus, general information-processing skills, [illegible] perceptual [illegible] and favorable responses to the testing situation were greater for older children and those from families of higher socioeconomic status. As reported in the earlier project report (Shipman, 1971), those measures loading on the first factor and defining a general ability dimension showed significant [illegible] effects, despite the relatively restricted range of [illegible] effects in general were substantially larger than those [illegible] differences in SES level for the white and black samples [illegible] Chapter 2, differences in mean factor scores, as indicated [illegible] correlation with race, would be expected. [illegible] similarity of structural findings across age, race and SES groups suggests, however, that despite these differences in mean level there was sufficient variation within groups to produce these interrelationships [illegible]

[illegible]

[illegible]

differences [illegible]

[illegible]

qualifications [illegible]

[illegible]

[illegible]

with [illegible]

[illegible]

[illegible]

highly on the first factor); thus the score for nonsense items may be a better index of auditory discrimination than the total score.

The fact that the perceptual tasks had slightly lower rank loadings on the first factor in Year 2 may indicate increasing differentiation of these tasks in Year 2. As outlined in the earlier report on Year 1 findings, variations in performance level did suggest an ordering in complexity ranging from those tasks primarily involving form discrimination (Johns Hopkins Perceptual Test and Matching Familiar Figures) to those requiring analysis (Preschool Embedded Figures Test) and copying skills (Form Reproduction). Analysis skills would appear to require prior mastery of discrimination, which, in turn, presupposes figure-ground separation. Consequently one might expect these skills to be developmentally ordered with the more complex functions developing at later ages than the simpler ones (Birch, 1963; 1967). Thus, in Year 2 after initial familiarity and understanding of matching to sample task demands, more complex perceptual abilities may be emerging which are partly responsible for performance on particular tasks, so that the only clustering basis is what they have in common with all tasks. These data also suggest discontinuity in the meaning of "g" with age (cf. McCall et al., 1972).

The second factor in the 13-factor Varimax solution (Table 14) appeared to be spontaneous verbalization. It was primarily defined by the number of items elaborated upon in the Preschool Inventory and by whether the child spontaneously talked to the tester and to himself in the Open Field Test situation. In extension analysis, the number of items elaborated upon in the Social Schemata Test which was administered for the first time in Year 2 also correlated significantly ($r = .46$) with this factor. Since in oblique rotation this factor was shown to be essentially orthogonal to the first factor (see Table B-4, the correlation between Promax factors 1 and 2 was .06); this factor appears to be tapping personal-social characteristics of the child (e.g., ease in the situation, need to relate), rather than verbal competency.

In Year 1 the Preschool Inventory elaboration score also defined a factor orthogonal to the first, but in Year 2 this behavior was correlated with spontaneous verbalization in another test situation, apparently reflecting a more general child characteristic. Since the verbal elaboration score on the Preschool Inventory ref_ s only to verbalizations that are task-relevant, and those in the Open Field situation may also be task-relevant, for this sample at this age factor 2 may represent a period in which talking to self and talking to the tester are undifferentiated, a phase in the internalization of speech (Vygotsky, 1962). Thus, it may be more "cognitive" than affective. If so, according to theory this factor should drop out in future years.

Although the third factor was defined by two latency scores (Sigel and Preschool Embedded Figures Test), latency on the Matching Familiar Figures Test defined a separate factor (factor 12). In contrast to Year 1, a significant correlation was obtained between MFF errors and latency (-.27); for Sigel latency and grouping responses this was not the case (r = -.08). This split of the latency scores may reflect an emerging differentiation of perceptual speed and cognitive style factors. Further clues to interpretability of these findings may be provided by analyzing the data from children categorized into slow-fast and accurate-inaccurate subgroups.

As in Year 1, other controlling mechanisms such as risk-taking, delayed gratification, and complexity of play defined separate factors. There was, however, some suggestion of the generalization of personal-social behaviors (e.g., compliance, desire to please) across tasks. Vigor 2 (crank turning) and smiling in the photograph taken for the Brown Self-Concept Test defined a factor (Varimax factor 4) as did the rating of the child's cooperation in the mother-child interaction session and mean initial viewing time on the Fixation Test (Varimax factor 5). Although in Year 1 Vigor 2 loaded on the first factor, it shared relatively little common variance with other tasks. Its correlation with age suggested that physical coordination was a factor in performance for that age sample. However, the extent to which this measure also taps vigor, persistence and/or willingness to please the examiner is unknown. Its lack of loading on the first factor in Year 2 and its correlation with smiling suggests that for this age sample differences in coordination and task comprehension may be less influential than the child's orientation to the social context of testing.

Although attending behavior has been studied as an index of cognitive functioning, at this age differences in viewing time for the Fixation Task may reflect differences in the desire to follow instructions and please the examiner. The child is explicitly instructed to look; thus his behavior is under the control of the instructional set rather than rate of information-processing, as in younger children. The rating of the child's cooperation during the Eight-Block Sorting Task also reflects the child's willingness to attend to his mother and follow her directions. Thus, some personal-social behaviors (i.e., compliance to social expectations) that in Year 1 appeared most situationally determined and task specific seem to have generalized to other similar situations.

As in Year 1, the self-concept score defined a factor (Varimax factor 9). As indicated in the extension analyses, the Gumpgookies Test, a purported measure of achievement motivation administered for the first time in Year 2, correlated with this factor (.30), supporting the construct validity of the task as an assessment of self-esteem.

The two Piagetian-derived measures, the Boy-Girl Identity Task and Spontaneous Numerical Correspondence, both defined separate factors. As in Year 1, the former did not seem to be tapping a cognitively based reality judgment of gender identity constancy in this population at this age and the latter reflected preoperational, global intuitive perceptual responses. The emerging correlation among subscores on the Boy-Girl Identity Task at Year 2 suggests, however, that some of the children have become operational in their thinking. In subsequent analyses this task may provide an index by which the pattern of interrelationships among tasks for different developmental levels may be assessed.

As in Year 1, the Enumeration and Spontaneous Numerical Correspondence Tests, both tapping what Piaget (1952) considered prerequisites for the later understanding and use of number--perceptual ordering and articulation--did not form a quantitative cluster and their placements in the structure were quite different. These measures may be differentially related to general mathematical concepts and to numerical and computational skills.

Year 2 Extension Analyses

As was obtained for the Year 1 data, race, mother's education, and occupation of head of household were correlated with the first factor (-.36 and .36, respectively). Similarly, economic eligibility for Head Start correlated only with the first factor (-.30). When factor analyses were performed by race within site and by level of mother's education, significant differences in structural findings by race and socioeconomic status were not obtained. Thus, though there were differences in performance level on those measures loading on the first factor associated with environmental differences, the pattern of interrelationships among these tasks was similar.

In Year 2, with a more restricted age range due to the shorter testing interval, age was not found to be correlated with the first factor. It did correlate, however, (<u>r</u> = .36) with factor 4, defined by Vigor 2 and smiling scores. Small age differences may have greater effect on social compliance and physiological factors than intellectual status at this time.

