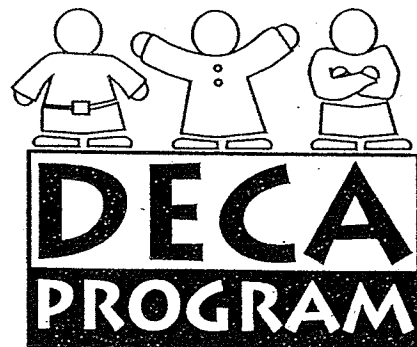# Devereux Early Childhood Assessment

# Technical Manual

by Paul A. LeBuffe and Jack A. Naglieri

DECA
PROGRAM

# Devereux Early Childhood Assessment — Technical Manual

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# Preface

This manual presents information on the development and standardization of the *Devereux Early Childhood Assessment* (DECA), as well as the results of studies examining the DECA's reliability and validity. This information is provided to help the DECA User become better informed about the strengths and proper uses of the DECA.

Complete information on the administration, scoring and interpretation of the DECA may be found in the *DECA User's Guide*.

Many individuals have contributed to the development of the DECA. Their names may be found in the acknowledgement section of the *DECA User's Guide*.

The authors welcome feedback on the DECA as well as opportunities for collaboration. They may be reached through the Institute of Clinical Training and Research of the Devereux Foundation in Villanova, Pennsylvania.

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## Tables

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# Chapter 1 - Development and Standardization

## Development of the DECA Items

We used two approaches to develop the initial set of DECA items. First, we reviewed the literature on resilience (e.g. Werner & Smith 1982, 1992) and noted behavioral descriptions of resilient children. Second, we conducted focus groups with both preschool teachers and parents of preschoolers. In the focus group sessions, parents and teachers were asked to describe the behaviors of children that "were likely to do well" or indicated that the child was "doing well" in regards to social and emotional health. Conversely, parents and teachers were also asked to describe behaviors that indicated that the child was "likely to have problems."

Next, we used these behavioral descriptions to generate rating scale items. We wrote the items so that they would measure directly observable behaviors that require little or no inference on the part of the observer. We paid careful attention to important psychometric qualities such as reliability and validity as well as ease of use of the scales. Finally, throughout all phases of item development, the reading level of the items and rater directions were carefully considered so that the overall readability of the text would be as easy as possible.

The item development phase resulted in a pool of items, which served as the starting point in the construction of the DECA. We conducted a pilot study in the spring of 1997 to examine the usefulness of the initial set of items and their inter-relationships. The pool of pilot study items was also submitted to the Culturally and Linguistically Appropriate Services program of the Educational Resources Information Center (ERIC:CLAS) for review. Based on their feedback, a small number of items that were judged to be potentially biased against minority children were eliminated from all subsequent versions of DECA. The results of the pilot study were used to create two forms, which were then used in the national standardized study. The first form (Form A) contained 53 items related to within-child protective factors in preschoolers. The second form (Form B) contained the same 53 protective factor items and an additional 77 items related to emotional and behavioral problems found in some preschool children. These problem items were selected from the childhood age level of the Devereux Scales of Mental Disorders (Naglieri, LeBuffe and Pfeiffer, 1994) and from parent and teacher comments made in the focus groups. The problem items were included in Form B so that we could assess the relationships between child protective factors and problem behaviors.

## National Standardization

The DECA was standardized through a carefully prescribed method so that the sample would closely represent the United States population on important demographic characteristics. The data collection procedures also ensured that a wide variety of children were included for the generation of norms. We collected data from two samples. The first, which is referred to as the DECA Protective Factors standardization sample, consisted of 2,000 children aged 2 years 0 months to

5 years 11 months 30 days. Of this sample, 939 children were rated using Form A and 1,061 children were rated using Form B. Analyses indicated that the presence of the problem behaviors on Form B had no effect on the protective item ratings. Therefore, the ratings on the protective items from both forms were combined into one data set for all analyses.

The second sample, which is referred to as the DECA Behavioral Concerns standardization sample, consisted of 1,108 children aged 2 years 0 months to 5 years 11 months 30 days that were rated on Form B. Both samples were collected during the fall of 1997 and the spring of 1998.

Ninety-five preschools and child care programs from across the United States participated in the standardization of the DECA. Preschool teachers and child care staff from center based programs provided the teacher ratings. Parent ratings were obtained not only from these same centers, but also in response to advertisements placed in parent magazines in Pittsburgh, PA; Atlanta, GA; Kansas City, KS; Phoenix, AZ; and Seattle, WA. To ensure the confidentiality of their responses, parents who chose to participate sent the completed rating forms directly to the Devereux Foundation Institute of Clinical Training and Research (ICTR). Teachers returned the completed forms in sealed envelopes to ICTR.

# Representativeness of the DECA Protective Factors Standardization Sample

The DECA Protective Factors standardization sample consisted of 2,000 preschool aged children. Teachers provided ratings on 1,017 of these children; parents provided ratings on the remaining 983 children. As shown below, the DECA Protective Factors standardization sample closely approximated the two- to five-year old population of the United States with respect to gender, geographic region of residence, race, ethnicity, and socioeconomic status. The desired characteristics of the standardization sample were based on the *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census. In the tables that follow, the total numbers of children included may not sum to 2,000 due to missing data.

## Age and Gender

Table 1.1 presents the numbers and percentages of males and females at each age from 2 to 5 years. The average number of children at each age was 493.5, ranging from 370 to 624. These results show that each age was sufficiently sampled. The data also show that the percentages of males and females in the standardization sample as a whole, as well as at each age, very closely approximated the proportions of the U.S. population.

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## Table 1.1
## DECA Protective Factors Standardization Sample Characteristics:
## Age and Gender

| Age | Males | | Females | | Total | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| 2 year olds | 219 | 51.3 | 208 | 48.7 | 427 | 21.6 |
| 3 year olds | 322 | 51.6 | 302 | 48.4 | 624 | 31.6 |
| 4 year olds | 272 | 49.2 | 281 | 50.8 | 553 | 28.0 |
| 5 year olds | 195 | 52.7 | 175 | 47.3 | 370 | 18.7 |
| Total Sample | 1008 | 51.1 | 966 | 48.9 | 1974 | |
| U.S. %[1] | | 51.2 | | 48.8 | | |

Note. The U. S. population data are based on "Resident Population, by Sex and Age: 1995, Table No. 16," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

## Geographic Region

We collected data from 95 sites in 28 states in the four geographic regions: Northeast, Midwest, South, and West. Figure 1.1 indicates by region the states in which standardization data were collected.