There were no significant correlations of sex with any of the obtained factors, nor did attendance in Head Start or any other preschool program vs. no known preschool attendance correlate with these factors.

Site correlated with several factors; its correlation with the latency factor, however, was much smaller than in Year 1. Given the disproportionalities and possible tester differences among sites, these differences can not be interpreted at this time. They suggest caution, however, in the interpretation of structural findings until appropriate adjustment for differences in means and variances can be made. As noted in the data analysis section of Chapter 3, the non-Gramian properties of the correlation matrix for within-group factor analyses caused by missing data precluded further analysis at this time.

Later attendance in Head Start in contrast to other preschool programs correlated with the first factor (<u>r</u> = .26), reflecting continuing differences in mean level of performance between these two groups. As pointed out in Chapter 2, however, the variables defining [illegible] groups are confounded and thus, no simple [illegible] comparisons [illegible] classificatory variables such as Head Start [illegible] can be made without careful consideration of their interactions.

with other variables. For example, preschool attendance is confounded with site, race, and socioeconomic status. Thus, to interpret simple mean differences for Head Start vs. non-Head Start groups would be quite unwarranted. Moreover, these data do not reveal the extent of change in performance level that may have occurred for the different groups. Future reports will be addressed more specifically to the question of Head Start effects.

Subgroup Comparisons*

Factor matching procedures for comparing factor structures in Year 1 and Year 2 were performed for selected subgroups. One question asked was the extent to which, of those children economically eligible for Head Start, those who later attended Head Start were different from those who did not attend a preschool program. Since a disproportionate percentage of black children in our sample attended Head Start (see Chapter 2), the question was asked of the black sample only. For Year 1, the coefficient of congruence between the first factor for the black Head Start-eligible sample who later attended Head Start rotated to the first Varimax factor for the black Head Start-eligible sample who were not known to have attended a preschool program was .90. In Year 2 this coefficient of congruence was .94. Thus, the pattern of cognitive-perceptual performances was similar for these groups both prior to and following preschool intervention. Differences in mean performance level may be present, of course, but the obtained similarity of structural findings will clarify and simplify the interpretation of level changes that will be investigated in subsequent reports.

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*These analyses were performed earlier, using Form Reproduction and Matched Pictures unadjusted total scores. Since these scores correlated .91 and .92, respectively, with the adjusted scores used in later analyses, the cost of redoing these rather extensive analyses for these minor changes did not seem to be justified.

Comparisons also were made of structural findings obtained for subgroups varying in socioeconomic status. Level of education was used as an index of socioeconomic status, since structural analysis of the data obtained from the initial parent interview indicated that educational level correlated higher with availability of home resources than did occupational level. Moreover, the pattern of interrelationships of educational level with other demographic indexes and maternal behaviors and attitudes was similar for blacks and whites; for occupational level it was not (Shipman, 1972a). Subjects were separated into three categories: those whose mothers had completed less than ten years of schooling; those whose mothers had completed at least ten years, but no more than twelve; and those with more than twelve years of schooling. To investigate the extent to which findings may have been due to atypical subjects, comparisons were made between the 10-12 year group and those above and below that educational level.

For both Years 1 and 2 the coefficient of congruence between the first factor for those whose mothers had completed less than 10 years of schooling rotated to the first Varimax factor for those whose mothers completed 10-12 years of schooling was .97 (when simultaneously rotating Year 1 and later, Year 2 data for both groups to simple structure, the coefficients of congruence obtained were .97 and .98, respectively). In Years 1 and 2, three and two additional factors, respectively, also had coefficients of congruence above .86.

When comparing the first factor for those whose mothers had completed more than 12 years of school rotated to the first Varimax factor for those whose mothers completed 10-12 years of schooling, the coefficient obtained for both Years 1 and 2 was .95 (when simultaneously rotating Year 1 and later, Year 2 data for both groups to simple structure, the coefficients of congruence obtained were .94 and .95, respectively). Thus, for this sample differences in socioeconomic status were not associated with differences in the pattern of interrelationships among cognitive-perceptual performances in Years 1 and 2.

Year 1 - 2 Comparisons

In the previcus description of the structural findings for the Year 2 data, the marked similarity to Year 1 findings was noted. As revealed in the description of the first factor, the pattern of interrelationships among cognitiye-perceptual measures was highly stable across years. Moreover, there was continued lack of clear differentiated clustering of tasks according to verbal, perceptual and quantitative subdomains. As reflected in the higher loadings obtained in Year 2, the organization of information-pro essing skills and unidimensionality of the cognitive-perceptual domain appeared greater in Year 2.

Various factor matching techniques were used to test the similarity of the factor structures obtained. When Year 2 data were rotated to the 13-factor Varimax solution for the Year 1 data as a target matrix, the coefficient of congruence obtained was .97 for the first factor. Except for factors 6 and 8 (Open Field and Boy-Girl Identity), remaining coefficients were below .87. Using a slightly different approach, by simultaneously rotating the Year 1 and Year 2 data to simple structure and thereby maximizing the similarity of factor structures, similar results were obtained. The coefficient of congruence obtained was .98 for the first factor and at or above .87 for factors 2 through 7.

Another indication of the striking consistency in structure of the first factor across years was provided by results of the extension analyses of the Year 2 data on Year 1 factors obtained as a step during the sequential block factor analysis procedure. Performance on the cognitive-perceptual tasks in Year 2 correlated significantly with the first factor, and that factor alone (see Table 15). The coefficient of congruence for the Year 2 variables extended onto the Year 1 first factor and the Year 1 loadings on the first factor was .97. Intercorrelations among residuals were very low; only three correlations in the entire matrix were .20 or larger.

In contrast to the factor matching techniques which were used primarily to study the degree of structural similarity across years, sequential block factor analyses were performed primarily to investigate the change in factor structure over time in the longitudinal sample. Since the procedure develops factors at the later time period orthogonal to the factors at the earlier time period, these factors may represent dimensions of change in subjects over the intervening time period. Table 16 presents the 13-factor Varimax solution for the residual matrix after partialling out the first thirteen Year 1 factors. As can be seen, the results are similar to those obtained for Year 2. There is a general cognitive dimension, a verbal elaboration factor, a perceptual speed factor and many task-defined factors. Given the similarity of the first factor to that obtained in Year 1 (the coefficient of congruence between the first Varimax factor of the residual matrix and the Year 1 first Varimax factor was .92), one might question the extent to which this is the result of inadequate partialling, since the variables partialled out are not perfectly reliable (alpha = .84 for factor 1 in Year 1). However, the

Table 15.