Table 1.2 shows the numbers and percentages of children for each age and the total sample for each of the four geographic regions. On average, the regional distribution of the DECA Protective Factors standardization sample was within 2.5% of the U.S. population of two- to five-year olds. These data show that the DECA standardization sample closely approximated the regional distribution of the U.S. population.

## Table 1.2
## DECA Protective Factors Standardization Sample Characteristics:
## Geographic Region and Age

| Age | Northeast | | Midwest | | West | | South | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n |
| 2 year olds | 94 | 22.0 | 85 | 19.9 | 102 | 23.9 | 146 | 34.2 | 427 |
| 3 year olds | 97 | 15.6 | 165 | 26.4 | 129 | 20.7 | 233 | 37.3 | 624 |
| 4 year olds | 115 | 20.9 | 150 | 27.2 | 119 | 21.6 | 167 | 30.3 | 551 |
| 5 year olds | 79 | 21.4 | 122 | 33.0 | 55 | 14.9 | 114 | 30.8 | 370 |
| Total Sample | 385 | 19.5 | 522 | 26.5 | 405 | 20.5 | 660 | 33.5 | 1972 |
| U.S. %[2] | | 18.5 | | 22.4 | | 24.5 | | 34.6 | |

Note. The U. S. population data are based on "Resident Population, by Age and State: 1995, Table No. 34," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

[1] These figures are based on children ages 2 through 5 only.
[2] These figures are based on children less than five years of age only.

Figure 1.1
DECA Standardization Sites
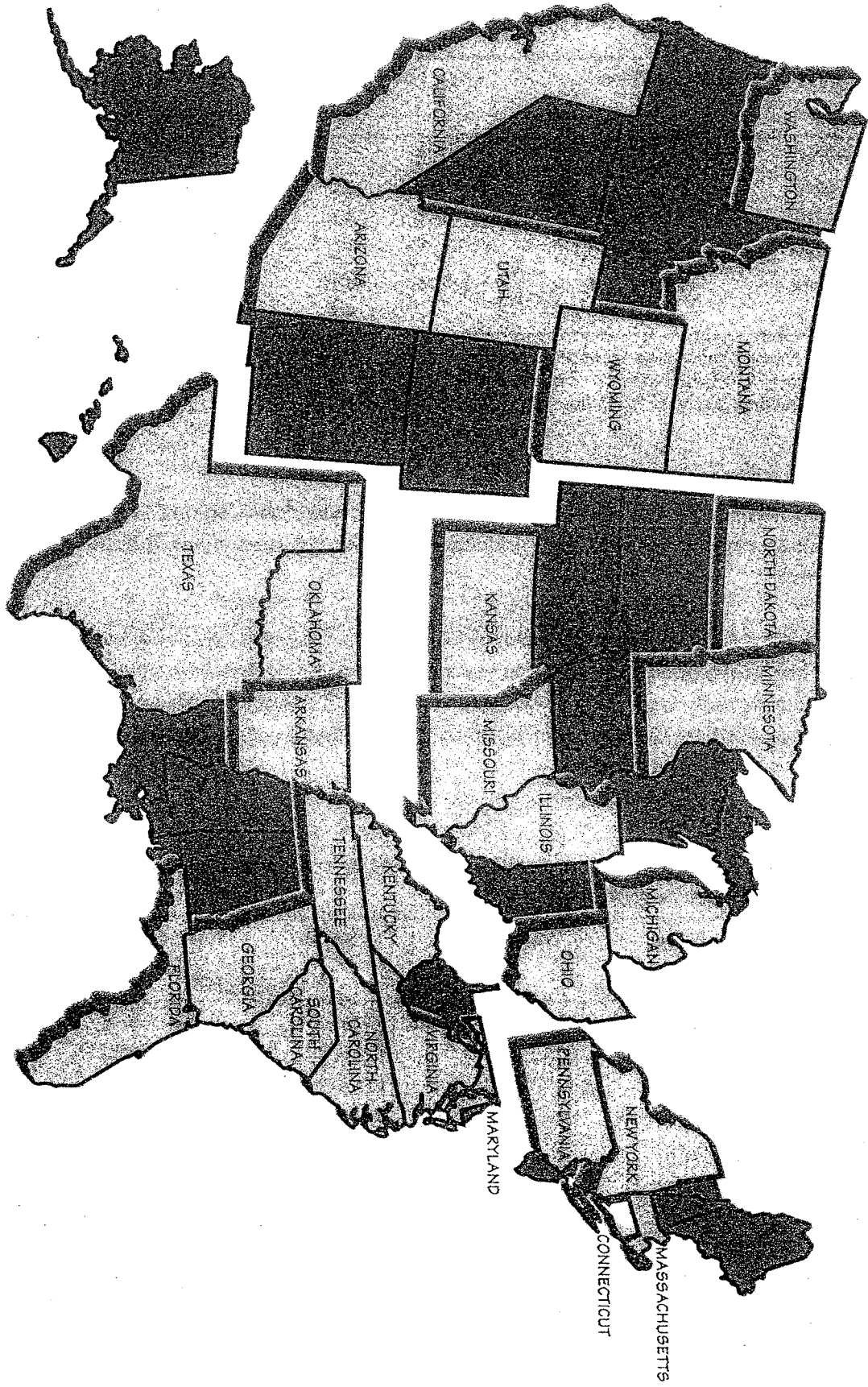
## Race

Table 1.3 provides the DECA Protective Factors standardization sample composition by race and geographic region. Based on information provided on the rating forms, the children were classified according to the four major race categories used by the U.S. Bureau of the Census: Asian/Pacific Islander, Black, American Indian/Eskimo/Aleut, and White. The DECA rating forms also allowed the rater to describe the race of the child as "Other." However, the *Statistical Abstract of the United States, 1996* does not provide figures for this category. Therefore, the data describing the racial composition of the DECA Protective Factors standardization sample are presented both with and without this category.

The data in Table 1.3 indicate that the racial composition of the total DECA standardization sample closely approximated that of the U.S. population. White children were slightly under-represented and Black children were slightly over-represented. In both cases the difference was 3% or less. Both Asian/Pacific Islander and American Indian/Eskimo/Aleut children were represented in this sample within three-tenths of 1% of their actual representation in the population. Additionally, sample percentages within each region were also similar to the actual population percentages found in each geographic region.