Loading of Year 2 Variables on Extension of First Thirteen Factors

Score*	1	2	3	4	5	6	7
1	.59**	.10	.05	.04	-.01	.02	.04
2	-.30	.01	.04	-.02	.05	.00	-.03
3	.44	.12	-.04	.03	-.03	-.03	-.01
4	.73	-.07	.04	.01	.03	.05	.01
5	.11	.19	.03	-.10	.13	-.01	.04
6	.57	-.07	-.09	.02	-.08	.07	-.05
7	.33	.03	-.11	-.01	-.01	-.05	.18
8	.46	-.08	-.13	.01	-.10	.07	-.03
9	.26	-.15	-.10	.00	-.09	.00	-.02
10	.24	-.26	.03	-.13	.12	-.09	.04
11	.54	-.05	.08	-.04	-.03	-.03	.04
12	-.01	-.13	-.03	-.03	.03	.10	.00
13	.48	.02	.01	-.02	-.02	.03	.10
14	-.03	.01	.05	.12	-.11	.05	.09
15	.25	-.22	.09	.05	-.05	.10	.01
16	-.01	.04	.02	-.04	.06	.01	-.04
17	.40	-.14	-.02	-.05	.03	.08	-.02
18	-.07	.18	-.13	-.01	-.09	-.05	.08
19	.06	.13	.01	-.05	.14	-.01	.06
20	.01	.22	-.02	-.01	.03	.02	.10
21	-.16	.14	.02	.08	.03	-.04	.02
22	.37	-.14	.01	-.09	.05	-.04	.05
23	-.56	.16	.10	.04	.03	.03	.05
24	.16	.17	-.02	.06	-.05	-.03	.03
25	-.54	.05	.04	-.02	.04	.00	-.02
26	.12	.00	.17	.11	-.08	.01	.02
27	.14	-.02	-.01	-.01	.01	-.11	.07
28	.21	.07	-.10	-.01	.09	-.04	.12
29	.43	-.10	-.05	.03	.01	-.03	.01
30	-.14	-.01	.03	.01	-.02	.09	.05
31	.28	.04	.00	.01	-.02	-.02	-.01
32	.55	.07	.09	.01	-.02	-.02	-.02
33	.70	.17	.03	.04	.04	.0'	.02
34	.21	.10	.03	-.08	.06	.02	-.11
35	-.04	.00	-.01	-.04	.04	.08	-.09
36	.38	-.17	-.03	.05	.05	.01	-.05
37	.46	-.02	.13	-.01	.06	.04	.00

*See Table 10 for score description.
**Loadings equal to or greater than .30 in absolute value are u rlined.

Table 15 - (continued)

Loadings of Year 2 Variables on Extension of First Thirteen Factors

Score*	8	9	10	11	12	13
1	.03	.05	.00	.08	-.08	-.04
2	-.03	-.11	-.17	-.05	-.06	.08
3	.12	-.02	.05	.06	.01	.08
4	.12	.00	-.06	-.01	.02	-.03
5	.09	-.03	-.15	-.04	-.05	.02
6	-.03	.06	.05	.09	.09	-.02
7	-.10	.06	-.03	.46**	.14	-.03
8	-.05	.01	.07	-.04	-.06	.04
9	.00	.01	.10	.14	.01	.05
10	.23	.16	.02	-.07	.00	-.05
11	.09	.04	.05	-.10	-.08	.09
12	-.13	.00	-.01	.00	.00	.00
13	.02	.02	.01	-.02	.05	-.05
14	.02	.05	.04	-.05	.12	.10
15	.03	.11	-.08	.05	-.04	-.02
16	-.03	.09	.02	-.05	-.02	.07
17	-.08	.07	-.02	-.09	-.04	-.04
18	.01	.05	-.05	.10	-.02	.01
19	.03	-.0[illegible]	-.09	-.08	-.04	.09
20	.00	-.03	-.17	-.01	-.05	.06
21	-.13	-.05	-.03	.12	-.06	.06
22	.04	.02	-.04	-.02	-.03	.00
23	.11	-.04	-.03	-.10	-.12	.03
24	.03	.03	-.04	.00	.13	.03
25	.00	-.09	.01	-.08	.03	.06
26	.02	.17	.12	.00	-.04	-.02
27	-.02	.07	.00	.04	-.02	-.12
28	-.08	-.04	-.01	.04	.04	.04
29	-.09	-.07	.13	-.13	.11	-.01
30	.17	.13	-.06	.08	-.12	.01
31	.08	.06	-.04	-.04	.01	.04
32	.15	.08	-.02	-.14	.02	.02
33	.07	.09	-.04	[illegible]	-.03	-.06
34	.04	.05	.08	-.03	.13	.11
35	.01	.07	.09	.03	[illegible]	-.06
36	.07	.10	.05	.07	-.11	.11
37	.13	-.03	.02	-.15	.00	.03

*See Table 10 for score descriptions.

**Loadings equal to or greater [illegible] absolute value are underlined.

Table [illegible]

Varimax Thirteen Factor Solution* For Year 2 Variables with [illegible]

Score**	1	2	3	4		[illegible]	
1	.12	.03	.01	[illegible]	[illegible]	[illegible]	[illegible]
2	-.01	-.03	-.03	[illegible]	[illegible]	[illegible]	[illegible]
3	.08	.02	-.03	[illegible]	-.02	[illegible]	[illegible]
4	.36***	-.05	.03	[illegible]	-.05	.13	[illegible]
5	.01	.57	.00	-.02	.01	.30	[illegible]
6	.25	-.04	[illegible]	.01	.11	[illegible]	[illegible]
7	-.06	.02	.02	-.03	[illegible]	[illegible]	[illegible]
8	.25	-.03	.01	.00	[illegible]	[illegible]	[illegible]
9	.24	.03	-.05	-.02	.13	[illegible]	[illegible]
10	.36	-.05	-.01	-.02	-.02	[illegible]	[illegible]
11	.26	.07	[illegible]	.01	-.02	.14	-.08
12	.04	.05	-.02	.03	[illegible]	[illegible]	[illegible]
13	.14	.05	.01	-.03	[illegible]	.20	[illegible]
14	.04	-.06	.04	-.04	[illegible]	-.05	[illegible]
15	.06	.03	-.07	-.06	[illegible]	-.03	.03
16	-.02	.00	.01	.52	.03	-.04	-.02
17	.42	.07	.00	.06	[illegible]	[illegible]	[illegible]
18	-.14	.08	.68	-.02	[illegible]	[illegible]	[illegible]
19	.07	.54	.01	[illegible]	[illegible]	[illegible]	[illegible]
20	-.05	.49	-.02	.00	[illegible]	[illegible]	[illegible]
21	-.17	.12	-.60	-.02	[illegible]	-.07	[illegible]
22	.23	.01	.04	.00	[illegible]	[illegible]	.15
23	-.28	-.05	.02	[illegible]	-.12	.00	.02
24	.11	.09	.01	[illegible]	.04	.03	.13
25	-.37	.04	.03	[illegible]	.04	[illegible]	[illegible]
26	-.17	-.12	-.06	[illegible]	-.01	[illegible]	[illegible]
27	-.04	-.12	[illegible]	[illegible]	-.07	[illegible]	[illegible]
28	-.04	.03	[illegible]	[illegible]	.11	[illegible]	[illegible]
29	.33	.09	-.01	[illegible]	[illegible]	[illegible]	[illegible]
30	-.20	-.05	.04	[illegible]	.01	[illegible]	.46
31	.13	.00	.07	[illegible]	.04	[illegible]	-.02
32	.23	.05	-.02	.00	-.01	.12	[illegible]
33	.21	.01	.00	.01	.00	.08	[illegible]
34	.07	.01	.04	.03	.52	[illegible]	[illegible]
35	-.08	-.03	.04	-.02	.60	-.06	[illegible]
36	.25	-.09	-.05	[illegible]	-.01	.04	[illegible]
37	.30	.04	[illegible]	-.01	-.09	.06	[illegible]
	1.54	.97	.85	[illegible]	.81	[illegible]	[illegible]

*Using communalities in the diagonal.
**See Table 10 for score description.
***Loadings equal to or greater than .30 in absolute value are underlined.