## Table 1.3
## DECA Protective Factors Standardization Sample Characteristics:
## Race and Geographic Region

| Region | White n | White Row % | Black n | Black Row % | Asian/Pacific Islander n | Asian/Pacific Islander Row % | American Indian n | American Indian Row % | Other n | Other Row % | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DECA Sample** | | | | | | | | | | | |
| **Northeast** | 244 | 63.5 | 67 | 17.4 | 15 | 3.9 | 1 | 0.3 | 57 | 14.8 | 384 |
| **Midwest** | 392 | 74.2 | 63 | 11.9 | 29 | 5.5 | 8 | 1.5 | 36 | 6.8 | 528 |
| **West** | 331 | 80.7 | 21 | 5.1 | 10 | 2.4 | 3 | 0.7 | 45 | 11.0 | 410 |
| **South** | 413 | 62.0 | 190 | 28.5 | 15 | 2.3 | 7 | 1.1 | 41 | 6.2 | 666 |
| **Total** | 1380 | 69.4 | 341 | 17.2 | 69 | 3.5 | 19 | 1.0 | 179 | 9.0 | 1988 |
| **DECA Sample (w/out "Other" category)** | | | | | | | | | | | |
| **Total** | 1380 | 76.3 | 341 | 18.8 | 69 | 3.8 | 19 | 1.0 | - | - | 1809 |
| **U.S. %[1]** | | 79.0 | | 15.8 | | 4.1 | | 1.1 | | - | |

Note. The U. S. population data are based on "Resident Population, by Race, Hispanic Origin, and Single Years of Age: 1995, Table No. 22," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

[1] These figures are based on children ages 2 through 5 only.

## Hispanic Ethnicity

Table 1.4 presents the numbers and percentages of children of Hispanic ethnicity included in the DECA Protective Factors standardization sample. These data, based on the number of participants who reported Hispanic ethnicity, show that the composition of the DECA Protective Factors standardization sample closely approximated that of the U.S. population. Because percentages of Hispanic children ages two to five by region were not available, the U.S. population figures in Table 1.4 reflect all individuals of Hispanic ethnicity regardless of age. However, it should be noted that 15.7% of all children ages two through five are of Hispanic ethnicity.

### Table 1.4
### DECA Protective Factors Standardization Sample Characteristics:
### Hispanic Ethnicity and Geographic Region

|  | Northeast | Midwest | West | South | Total |
|---|---|---|---|---|---|
| Total Reporting | 376 | 511 | 400 | 639 | 1926 |
| Non-Hispanic | 317 | 487 | 351 | 565 | 1720 |
| Hispanic |  |  |  |  |  |
| n | 59 | 24 | 49 | 74 | 206 |
| % | 15.7 | 4.7 | 12.3 | 11.6 | 10.7 |
| U.S. Population %[1] | 7.9 | 3.1 | 19.9 | 8.4 | 10.3 |

Note. The U.S. population data are based on "Resident Population, by Race, Hispanic Origin, and Single Years of Age: 1995, Table No. 22," and "Resident Population by Race, Hispanic Origin, and State: 1992, Table No. 35," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

## Socioeconomic Status

The socioeconomic status of the DECA Protective Factor standardization sample was assessed by determining the number of children receiving either subsidized day care or public assistance. Of the entire sample of 2,000 children, 493 (24.6%) were either receiving subsidized day care or public assistance. This very closely approximates the 25% of preschool children living in poverty (Children's Defense Fund, 1998).

[1] These figures are based on the entire population.

# Representativeness of the Behavioral Concerns Scale Standardization Sample

The standardization sample for the Behavioral Concerns Scale consisted of 1,108 preschool children, aged 2 years 0 months through 5 years 11 months 30 days, who were rated on Form B of the DECA. These children were rated by parents (n = 541) or teachers (n = 567). The sample is described in the following sections.

## Age and Gender

Table 1.5 presents the numbers and percentages of males and females at each age from 2 to 5 years. The average number of children at each age across the groups was 274, ranging from 200 to 351. These results show that each age was sufficiently sampled. The data also show that the percentages of males and females in the Behavioral Concerns Scale standardization sample as a whole, as well as at each age, closely approximated the proportions of the U.S. population.

**Table 1.5**
**DECA Behavioral Concerns Scale Standardization Sample Characteristics:**
**Age and Gender**

| Age | Males | | Females | | Total | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| **2 year olds** | 128 | 51.4 | 121 | 48.6 | 249 | 22.7 |
| **3 year olds** | 189 | 53.8 | 162 | 46.2 | 351 | 32.0 |
| **4 year olds** | 140 | 47.3 | 156 | 52.7 | 296 | 27.0 |
| **5 year olds** | 105 | 52.5 | 95 | 47.5 | 200 | 18.2 |
| **Total** | 562 | 51.3 | 534 | 48.7 | 1096 | |
| **U.S. %[1]** | | 51.2 | | 48.8 | | |

Note. The U. S. population data are based on "Resident Population, by Sex and Age: 1995, Table No. 16," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

[1] These figures are based on children ages 2 through 5 only.

## Geographic Region

Data were collected from sites in the same states as the DECA Protective Factors standardization sample, which are shown in Figure 1.1 above. Table 1.6 shows the numbers and percentages for each age and for the total sample for each of the four geographic regions. These data show that the Behavioral Concerns Scale standardization sample was similar to the U.S. population in terms of regional distribution.

**Table 1.6**
**Behavioral Concerns Scale Standardization Sample Characteristics: Geographic Region and Age**

| Age | Northeast | | Midwest | | West | | South | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n |
| **2 year olds** | 79 | 31.9 | 73 | 29.4 | 46 | 18.5 | 50 | 20.2 | 248 |
| **3 year olds** | 74 | 21.1 | 101 | 28.9 | 71 | 20.3 | 104 | 29.7 | 350 |
| **4 year olds** | 80 | 27.1 | 79 | 26.8 | 60 | 20.3 | 76 | 25.8 | 295 |
| **5 year olds** | 63 | 31.5 | 57 | 28.5 | 36 | 18.0 | 44 | 22.0 | 200 |
| **Total Sample** | 296 | 27.1 | 310 | 28.4 | 213 | 19.5 | 274 | 25.1 | 1093 |
| **U.S. %**[1] | | 18.5 | | 22.4 | | 24.5 | | 34.6 | |

Note. The U. S. population data are based on "Resident Population, by Age and State: 1995, Table No. 34," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

[1] These figures are based on children less than five years of age only.

## Race

Table 1.7 provides the Behavioral Concerns Scale standardization sample composition by race and geographic region. Based on information provided on the rating forms, the children were classified according to the four race categories used by the U.S. Census Bureau: Asian/Pacific Islander, Black, American Indian/Eskimo/Aleut, and White. As explained in the previous section, raters were also allowed to describe the race of the child as "Other." The data in Table 1.7 indicate that the racial composition of the Behavioral Concerns Scale standardization sample approximated that of the U.S. population. For each race, representation within the sample was within 2% of actual representation in the population. Additionally, sample percentages within each geographic region were similar to the actual population percentages found in each geographic region.