Chapter 5

Conclusions

[illegible] present analyses were designed to assess the extent of structural stability and change when comparing the pattern of interrelationships among the test performances of the Year 1 - 2 three-site urban longitudinal sample

In both years structural analyses yielded 1) a general ability dimension accounting for much of the common variance among cognitive-perceptual tasks; 2) a response tempo dimension, and 3) additional factors tapping task-specific styles and behaviors. Given the generally high internal consistency of the various scores and their moderate to low communalities, considerable non-error specific variance remained. These findings were strikingly consistent across a variety of statistical methods and [illegible] major subject classifications [illegible] for eligibility, [illegible] and race within sites. [illegible] results reported here for the Year 1 longitudinal sample [illegible] identical [illegible] reported previously (Shipman, [illegible]) for the total initial [illegible] Count children and [illegible] not retested [illegible]

The Year 2 analyses also suggested the emergence [illegible] spontaneous verbalization [illegible] dimensional [illegible] the first [illegible] differentiation [illegible] perceptual speed [illegible] tive style [illegible] generalized [illegible] the [illegible] and [illegible] relative [illegible]

[illegible] indicates [illegible]

[illegible]

[illegible]

correlated only with the first factor, in [illegible] restricted [illegible] range due to the shorter testing interval [illegible] and SES were correlated with the first factor [illegible] cognitive-perceptual performance at this age [illegible] developmental level and experience. (It should be noted [illegible] differences were not associated with the "non-cognitive" measures [illegible] the confounding of race and SES in this sample, race differences would be expected and should not be interpreted without [illegible] regard for [illegible] Site differences were highly correlated with the response speed [illegible] Year 1, but not in Year 2 [illegible] given the disproportionality [illegible] major classifi cation variables by site, and the unknown extent to which differences in tester performance across sites are associated with this finding, these data are not interpretable at this time.

Both economic eligibility and later [illegible] selection for Head Start were associated with cognitive-perceptual performance differences in Year 1. [illegible] significant differences remained in Year 2. As pointed out in these analyses, no adjustments were made for pre-existing group differences. The investigation of changes in level of performance associated with differential experiences provided by Head Start and other preschool programs will be the subject of future reports. In addition to attempting to adjust for pre-existing differ ences, particular program variables will replace the present global category of preschool attendance. Such experiences would be expected to have differ- ential effects depending on the nature of the processes involved and the level of the child's functioning.

In investigating the extent of change in the factor structure across years, the major finding was the low degree of correlation remaining among measures [illegible] appear from Year 1 factors [illegible] except for the [illegible] perceptual dimension, the spontaneous verbal [illegible] of the perceptual speed factor, there was no [illegible] evidence of new factors emerging in Year 2. As revealed by the various [illegible] matrices [illegible] the pattern of interrelationships among cognitive-perceptual measures was [illegible] across years. During this [illegible] period there appeared instead an [illegible] integration of cognitive-perceptual skills rather than differentiation of abilities. For example, [illegible] apparently [illegible] task-specific skill, and [illegible] separate factor [illegible] first factor in [illegible]. These findings [illegible] presented in the earlier [illegible] at the beginning [illegible] of differentiation [illegible]

[illegible] There did [illegible] perceptual [illegible] individual differences in [illegible].

[illegible] however, remains [illegible] performance [illegible] related to specific [illegible] limited [illegible] particular situational [illegible] with the exception of [illegible] tasks primarily [illegible] there was little [illegible] performance [illegible] large extent [illegible] reported [illegible] performance [illegible] to greater susceptibility to situational factors (cf. [illegible] and [illegible], 1967). For the children in this sample, who at the time [illegible] initial testing had [illegible] preschool or testing experience, [illegible] situational factors [illegible] expected to have had greater effects. To some extent low test-retest [illegible] also may reflect transient age-specific determinants (e.g., the spontaneous verbalization score). For some tasks different components may be most [illegible] ing performance at different times indicating changes in [illegible] with age. For example, many factors other than the ability to delay grati[illegible] [illegible] are represented in the child's performance on the Mischel task (e.g. understanding of instructions, faith in the tester). These variables would [illegible] expected to be less influential at the time of second testing. Also, tester differences may influence performance [illegible] some tasks more than others. Differ[illegible] [illegible] tester-child [illegible] be expected to have a greater effect [illegible] the Risk-Taking, [illegible] tasks. Test differences [illegible] a stopwatch might be expected to have greater effects on time scores. For some tasks, of course, [illegible] ceiling effects may be creating differences in the amount of sample variation within a given time period with consequent effects on the stability coefficient. For the developmentally less mature subjects who showed reduced variability of measurement [illegible] (Shipman, [illegible]), environmental (e.g. preschool attendance) [illegible] developmental differences may [illegible] individual differences [illegible] [illegible]

Thus, although the pattern of interrelationships among tasks remained highly similar across years in each of the major subject breakdowns, changes in mean level of performance may not be. Moreover, the correlates of such change may also differ according to the behavior involved. Future analyses will be focused on investigating these relationships partialling out age at [illegible] between Year 1 and Year 2 testing as [illegible] finding [illegible] similar factor structure [illegible] interpretation in the [illegible] differences are [illegible] or construct

[illegible]

[illegible]

Table A-1

[illegible] in Longitudinal Sample, Classified by Sex, Race, [illegible] Attendance and Head Start Eligibility [illegible]

	Boys		Girls		
	White	Black	White	Black	Total
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table A-3

St. Louis Longitudinal Sample, Classified by Sex, Race,
Preschool Attendance and Head Start Eligibility (Year 1-2)

		Boys		Girls		
		White	Black	White	Black	Total
	Elig.	5		1	11	[illegible]
H.S.	Inelig.	[illegible]	1	1	6	[illegible]
	Ind.	[illegible]		[illegible]	1[illegible]	[illegible]
	Elig.	1		1	[illegible]	18
N.P.	Inelig.	0	[illegible]	[illegible]		[illegible]
	Ind.	0		[illegible]	[illegible]	16
	Elig.	0	[illegible]	[illegible]	[illegible]	[illegible]
P	Inelig.	0	1	[illegible]		[illegible]
	Ind.	0		[illegible]	1	[illegible]
	Total	15	[illegible]	[illegible]	[illegible]	[illegible]