### Table 1.7
### Behavioral Concerns Scale Standardization Sample Characteristics: Race and Geographic Region

| Region | White | | Black | | Asian/Pacific Islander | | American Indian | | Other | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | Row % | n | Row % | n | Row % | n | Row % | n | Row % | |
| **Behavioral Concerns Sample** | | | | | | | | | | | |
| **Northeast** | 216 | 73.0 | 25 | 8.4 | 11 | 3.7 | 1 | 0.3 | 43 | 14.5 | 296 |
| **Midwest** | 256 | 82.1 | 30 | 9.6 | 4 | 1.3 | 3 | 1.0 | 19 | 6.1 | 312 |
| **West** | 173 | 80.5 | 15 | 7.0 | 6 | 2.8 | 3 | 1.4 | 18 | 8.4 | 215 |
| **South** | 161 | 58.3 | 102 | 37.0 | 0 | 0.0 | 3 | 1.1 | 10 | 3.6 | 276 |
| **Total** | 806 | 73.3 | 172 | 15.7 | 21 | 1.9 | 10 | 0.9 | 90 | 8.2 | 1099 |
| **Behavioral Concerns Sample (w/out "Other" category)** | | | | | | | | | | | |
| **Total** | 806 | 79.9 | 172 | 17.0 | 21 | 2.1 | 10 | 1.0 | - | - | 1009 |
| **U.S. %[1]** | | 79.0 | | 15.8 | | 4.1 | | 1.1 | | - | |

Note. The U. S. population data are based on "Resident Population, by Race, Hispanic Origin, and Single Years of Age: 1995, Table No. 22," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

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[1] These figures are based on children ages 2 through 5 only.

## Hispanic Ethnicity

Table 1.8 provides the numbers and percentages of children of Hispanic ethnicity included in the Behavioral Concerns Scale standardization sample. These data, based on the number of participants who reported Hispanic ethnicity, show that the composition of this sample approximated that of the U.S. population.

**Table 1.8**
**Behavioral Concerns Scale Standardization Sample Characteristics:**
**Hispanic Ethnicity and Geographic Region**

|  | Northeast | Midwest | West | South | Total |
|---|---|---|---|---|---|
| **Total Reporting** | 290 | 298 | 207 | 257 | 1052 |
| **Non-Hispanic** | 250 | 285 | 184 | 236 | 955 |
| **Hispanic** |  |  |  |  |  |
| *n* | 40 | 13 | 23 | 21 | 97 |
| % | 13.8 | 4.4 | 11.1 | 8.2 | 9.2 |
| **U.S. Population %**[1] | 7.9 | 3.1 | 19.9 | 8.4 | 10.3 |

Note. The U.S. population data are based on "Resident Population, by Race, Hispanic Origin, and Single Years of Age: 1995, Table No. 22," and "Resident Population By Race, Hispanic Origin, and State: 1992, Table No. 35," *Statistical Abstract of the United States 1996* (116th edition.): *The National Data Book* by the U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census, 1996. Washington, DC: Author.

## Socioeconomic Status

The socioeconomic status of the Behavioral Concerns Scale standardization sample was assessed by determining the number of children receiving either subsidized day care or public assistance. Of the entire sample of 1108 children, 281 (25.4%) were either receiving subsidized day care or public assistance. This very closely approximates the 25% of preschool children living in poverty (Children's Defense Fund, 1998).

# Organization of Items into Scales

Utilizing the standardization data set, we organized the DECA items into statistically and logically derived scales. The Protective Factor Scales were identified through the use of item factor analysis. We applied this method to the entire set of protective factor items included on both Form A and Form B of the DECA. Careful examination of the factorial results suggested that three factors (eventually labeled Initiative, Self-control, and Attachment) best described the data.

[1] These figures are based on the entire population.

Next we conducted a series of analyses to determine which items should be deleted to obtain the best configuration of scales. We based the decisions to delete items on the following goals: 1) to identify the best factor solution from psychometric and interpretability perspectives, 2) to shorten the DECA as much as possible without compromising breadth of coverage, and 3) to ensure that the constructs are measured reliably by the scales. The final results of these analyses are provided in Table 1.9.

## Table 1.9
## Varimax Rotated Factor Analysis Results for the DECA Protective Factor Scales

| | Factor | | |
|---|---|---|---|
| Item | 1 | 2 | 3 |
| 19 try or ask to try new things or activities | .65 | | |
| 20 start or organize play with other children | .63 | | |
| 36 make decisions for herself/himself | .63 | | |
| 3 choose to do a task that was challenging for her/him | .62 | | |
| 16 try different ways to solve a problem | .59 | .40 | |
| 12 keep trying when unsuccessful (act persistent) | .56 | | |
| 28 say positive things about the future (act optimistic) | .54 | | |
| 24 focus his/her attention or concentrate on a task or activity | .52 | | |
| 32 ask other children to play with him/her | .51 | | |
| 2 do things for himself/herself | .48 | | |
| 7 participate actively in make-believe play with others (dress-up, etc.) | .46 | | |
| 21 show patience | | .74 | |
| 13 handle frustration well | | .72 | |
| 5 control her/his anger | | .71 | |
| 4 listen to or respect others | | .62 | .37 |
| 33 cooperate with others | | .59 | |
| 30 accept another choice when her/his first choice was unavailable | | .56 | |
| 34 calm herself/himself down when upset | | .54 | |
| 25 share with other children | | .52 | |
| 10 show affection for familiar adults | | | .69 |
| 17 act happy or excited when parent/guardian returned | | | .60 |
| 1 act in a way that made adults smile or show interest in her/him | | | .60 |
| 29 trust familiar adults and believe what they say | | | .58 |
| 37 show an interest in what children/adults are doing | | | .55 |
| 22 ask adults to play with or read to him/her | | | .55 |
| 6 respond positively to adult comforting when upset | | | .52 |
| 31 seek help from children/adults when necessary | | | .48 |

Note. Only loadings above .34 (which accounts for 10% or more of the item variance) are reported.

The individual DECA protective item factor loadings were obtained using principal factor analysis with varimax rotation. These results show that each of the three Protective Factor Scale factors is comprised of items with substantial loadings on the scale on which they are placed. Only two items (16 and 4) had secondary loadings on a different factor, illustrating the strength of these findings.

The ten items that comprise the Behavioral Concerns Scale were selected from the 77 problem behaviors on standardization Form B. These items were selected based on both their psychometric properties and their representation of a wide range of challenging behaviors.