Table A-4

[illegible] Longitudinal Sample, Classified by Sex, Race,
Preschool Attendance and Head Start Eligibility (Year 1-2)

		Boys		Girls		
		White	Black	White	Black	Total
	Elig.		28	1	[illegible]	61
H.S.	Inelig.		15	[illegible]	[illegible]	29
	Ind.	[illegible]	9	[illegible]	[illegible]	18
	Elig.		[illegible]6	1	11	[illegible]
N.P.	Inelig.	3	13	[illegible]	[illegible]	39
	Ind.	[illegible]	8	1	[illegible]	19
	Elig.	[illegible]	5	[illegible]	[illegible]	[illegible]
P	Inelig.	[illegible]	13	[illegible]	15	[illegible]
	Ind.	[illegible]	[illegible]	[illegible]	1	[illegible]
	Total	[illegible]	[illegible]	17	110	[illegible]

APPENDIX [illegible]

SUPPLEMENTARY [illegible]

Table B-1

...ix Correlations with Reference Vectors* (Year ...)

[illegible]	1	2	3	4	5	6	[illegible]
[illegible]	[illegible]	[illegible]	.11	.00	-.06	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.13	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	.31	[illegible]	.03	[illegible]	-.08	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.06	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-.02	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	-.12	.06	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.03	[illegible]	.04	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.11	[illegible]	.18	[illegible]	.21
[illegible]	[illegible]	[illegible]	[illegible]	-.09	.13	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.31	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.30	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.06	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.18	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	.00	[illegible]	-.16	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	.11	-.08	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-.13	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	.10	[illegible]	[illegible]	[illegible]	.16	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	.18	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Score**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	.00	[illegible]	[illegible]	[illegible]***	.11	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	-.02	[illegible]	[illegible]
9	-.06	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	-.12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	.04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	-.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	-.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	.03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	-.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	-.02	[illegible]	[illegible]	[illegible]	.05	[illegible]
20	-.08	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]***	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.01
36	[illegible]	[illegible]	.10	[illegible]	[illegible]	[illegible]
37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Using communalities in the diagonal.
**See Table IV for score description.
***Correlations equal to or greater than [illegible]

Table B-4

Promax Correlations Among Primary Factors* (Year 2)

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13
1		.06	-.13	.19	.18	.11	.13	.31**	.22	-.10	.07	.03	.05
2	.06		-.01	.15	.28	-.01	.04	-.03	.09	.05	-.17	.07	-.23
3	-.13	-.01		-.27	.05	-.02	-.12	-.06	.05	.02	-.13	-.18	-.15
4	.19	.15	-.27		.11	.02	.10	.08	.06	-.04	.05	.36	.07
5	.18	.28	.05	.10		.09	.03	-.07	.12	.03	-.14	-.05	-.01
6	.11	-.02	-.02	.01	.09		.18	.03	.09	-.07	.10	.01	.09
7	.13	.04	-.12	.10	.03	.18		.03	.09	.03	.08	.09	.08
8	.31**	-.03	-.06	.08	-.07	.03	.03		.16	-.05	-.16	-.05	.02
9	.22	.09	.05	.06	.12	.09	.09	.16		-.06	-.14	-.10	-.14
10	-.10	.05	.02	-.04	.03	-.07	.03	-.05	-.06		-.06	.10	.10
11	.07	-.17	-.13	.05	-.14	.10	.08	-.16	-.14	-.06		.19	.19
12	.03	.07	-.18	.36	-.05	.01	.09	-.05	-.10	.10	.19		.20
13	.05	-.23	-.15	.07	-.01	.09	.08	.02	-.14	.10	.19	.20	

*Using communalities in the diagonal.
**Correlations equal to or greater than .30 in absolute value are underlined.

Table B-5

Correlations Among Year 1 Measures Using the Longitudinal Sample*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1		-.36	.25	.47	.09	.32	.20	.13	.13	.18	.25	.04	.28	.08	.09	.08	.26	.04	.12
2	.36		.20	.29	-.03	-.21	-.18	-.12	-.16	-.20	-.13	-.03	-.17	-.02	-.13	.00	-.19	.08	-.08
3	.25	-.20		.37	.08	.28	.20	.07	.11	.09	.20	-.06	.22	.09	.09	-.09	.19	.04	.15
4	.47	-.29	.37		.13	.49	.32	.30	.28	.22	.31	.03	.39	.06	.23	-.06	.32	-.04	.22
5	.09	-.03	.08	.13		.04	.08	.03	-.07	.07	.05	.00	.09	.06	.07	-.04	.11	-.03	.07
6	.32	-.21	.28	.49	.04		.22	.29	.30	.18	.15	-.01	.28	.08	.08	-.04	.31	-.03	.10
7	.20	-.18	.20	.32	.08	.22		.06	.07	.15	.09	.06	.15	.11	.06	.02	.14	.10	.14
8	.13	-.12	.07	.30	.03	.29	.06		.29	.05	.03	.04	.07	-.03	.18	.01	.11	-.09	.01
9	.13	-.16	.11	.28	-.07	.30	.07	.29		.10	.05	.08	.14	-.12	.14	-.09	.10	-.08	-.01
10	.18	-.20	.09	.22	.07	.18	.15	.05	.10		.41	.00	.13	.01	.10	-.03	.14	-.07	.06
11	.25	-.13	.20	.31	.05	.15	.09	.03	.05	.41		.02	.17	-.05	.06	-.02	.16	.03	.15
12	.04	-.03	-.06	.03	.00	-.01	.06	.04	.08	.00	-.02		-.01	-.11	.03	-.01	.02	-.01	-.04
13	.28	-.17	.22	.39	.09	.28	.15	.07	.14	.13	.17	-.01		.11	.10	-.03	.31	.03	.17
14	.08	-.02	.09	.06	.06	.08	.11	-.03	-.12	.01	-.05	-.11	.11		-.03	-.03	-.02	.16	.10
15	.09	-.13	.09	.23	.07	.08	.06	.18	.14	.10	.06	.03	.10	-.03		-.08	.08	-.02	-.00
16	-.08	.00	-.09	-.06	-.04	-.04	.02	.01	-.09	-.03	-.02	-.01	-.03	-.03	-.08		.03	.02	.01
17	.26	-.19	.19	.32	.11	.31	.14	.11	.10	.14	.16	.02	.31	-.02	.08	.03		-.04	.13
18	-.04	.08	.04	-.04	-.03	-.03	.10	-.09	-.08	-.07	.03	-.01	-.03	.16	-.02	.02	-.04		-.00
19	.12	-.08	.15	.22	.07	.10	.14	.01	-.01	.06	.15	-.04	.17	.10	-.00	.01	.13	-.00	