# Norming Procedures

The first step in preparing the norms was to determine if any trends existed in the data. We examined the children's Total Protective Factor Scale and Behavioral Concerns Scale raw score means and standard deviations for age, rater, and gender differences. These analyses indicated that the scores did not show any meaningful age-related changes across the 2 through 5 year age span, therefore, we combined all ages in the construction of norms. It should be noted that the DECA measures the frequency of occurrence of the general, relatively broad behaviors (e.g. calm himself/herself down when upset). The DECA does not specify the exact, detailed behavior of the child (i.e. the behavior's topography). Focus groups conducted with the DECA indicated that the specific behavioral topographies may differ by age, but the frequency of those behaviors do not differ by age, for instance, a two year old may calm himself by sucking his thumb, and a five year old by telling his teacher what is bothering him, but at both ages, children tend to do this "occasionally." We did construct separate norms by Rater (Parent or Teacher) because of the different environments in which the children are seen by these different raters. Gender differences, which reflect real disparities in how boys and girls behave, were indicated by mean score differences. To preserve these findings, we constructed one set of norms based on the combined data from both genders. (Having separate norms by gender would have removed these differences).

After determining that norms would be constructed by rater, we examined the distributions of raw scores for normality. The cumulative frequency distributions for the factorially derived scales all approached normality but were slightly positively skewed. For this reason we decided to compute norms using normalization procedures. To accomplish this, we fit the obtained frequency distribution for each scale to normal probability standard scores via the obtained percentile ranks. Minor irregularities in raw score to standard score progressions were eliminated by smoothing. These procedures were followed for all of the Protective Factor scales as well as the Behavioral Concerns Scale.

# T-Scores

We computed standard scores separately for each of the five scales (Initiative, Self-control, Attachment, Total Protective Factors, and Behavioral Concerns) based on their individual raw score distributions. We determined the standard scores corresponding to the percentiles for which they are theoretically associated based on the normal curve. T-scores for each scale were set at a mean of 50 and a standard deviation of 10. We selected this metric because of its familiarity to professionals and because it facilitates interpretation of the results and comparison to scores from other similar scales.

# Chapter 2 - Reliability

The reliability of an assessment tool like the DECA is defined as, "the consistency of scores obtained by the same person when reexamined with the same test on different occasions, or with different sets of equivalent items, or under other variable examining conditions" (Anastasi, 1988, p. 102). We assessed the reliability of the DECA using several methods. First, we computed the internal reliability coefficients for each scale. Second, we assessed the test-retest reliability of each scale. Finally, we determined the interrater reliability for each scale.

## Internal Reliability

Internal reliability (also known as internal consistency) refers to the extent to which the items on the same scale or assessment instrument measure the same underlying construct. High internal reliability, which is desirable, indicates that the items assess the same characteristic of the child (i.e. construct) and, therefore, truly comprise a single scale. In contrast, low internal reliability indicates that the items measure a variety of different child characteristics and, therefore, do not comprise a single scale.

We determined the internal reliability of each scale using Cronbach's alpha (Cronbach, 1951). This statistic can vary from .00 (low) to .99 (high). The internal reliability coefficients (alphas) were based on the DECA Protective Factors standardization sample for the Protective Factor Scales, and the Behavioral Concerns standardization sample for the Behavioral Concerns Scale. The internal reliability estimates for each scale were calculated separately for each rater (parent or teacher) and are presented in Table 2.1.

The results in Table 2.1 indicate that the DECA has excellent internal reliability. The Total Protective Factors Scale alpha for both Parent Raters (.91) and Teacher Raters (.94) exceeded the .90 minimum for a total score suggested by Bracken (1987). In addition, these values met the "desirable standard" described by Nunnally (1978, p. 246).

The internal reliability coefficients for the remaining scales (Initiative, Self-control, Attachment and Behavioral Concerns) were also high. These coefficients ranged from a low of .71 (Behavioral Concerns - Parent Raters) to a high of .90 (Initiative and Self-control - Teacher Raters). The median reliability coefficient across these four scales was .80 for Parent Raters and .88 for Teacher Raters. These median values met or exceeded the .80 minimum for scale scores suggested by Bracken (1987).

**Table 2.1**
**Internal Reliability (Alpha) Estimates for DECA Scales by Rater**

| | Raters | |
|---|---|---|
| Scale | Parents | Teachers |
| Initiative | .84 | .90 |
| Self-control | .86 | .90 |
| Attachment | .76 | .85 |
| Total Protective Factors | .91 | .94 |
| Behavioral Concerns | .71 | .80 |

# Standard Errors of Measurement

The standard error of measurement ($SE_M$) is another index of the reliability of test scores. It is an estimate of the amount of error in the observed score, expressed in standard score units (i.e. $T$-scores). We obtained the $SE_M$ for each of the DECA Scale $T$-scores directly from the internal reliability coefficient ($r$) using the formula,

$$SE_M = SD\sqrt{1-r}$$

where SD is the theoretical standard deviation of the $T$-score (10) and the appropriate reliability coefficient ($r$) is used. The $SE_M$s for each DECA scale according to rater are presented in Table 2.2. Note that the $SE_M$s varied with the size of the internal reliability coefficient reported in Table 2.1 — the higher the reliability, the smaller the standard error of measurement.

**Table 2.2**
**Standard Errors of Measurement for the DECA Scale $T$-Scores by Rater**

| | Raters | |
|---|---|---|
| Scale | Parents | Teachers |
| Initiative | 4.03 | 3.15 |
| Self-control | 3.74 | 3.21 |
| Attachment | 4.91 | 3.87 |
| Total Protective Factors | 2.97 | 2.39 |
| Behavioral Concerns | 5.40 | 4.46 |

# Test-Retest Reliability

The correlation between scores obtained for the same child by the same rater on two separate occasions is another indicator of the reliability of an assessment instrument. The correlation of this pair of scores is the test-retest reliability coefficient ($r$), and the magnitude of the obtained value informs us about the degree to which random changes influence the scores (Anastasi, 1988).

To investigate the test-retest reliability of the DECA, a group of parents ($n$=26) and a group of teachers ($n$=82) rated the same child on two different occasions separated by a minimum of 24 hours and a maximum of 72 hours. Descriptive information on the children rated in this study is provided in Table 2.3.

## Table 2.3
## Characteristics of the Test-Retest Reliability Sample

| Characteristic | Raters | |
| --- | --- | --- |
| | Parents | Teachers |
| Size of Sample ($n$) | 26 | 82 |
| Age (years) | | |
| Mean | 3.9 | 3.6 |
| SD | 1.3 | 1.2 |
| Gender | | |
| Boys | 42.3% | 48.8% |
| Girls | 57.7% | 51.2% |
| Race | | |
| Asian/Pacific Islander | - | 2.4% |
| Black | 15.4% | 14.6% |
| American Indian | - | - |
| White | 73.1% | 72.0% |
| Other | 11.5% | 11.0% |
| Hispanic Ethnicity | 16.0% | 7.7% |

Table 2.4 presents the results of this study. All of the correlation coefficients were significant ($p < .01$), which indicates that the DECA scales have very good test-retest reliability. Overall, teachers were more consistent in their evaluation of the children's behavior across time. For teachers, the highest correlation was found on the Total Protective Factors Scale, and the lowest on the Behavioral Concerns Scale. The highest correlation for Parents was found on the Initiative Scale, and the lowest on the Attachment and Behavioral Concerns Scale.