Table B-5 (Continued)*

Correlations Among Year 1 Measures Using the Longitudinal Sample

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
	.00	-.01	.23	-.26	.03	-.28	.13	.13	.07	.22	.01	.15	.28	.39	.17	-.18	.22	.18
	.01	.06	-.20	.29	.03	.22	.00	-.08	-.09	-.22	.08	-.15	-.16	-.22	-.08	.06	-.25	-.15
	.08	-.05	.22	-.24	.10	-.22	.13	.08	.13	.18	.06	.11	.29	.36	.14	-.10	.17	.15
	.02	-.06	.39	-.44	.02	-.42	-.00	.13	.11	.32	.00	.24	.41	.58	.18	-.18	.30	.28
	.05	.07	.08	-.04	.03	-.05	.03	.03	.09	.09	.07	.07	.12	.16	.05	-.03	.05	.04
	-.03	-.08	.26	-.42	.02	-.37	.01	.13	.09	.31	.02	.16	.27	.38	.12	-.14	.34	.17
	.10	.03	.13	-.29	.04	-.23	-.01	.13	.15	.23	.07	.18	.20	.25	.06	-.09	.20	.12
	-.07	-.08	.17	-.21	-.10	-.15	-.10	-.01	.02	.13	-.02	.10	.07	.21	.07	-.02	.22	.12
	-.13	-.11	.19	-.22	-.12	-.13	-.04	.10	.00	.12	-.15	.05	.04	.11	.02	-.10	.20	.10
10	.02	-.05	.15	-.18	.00	-.18	.00	.04	.06	.11	-.05	.16	.18	.24	.01	-.09	.17	.06
11	.05	-.00	.16	-.22	-.05	-.20	-.01	.05	.08	.13	.02	.17	.24	.28	.15	-.03	.12	.12
12	-.04	-.08	.01	-.03	-.01	-.03	-.04	.01	-.03	-.04	-.04	-.01	-.08	-.04	.00	.03	-.01	-.06
13	.05	.03	.31	-.26	.06	-.27	.03	.13	.14	.20	-.04	.10	.29	.40	.18	-.16	.09	.15
14	.10	.17	-.16	-.02	.46	-.01	-.04	.08	.14	.07	.23	.07	.13	.20	.02	-.09	.04	.03
15	-.09	.05	.13	-.13	.05	-.14	.09	.04	.02	.06	.00	.09	.12	.27	.05	-.08	.07	.07
16	.10	.00	-.02	-.02	-.00	.01	.00	.01	.02	-.01	.06	.02	-.08	-.07	.04	.04	.01	-.00
17	.08	-.03	.35	-.38	-.06	-.43	.11	.08	.07	.25	-.08	.15	.20	.32	.15	-.08	.22	.21
18	.19	-.19	-.07	.02	.12	.03	-.07	-.01	.03	.08	13	.05	-.05	.02	-.00	.08	-.01	.03
19	.18	.09	.15	-.08	.06	-.14	.01	.03	.08	.10	.11	.09	.20	.23	.13	-.09	.01	.12

Table B-5 (Continued)

Correlations Among Year 1 Measures Using the Longitudinal Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	.00	.01	.08	.02	.05	-.03	.10	-.07	-.13	.02	.05	-.04	.05	.10	-.09	.10	.08	.19	.18
21	-.01	.06	-.05	-.06	.07	-.08	.03	-.08	-.11	-.05	-.00	-.08	.03	.17	.05	.00	-.03	-.19	.09
22	.23	-.20	.22	.39	.08	.26	.13	.17	.19	.15	.16	.01	.31	-.16	.13	-.02	.35	-.07	.15
23	-.26	.29	-.24	-.44	-.04	-.42	-.29	-.21	-.22	-.18	-.22	-.03	-.26	-.02	-.13	-.02	-.38	.02	-.08
24	.03	.03	.10	.02	.03	.02	.04	-.10	-.12	.00	-.05	-.01	.06	.46	.05	-.00	-.06	.12	.06
25	-.28	.22	-.22	-.42	-.05	-.37	-.23	-.15	-.13	-.18	-.20	-.03	-.27	-.01	-.14	.01	-.43	.03	-.14
26	.13	.00	.13	-.00	.03	.01	-.01	-.10	-.04	.00	-.01	-.04	.03	-.04	.09	.00	.11	-.07	.01
27	.13	-.08	.08	.13	.03	.13	.13	-.01	.10	.04	.05	.01	.13	.08	.04	.01	.08	-.01	.03
28	.07	-.09	.13	.11	.09	.09	.15	.02	.00	.06	.08	-.03	.14	.14	.02	.02	.07	.03	.08
29	.22	-.22	.18	.32	.09	.31	.23	.13	.12	.11	.13	-.04	.20	.07	.06	-.01	.25	.08	.10
30	.01	.08	.06	.00	.07	.02	.07	-.02	-.15	-.05	.02	-.04	-.04	.23	.00	.06	-.08	.13	.11
31	.15	-.15	.11	.24	.07	.16	.18	.10	.05	.16	.17	-.01	.10	.07	.09	.02	.15	.05	.09
32	.28	-.16	.29	.41	.12	.27	.20	.07	.04	.18	.24	-.08	.29	.13	.12	-.08	.20	-.05	.20
33	.39	-.22	.36	.58	.16	.38	.25	.21	.11	.24	.28	-.04	.40	.20	.27	-.07	.32	.02	.23
34	.17	-.08	.14	.18	.05	.12	.06	.07	.02	.01	.15	.00	.18	.02	.05	.04	.15	-.00	.13
35	-.13	.06	-.10	-.18	-.03	-.14	-.09	-.02	-.10	-.09	-.03	.03	-.16	-.09	-.08	.04	-.08	.08	-.09
36	.22	-.25	.17	.30	.05	.34	.20	.22	.20	.17	.12	-.01	.09	.04	.07	.01	.22	-.01	.01
37	.18	-.15	.15	.28	.04	.17	.12	.12	.10	.06	.12	-.08	.15	.03	.07	-.00	.21	.03	.12

Table B-5 (Continued)