## Table 2.4
## Test-Retest Reliability Coefficients for DECA Scores Obtained at a 24- to 72-Hour Interval

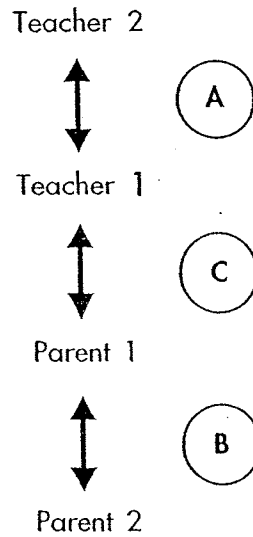| | Rater | |
| --- | --- | --- |
| Scale | Parents | Teachers |
| Initiative | .80** | .91** |
| Self-control | .64** | .91** |
| Attachment | .55** | .87** |
| Total Protective Factors | .74** | .94** |
| Behavioral Concerns | .55** | .68** |

Note: ** $p < .01$

# Interrater Reliability

The correlation between scores obtained for the same child at the same time by two different raters is another indicator of the reliability of an assessment instrument. The magnitude of the obtained value informs us about the degree of similarity in the different raters' perceptions of the child's behavior. In general, raters who perceive the child in the same environment (e.g. two teachers) will have more similar perceptions and, therefore, higher interrater reliability than raters who perceive the child in different settings (e.g. a teacher and a parent) (Achenbach, McConaughy, and Howell, 1987).

Figure 2.1 illustrates the design of this study. A set of ratings included four independent ratings of the same child, all completed on the same day. The ratings were provided by two teachers (or a teacher and teacher-aide) and two parents (or other family members). As shown in Figure 2.1, three different comparisons were made: 1) Teacher-Teacher (A), 2) Parent-Parent (B), and 3) Teacher-Parent (C). We collected Teacher-Teacher pairs of ratings on 80 children, Parent-Parent pairs of ratings on 62 children, and Parent-Teacher pairs of ratings on 98 children. Demographic information on the children rated is provided in Table 2.5.

**Figure 2.1  Design of DECA Interrater Reliability Study**

Teacher 2

↕   Ⓐ

Teacher 1

↕   Ⓒ

Parent 1

↕   Ⓑ

Parent 2

Note: All ratings completed within a 24-hour period.

## Table 2.5
## Characteristics of the Interrater Reliability Sample

| Characteristic | Rater Pairs | | |
| --- | --- | --- | --- |
| | Parent-Parent | Teacher-Teacher | Parent-Teacher |
| Size of Sample (n) | 62 | 80 | 98 |
| Age (years) | | | |
| Mean | 3.6 | 3.8 | 3.8 |
| SD | 1.0 | 1.0 | 1.2 |
| Gender | | | |
| Boys | 48.4% | 47.5% | 52.0% |
| Girls | 51.6% | 52.5% | 48.0% |
| Race | | | |
| Asian/Pacific Islander | - | 2.5% | 2.0% |
| Black | 6.5% | 13.8% | 14.3% |
| American Indian | - | - | - |
| White | 91.9% | 73.8% | 74.5% |
| Other | 1.6% | 10.0% | 8.2% |
| Hispanic Ethnicity | 3.4% | 7.8% | 6.4% |

Table 2.6 presents the results of this study. Consistent with our expectation, the Teacher-Teacher pair, who saw the child in the same environment at the same time, showed the highest interrater reliability. All of the correlation coefficients for this pair of raters were significant ( $p < .01$ ). This indicates that different teachers rate the same child very similarly on the DECA scales.

Table 2.6 also indicates that rater pairs who saw the child in different environments (i.e., Parent-Teacher pairs) or at different times of the day while the child is involved in different activities (i.e., Parent-Parent pairs) showed somewhat lower reliability than the Teacher-Teacher pairs. In addition, both Parent-Teacher and Parent-Parent pairs of raters showed similar levels of interrater reliability. In each case, some of the correlations were significant and some were not. For Parent-Parent pairs, significant correlation coefficients were obtained on four of the five scales. For Parent-Teacher pairs, significant correlations were obtained on three of the five scales. Overall, the results indicate that different raters tended to provide similar ratings of preschoolers using the DECA, and that this similarity increased as the raters saw the child in the same environment.

## Table 2.6
## Interrater Reliability Coefficients for DECA Scores

|  | Parent-Parent | Teacher-Teacher | Parent-Teacher |
|---|---|---|---|
| Initiative | .32* | .59** | .34** |
| Self-control | .33** | .77** | .23* |
| Attachment | .26* | .57** | .19 |
| Total Protective Factors | .21 | .69** | .29** |
| Behavioral Concerns | .44* | .62** | .23 |

Note: $*p < .05$, $**p < .01$

# Summary

The results of the internal consistency, test-retest, and interrater reliability studies indicated that the DECA is a highly reliable instrument for assessing preschool children's protective factors. The results of the internal consistency study demonstrated that the DECA meets the "desirable standards" that professionals have recommended. The test-retest study showed that raters give very similar ratings on the same child across relatively short periods of time. This indicates that the DECA is not overly influenced by random day-to-day changes but rather tends to yield a consistent picture of the child. The results of the interrater reliability study demonstrated that different raters tend to give similar ratings, especially if they see the child in the same environment at the same time. This indicates that the DECA is truly measuring the child's characteristics, and is not overly influenced by the characteristics of the rater. Taken together, these results should assure early care and education professionals that the DECA is a highly reliable instrument which can be used with confidence.

# Chapter 3 - Validity

The validity of a test "concerns what the test measures and how well it does so" (Anastasi, 1988, p. 139). More specifically, validity studies investigate the evidence that supports the conclusions or inferences that are made based on test results and the interpretive guidelines presented in the test manual. According to the *Standards for Educational and Psychological Testing* (APA, 1985), validity evidence can be conceptualized as content-related, criterion-related, and construct-related. We investigated the validity of the DECA in regard to each of these three areas.

## Content-Related Validity

Content-related validity assesses the degree to which the domain measured by the test is represented by the test items. With respect to the DECA, content-related validity addresses how well the 27 protective factor items represent the entire domain of within-child behavioral characteristics related to resilience in preschoolers, and how well the 10 items on the Behavioral Concerns Scale represent the entire domain of preschool emotional and behavioral problems.

Typically, content-related validity is demonstrated by comparing the item content of the assessment instrument under investigation to that of other well established measures or research findings in the same area. Because the DECA is the first published behavior rating scale of within-child protective factors, this comparison is not possible. However, as detailed in Chapter 1 of this manual, the content of the DECA was based on a thorough review of the resilience literature and the results of focus groups conducted with parents and teachers. This resulted in a large initial pool of 53 distinct strength-based behaviors. Through the analytic techniques described in Chapter 1, half of the items were eliminated, resulting in a final set of 27 items.

We created the Behavioral Concerns Scale by choosing 10 items from DECA standardization Form B. Previous research had established that the 77 problem behaviors on Form B comprised five scales: Attention Problems, Aggression, Emotional Control Problems, Withdrawal/Depression, and a group of items related to self-esteem, self-harm and dangerous behaviors that were labeled, "Increased Concern Items." The two items with the strongest factor loading on each of these five scales were selected for the Behavioral Concerns Scale. As a result, these 10 items represent a wide range of preschool emotional and behavioral problems.

## Criterion-Related Validity

Criterion-related validity measures the degree to which the scores on the assessment instrument predict either 1) an individual's performance on an outcome or criterion measure, or 2) the status or group membership of an individual.

As discussed in Chapter 1 of the *DECA User's Guide*, protective factors buffer children against stress and adversity, resulting in better outcomes than would have been possible in their absence. One important outcome for preschoolers is social and emotional health. Consequently, children with high scores on the DECA Protective Factor Scales should have greater social and emotional health than children with low scores on these scales.

To test this hypothesis, we obtained DECA ratings on two samples of preschool children. The "identified" sample ($n = 95$), had known emotional and behavioral problems. These children met at least one of the following criteria: 1) a program or plan had been developed to manage their behavior problems, 2) they had been referred to a professional for emotional/behavioral problems, 3) they were currently being treated by a mental health professional, 4) they had been asked to leave a child care/preschool program due to their behavior, or 5) they had been given a psychiatric diagnosis. We also obtained DECA ratings for a comparison group of typical preschool children, the "community" sample ($n = 300$). Because additional detailed information about the child's family was also collected (see Construct-Related Validity below), all ratings were provided by parents or family members. The children involved in this study were from 39 different programs in 18 states.

From the community sample, we selected a matched sample of 86 children for comparison with the identified sample. Matching variables included age, gender, race, and Hispanic ethnicity. Table 3.1 provides descriptive information on the samples that shows that the two groups were demographically similar.

## Table 3.1
## Sample Characteristics for the DECA Validity Study

| | Identified Sample | | Community Sample | |
|---|---|---|---|---|
| | n | % | n | % |
| **Size of Sample** | 95 | | 86 | |
| **Age (years)** | | | | |
| Mean | 4.6 | | 4.6 | |
| SD | 0.9 | | 0.9 | |
| **Gender** | | | | |
| Boys | 63 | 66% | 58 | 67% |
| Girls | 32 | 34% | 28 | 33% |
| **Race** | | | | |
| Asian/Pacific Islander | 2 | 2% | 3 | 3% |
| Black | 25 | 27% | 28 | 33% |
| American Indian | 1 | 1% | 0 | 0% |
| White | 57 | 60% | 50 | 58% |
| Other | 9 | 10% | 5 | 6% |
| **Hispanic Ethnicity** | 9 | 10% | 4 | 5% |

## Contrasted Groups

The contrasted groups approach to assessing criterion validity examines scale score differences between groups of individuals who differ on some important variable. Multivariate Analysis of Variance (MANOVA) procedures were used to contrast Initiative, Self-control, and Attachment Scale scores for the identified and community samples. Independent t-tests were used to compare both the Total Protective Factors and Behavioral Concerns Scale scores for the two groups.

Table 3.2 presents the results of this study and documents that there were large and significant differences between the mean scores of the identified and community samples on all five DECA scales. The mean standard score differences and other results reported in Table 3.2 clearly show that the ratings of the two groups differed significantly despite the similarity in demographic characteristics. All scale comparisons were significant ($p < .01$).

In addition to being statistically significant, the means of the two groups on each scale differed by approximately half a standard deviation or more (d-ratios range from .47 to 1.08). The d-ratio is a measure of the size of the difference between the mean scores expressed in standard deviation units. According to commonly accepted guidelines for interpreting d-ratios (Cohen, 1988), d-ratios of .2, .5, and .8 are interpreted as small, medium and large, respectively. Therefore, the effect sizes in Table 3.2 would be characterized as small verging on medium (Attachment), medium verging on large (Initiative) and large (Self-control, Total Protective Factors, and Behavioral Concerns). These results provide evidence of the validity of the DECA scales in discriminating between groups of preschoolers with and without emotional and behavioral problems.

**Table 3.2**
**Mean *T*-Scores, Standard Deviations, and Difference Statistics for DECA Validity Study**

| | Identified Sample (n=95) | Community Sample (n=86) |
|---|---|---|
| **Initiative** | | |
| Mean | 41.2 | 48.6 |
| SD | 9.8 | 9.2 |
| F Value | 27.3*** | |
| d-ratio | .78 | |
| **Self-control** | | |
| Mean | 38.9 | 49.1 |
| SD | 10.2 | 10.0 |
| F Value | 46.4*** | |
| d-ratio | 1.01 | |
| **Attachment** | | |
| Mean | 41.9 | 47.0 |
| SD | 10.5 | 11.3 |
| F Value | 10.1** | |
| d-ratio | .47 | |
| **Total Protective Factors** | | |
| Mean | 38.5 | 47.3 |
| SD | 9.9 | 10.00 |
| t-Value[a] | -6.00** | |
| d-ratio | .89 | |
| **Behavioral Concerns** | | |
| Mean | 65.4 | 55.7 |
| SD | 8.8 | 9.3 |
| t-Value[a] | 7.15** | |
| d-ratio | 1.08 | |

** $p < .01$     *** $p < .001$

[a] *t*-test for independent means

# Examination of Potential Adverse Impact on Minority Children

The contrasted group approach can also be used to show that groups that differ on a variable thought to be *irrelevant* to the purpose of the instrument do *not* differ on scale scores. To evaluate the appropriateness of the DECA for use with minority children, we compared the mean scores of Black and White children and of Hispanic and Non-Hispanic children. The goal was to determine if these groups of children received similar ratings on the DECA. To assess the difference in ratings we compared the means using the *d*-ratio statistic. Table 3.3 presents the results of these analyses.