Correlations Among Year 1 Measures Using the Longitudinal Sample

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
20		.03	.00	-.01	.11	-.03	.00	.02	.14	.06	.14	.02	.05	.04	.04	-.01	-.04	.01
21	.03		-.08	.12	.08	.06	.01	-.02	.10	-.05	.08	.05	.04	.06	-.01	-.06	-.05	-.01
22	.00	-.08		-.28	-.12	-.33	.00	.05	.02	.13	.00	.11	.22	.35	.08	-.09	.19	.19
23	-.01	.12	-.28		.07	.43	-.05	-.06	-.06	-.34	.12	-.16	-.27	-.40	-.18	.13	-.32	-.22
24	.11	.08	-.12	.07		-.07	.07	.05	.07	.04	.23	.05	.11	.12	-.02	-.01	-.01	.04
25	-.03	.06	-.33	.43	-.07		-.20	-.12	-.09	-.23	-.01	-.13	-.30	-.43	-.12	.15	-.24	-.17
26	.00	.01	.00	-.05	.07	-.20		.00	.03	-.07	.00	-.03	.15	.14	.01	-.04	-.05	.10
27	.02	-.02	.05	-.06	.05	-.12	.00		.07	.17	-.01	.12	.11	.19	.03	-.11	.14	.02
28	.14	.10	.02	-.06	.07	-.09	.03	.07		.08	.09	.08	.10	.16	.11	-.03	.05	.05
29	.06	-.05	.13	-.34	.04	-.23	-.07	.17	.08		-.06	.23	.24	.31	.09	-.12	.33	.15
30	.14	.08	.00	.12	.23	-.01	.00	-.01	.09	-.06		.14	.09	.13	.08	.07	-.01	.05
31	.02	.05	.11	-.16	.05	-.13	-.03	.12	.08	.23	.14		-.00	.27	.05	-.08	.25	.10
32	.05	.04	.22	-.27	.11	-.30	.15	.11	.10	.24	.09	-.00		.52	.15	-.18	.24	.24
33	.04	.06	.35	-.40	.12	-.43	.14	.19	.16	.31	.13	.27	.52		.19	-.23	.25	.31
34	.04	-.01	.08	-.18	-.02	-.12	.01	.03	.11	.09	.08	.05	.15	.19		.16	.05	.04
35	-.01	-.06	-.09	.13	-.01	.15	-.04	-.11	-.03	-.12	.07	-.08	-.18	-.23	.16		-.14	-.08
36	-.04	-.05	.19	-.32	-.01	-.24	-.05	.14	.05	.33	-.01	.25	.24	.25	.05	-.14		.18
37	.01	-.01	.19	-.22	.04	-.17	.10	.02	.05	.15	.05	.10	.24	.31	.04	-.08	.18	

Table B-6

Correlations Among Year 2 Measures Using the Longitudinal Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1		-.35	.28	.53	.12	.39	.23	.23	.14	.13	.36	-.01	.37	-.09	.09	.04	.29	-.02	.11
2	-.35		-.16	-.28	-.01	-.18	-.13	-.14	-.13	-.08	-.25	-.01	-.28	.02	-.07	.08	-.11	.01	-.05
3	.28	-.16		.36	.09	.27	.15	.24	.15	.11	.27	.02	.23	.07	.05	.07	.20	-.06	.05
4	.53	-.28	.36		.04	.50	.27	.36	.27	.35	.53	-.02	.50	-.05	.31	-.04	.48	-.07	.09
5	.12	-.01	.09	.04		-.02	.09	.02	.02	-.02	.09	-.00	.12	-.09	.03	.00	.05	.06	.31
6	.39	-.18	.27	.50	-.02		.19	.37	.24	.22	.33	.07	.30	.02	.13	.00	.35	.04	.00
7	.23	-.13	.15	.27	.09	.19		.13	.13	.07	.15	-.01	.25	-.04	.18	-.04	.13	.06	.03
8	.23	-.14	.24	.36	.02	.37	.13		.28	.17	.27	.05	.26	.02	.09	.00	.32	-.08	-.04
9	.14	.13	.15	.27	.02	.24	.13	.28		.14	.23	-.02	.18	.02	.11	-.03	.22	-.04	-.06
10	.13	-.08	.11	.35	-.02	.22	.07	.17	.14		.38	-.03	.18	-.04	.15	-.02	.21	-.11	.06
11	.36	-.25	.27	.53	.09	.33	.15	.27	.23	.38		-.07	.37	-.05	.16	-.00	.28	-.08	.05
12	-.01	-.01	.02	-.02	.00	.07	-.01	.05	-.02	-.03	-.07		-.05	.10	.02	.04	.03	-.06	-.01
13	.37	-.28	.23	.50	.12	.30	.25	.26	.18	.18	.37	-.05		-.08	.17	-.04	.25	.01	.05
14	-.09	.02	.07	-.05	-.09	.02	-.04	.02	.02	-.04	-.05	.10	-.08		-.04	-.02	.02	-.02	-.02
15	.09	-.07	.05	[illegible]	.03	.13	.18	.09	.11	.15	.16	.02	.17	-.04		-.08	.16	-.05	.04
16	.04	.08	.07	-.04	.00	.00	-.04	.00	-.03	-.02	-.00	.04	-.04	-.02	-.08		.05	-.01	.01
17	.29	-.11	.20	.48	.05	.35	.13	.32	.22	.21	.28	.03	.25	.02	.16	.05		-.06	.07
18	-.02	.01	-.06	-.07	.06	-.04	.06	-.08	-.04	-.11	-.08	-.06	.01	-.02	-.05	-.01	-.06		.02
19	.11	-.05	.05	.09	.31	.00	.03	-.04	-.06	.06	.05	-.01	.05	-.02	.04	.01	.07	.02	

Table B-6 (Continued)

Correlations Among Year 2 Measures Using the Longitudinal Sample

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1	.01	-.07	.28	-.39	.15	-.40	.12	.06	.07	.29	-.13	.19	.38	.53	.14	-.06	.27	.29
2	.03	.12	-.26	.15	-.06	.22	-.16	-.01	-.03	-.13	.10	-.13	-.25	-.26	-.05	.04	-.14	-.20
3	.01	-.08	.15	-.19	.15	-.25	.08	.06	.06	.17	.02	.13	.34	.34	.12	-.07	.21	.24
4	-.02	-.18	.43	-.52	.14	-.54	.06	.13	.11	.36	-.12	.26	.52	.66	.31	-.13	.36	.52
5	.26	.05	.05	-.08	.10	-.03	-.07	-.07	.06	.06	-.03	.03	.11	.13	.05	-.04	-.01	.09
6	-.02	-.20	.27	-.46	.10	-.40	.06	.01	.10	.35	-.12	.18	.32	.42	.20	.02	.31	.28
7	.06	.03	.17	-.30	.03	-.18	.01	.06	.14	.05	-.07	.05	.17	.29	.02	-.05	.11	.10
8	-.09	-.17	.21	-.35	.07	-.30	.04	.02	.05	.32	-.06	.14	.27	.32	.09	.02	.26	.23
9	-.11	-.10	.22	-.30	.05	-.24	.05	.14	-.02	.16	.02	.18	.20	.23	.10	-.05	.24	.14
10	-.11	-.14	.22	-.23	.01	-.28	.01	.06	.06	.16	-.03	.17	.26	.25	.05	.01	.24	.25
11	.03	-.17	.36	-.30	.06	-.35	.08	.14	.06	.29	-.12	.22	.41	.44	.12	-.05	.25	.38
12	.03	-.04	.03	-.01	-.04	-.05	-.06	-.02	.03	.06	-.01	.03	-.03	-.01	.02	.03	.02	.01
13	.05	-.07	.23	-.35	.09	-.33	.12	.04	.11	.27	-.10	.15	.31	.44	.14	-.02	.19	.24
14	-.06	-.08	.06	.05	.09	.01	-.00	-.03	-.01	-.03	.20	-.02	-.01	-.08	.03	-.04	.05	.02
15	-.05	-.06	.17	-.24	.02	-.20	.09	.01	.08	.12	.03	.17	.12	.24	-.02	-.12	.13	.19
16	.00	-.01	-.01	-.00	-.01	-.03	.02	-.01	-.05	-.04	.00	-.03	-.01	-.00	.05	.03	-.03	-.02
17	.01	-.09	.27	-.36	.18	-.42	.01	.03	.02	.31	-.12	.13	.32	.37	.10	-.01	.28	.37
18	.11	-.19	-.03	.06	.08	.06	.00	.04	.03	-.10	.04	.04	-.07	-.02	.02	.05	-.13	-.12
19	.28	.05	.05	-.02	.09	-.03	-.06	-.05	.07	.04	-.06	.02	.12	.12	-.04	-.04	-.07	.07

Table B-6 (Continued)

Correlations Among Year 2 Measures Using the Longitudinal Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	.01	.03	.01	-.02	.26	-.02	.06	-.09	-.11	-.11	.03	.03	.05	-.06	-.05	.00	.01	.11	.28
21	-.07	.12	-.08	-.18	.05	-.20	.03	-.17	-.10	-.14	-.17	-.04	-.07	-.08	-.06	-.01	-.09	-.19	.05
22	.28	-.26	.15	.43	.05	.27	.17	.21	.22	.22	.36	.03	.23	.06	.17	-.01	.27	-.03	.05
23	-.39	.15	-.19	-.52	-.08	-.46	-.30	-.35	-.30	-.23	-.30	-.01	-.35	.05	-.24	-.00	-.36	.06	-.02
24	.15	-.06	.15	.14	.10	.10	.03	.07	.05	.01	.06	-.04	.09	.09	-.02	-.01	.18	.08	.09
25	-.40	.22	-.25	-.54	-.03	-.40	-.18	-.30	-.24	-.28	-.35	-.05	-.33	.01	-.20	-.03	-.42	.06	-.03
26	.12	-.16	.08	.06	-.07	.06	.01	.04	.05	.01	.08	-.06	.12	-.00	.09	.02	.01	.00	-.06
27	.06	-.01	.06	.13	-.07	.01	.06	.02	.14	.06	.14	-.02	.04	-.03	.01	-.01	.03	.04	-.05
28	.07	-.03	.06	.11	.06	.10	.14	.05	-.02	.06	.06	.03	.11	-.01	.08	-.05	.02	.03	.07
29	.29	-.13	.17	.36	.06	.35	.05	.32	.16	.16	.29	.06	.27	-.03	.12	-.04	.31	-.10	.04
30	-.13	.10	.02	-.12	-.03	-.12	-.07	-.06	.02	-.03	-.12	-.01	-.10	.20	.03	.00	-.12	.04	-.06
31	.19	-.13	.13	.26	.03	.18	.05	.14	.18	.17	.22	.03	.15	-.02	.17	-.03	.13	.04	.02
32	.38	-.25	.34	.52	.11	.32	.17	.27	.20	.26	.41	-.03	.31	-.01	.12	-.01	.32	-.07	.12
33	.53	-.26	.34	.66	.13	.42	.29	.32	.23	.25	.44	-.01	.44	-.08	.24	-.00	.37	-.02	.12
34	.14	-.05	.12	.21	.05	.20	.02	.09	.10	.05	.12	.02	.14	.03	-.02	.05	.10	.02	-.04
35	-.06	.04	-.07	-.13	-.04	.02	-.05	.02	-.05	.01	-.05	.03	-.02	-.04	-.12	.03	-.01	.05	-.04
36	.27	-.14	.21	.36	-.01	.31	.11	.26	.24	.24	.25	.02	.19	.05	.13	-.03	.28	-.13	-.07
37	.29	-.20	.24	.52	.09	.28	.10	.23	.14	.25	.38	.01	.24	.02	.19	-.02	.37	-.12	.07

Table B-6 (Continued)

Correlations Among Year 2 Measures Using the Longitudinal Sample

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
20		.14	-.02	.04	.10	.03	-.08	-.10	.06	-.02	-.01	.01	.02	.04	-.06	-.02	-.10	.03
21	.14		-.14	.12	-.00	.11	-.00	-.08	-.00	-.15	-.02	-.13	-.11	-.10	-.09	-.05	-.13	-.10
22	-.02	-.14		-.30	.07	-.28	.05	.08	.07	.22	.02	.17	.27	.33	.09	-.03	.28	.28
23	.04	.12	-.30		-.06	.50	-.05	-.07	-.16	-.38	.17	-.19	-.32	-.46	-.13	.07	-.31	-.26
24	.10	-.00	.07	-.06		-.27	.06	.01	.06	.09	.07	.05	.14	.16	.07	-.00	.03	.08
25	.03	.11	-.28	.50	-.27		-.05	-.07	-.11	-.30	.09	-.18	-.41	-.50	-.13	.09	-.29	-.37
26	-.08	-.00	.05	-.05	.06	-.05		.04	-.08	-.00	.02	.11	.08	.06	.04	-.04	.07	.04
27	-.10	-.08	.08	-.07	.01	-.07	.04		.10	.06	-.04	.08	.08	.14	-.02	-.05	.02	.05
28	.06	-.00	.07	-.16	.06	-.11	-.08	.10		.09	-.08	.03	.08	.15	.06	.06	.02	.07
29	-.02	-.15	.22	-.38	.09	-.30	-.00		.09		-.19	.15	.26	.29	.13	-.01	.21	.24
30	-.01	-.02	.02	.17	.07	.09	.02	-.04	-.08	-.19		-.01	-.06	-.09	-.00	-.01	-.05	-.10
31	.01	-.13	.17	-.19	.05	-.18	.11	.08	.03	.15	-.01		.06	.26	.08	.01	.12	.19
32	.02	-.11	.27	-.32	.14	-.41	.08	.08	.08	.26	-.06	.06		.47	.19	-.08	.29	.37
33	.04	-.10	.33	-.46	.16	-.50	.06	.14	.15	.29	-.09	.26	.47		.22	-.06	.26	.40
34	.06	-.09	.09	-.13	.07	-.13	.04	-.02	.06	.13	-.00	.08	.19	.22		.20	.05	.13
35	-.02	-.05	-.03	.07	-.00	.09	-.04	-.05	.06	-.01	-.01	.01	-.08	-.06	.20		-.03	-.10
36	-.10	-.13	.28	-.31	.03	-.29	.07	.02	.02	.21	-.05	.12	.29	.26	.05	-.03		.26
37	.03	-.10	.28	-.26	.08	-.37	.04	.05	.07	.24	-.10	.19	.37	.40	.13	-.10	.26	

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