As shown in Table 3.3, nearly half (13 of 30 or 43%) of the mean score differences were negligible. The remaining mean score differences would be characterized as "small." The average *d*-ratio when comparing scores earned by Black and White children was .25. The average *d*-ratio when comparing scores earned by Hispanic and Non-Hispanic children was .20. These results indicate that the DECA is appropriate for use with minority children, or stated in less statistical terms, the DECA does not discriminate against minority children.

## Table 3.3
## DECA Scale Scores: *d*-Ratios Comparing Minority and Non-Minority Children

| Teacher Raters | Black vs. White | Hispanic vs. Non-Hispanic |
|---|---|---|
| Initiative | .32 | .20 |
| Self-control | .33 | .06 |
| Attachment | .38 | .20 |
| Total Protective Factors | .38 | .18 |
| Behavioral Concerns | .28 | .22 |
| **Parent Raters** | | |
| Initiative | .04 | .25 |
| Self-control | .12 | .27 |
| Attachment | .38 | .16 |
| Total Protective Factors | .17 | .27 |
| Behavioral Concerns | .03 | .15 |
| **Total Sample** | | |
| Initiative | .18 | .23 |
| Self-control | .23 | .17 |
| Attachment | .38 | .18 |
| Total Protective Factors | .28 | .23 |
| Behavioral Concerns | .18 | .19 |

## Individual Prediction

The criterion validity of a test can also be determined by examining the ability of scale scores to predict accurately group membership for individual study participants. Therefore, we investigated the extent to which both the Total Protective Factors Scale scores and the Behavioral Concerns Scale scores accurately predicted membership in either the identified or community sample.

For the Total Protective Factors Scale, we predicted that individuals with a T-score of less than or equal to 40 would be members of the identified sample, and those with scores above 40 would be members of the community sample. For the Behavioral Concerns Scale, we predicted that individuals with a T-score of greater than or equal to 60 would be members of the identified sample, and those with scores below 60 would be members of the community sample. (Recall that T-Scores of 40 and below on the Protective Factor scales, and T-Scores of 60 and above on the Behavioral Concerns Scale indicate areas of concern.) We then compared the accuracy of these predictions with actual group membership. Table 3.4 presents the results of this study.

As shown in Table 3.4, low Total Protective Factors Scale scores correctly predicted group membership for 67% of the identified sample. Similarly, high Total Protective Factors Scale scores correctly predicted group membership for 71% of the Community Sample. Overall, the Total Protective Factors Scale score correctly predicted group membership for 69% of the children in this study. Significant chi-square analysis results ($X^2 = 26.49$, $df = 1$, $p < .001$) indicated that the Total Protective Factors Scale scores were significantly related to group membership.

### Table 3.4
### Actual and Predicted Group Membership for the DECA Validity Study

|  | Identified Sample | | Community Sample | |
| --- | --- | --- | --- | --- |
|  | n | % | n | % |
| Actual Group Membership | 95 | | 86 | |
| Predicted Group Membership | | | | |
|    Total Protective Factors | | | | |
|       TPF ≤ 40 | 64 | 67% | 25 | 29% |
|       TPF > 40 | 31 | 33% | 61 | 71% |
|    Behavioral Concerns | | | | |
|       BCS ≥ 60 | 74 | 78% | 30 | 35% |
|       BCS < 60 | 21 | 22% | 56 | 65% |

High scores on the Behavioral Concerns Scale correctly predicted group membership for 78% of the Identified Sample. Similarly, low scores on this scale correctly predicted group membership for 65% of the children in the Community Sample. Overall, the Behavioral Concerns Scale score correctly predicted group membership for 71% of the children in this study. Significant chi-square analysis results ($X^2 = 34.16$, $df = 1$, $p < .001$) indicated that the Behavioral Concerns Scale scores were significantly related to group membership. It should be noted that scores on the Total Protective Factors Scale were nearly as efficient in predicting which children had emotional and behavioral problems as scores on the Behavioral Concerns Scale (69% vs. 71%).

# Construct-Related Validity

Construct-related validity ascertains the degree to which the assessment instrument measures the theoretical construct of interest. In the case of the DECA, construct-related validity concerns the extent to which the DECA scale scores truly relate to resilience versus some other characteristic of preschool children.

Typically, construct validity is demonstrated by high correlations between scores on the instrument under investigation and scores on previously established measures of the same construct. Because no equivalent measure of within-child protective factors for preschool children exists, this commonly used approach is not possible with the DECA. As an alternative, construct validity can be established by demonstrating that the assessment instrument yields data that are consistent with predictions derived from the theory underlying the instrument. This approach was used in demonstrating the construct validity of the DECA.

Protective factors were defined in Chapter 1 of the *DECA User's Guide* as characteristics that moderate or buffer the negative effects of stress resulting in more positive behavioral and psychological outcomes in at-risk children than would have possible in their absence. Therefore, for similar levels of stress or risk, children with high protective factors as measured by the Protective Factor Scales of the DECA should have more positive behavioral outcomes as measured by the DECA Behavioral Concerns Scale. To test this hypothesis, we also had to obtain measures of childhood risk and stress for the 181 participants in the validity study.

A commonly used approach to measuring stress and risk in children and families is to inventory the major life events that the child has experienced, such as death of a parent, homelessness, or major illness. An alternative approach to measuring stress and risk is to assess "daily hassles," which are repetitive difficulties in daily living, such as transportation problems, family conflict, or financial difficulties. We used both approaches in this study.

Parents and family members, who provided the DECA ratings on the 181 subjects in the validity study, also completed a "Preschool Major Life Events Checklist" (adapted with permission from the *Life Events Checklist* (Work, Cowen, Parker & Wyman, 1990) and the *Sources of Stress Inventory* (Chandler, 1981)), as well as a "Preschool Daily Hassles Checklist" (adapted with permission from the *Daily Hassles Scale* (Kanner, Coyne, Schaefer & Lazarus, 1981)).

Raw scores from both risk assessment instruments were converted to T-scores. The two T-scores were then added together for each participant. The resulting sums were then converted to a "Total Risk Index" T-score. The Total Risk Index scores were then used to assign the 181 participants in the study to a High Risk Group (Total Risk Index score greater than or equal to 60) or a Low/Average Risk Group (T-score less than 60). Similarly, participants were assigned to a Low Protective Factor Group (Total Protective Factor Scale Score T-score less than or equal to 40) or an Average/High Protective Factor Group (T-score greater than 40). The relationship of Total Risk and Total Protective Factors to scores on the Behavioral Concerns Scale are presented in Figure 3.1 and Table 3.5.

**Figure 3.1 Mean Behavioral Concerns Scale *T*-Scores for Risk and Protective Factor Groups in DECA Construct Validity Study**
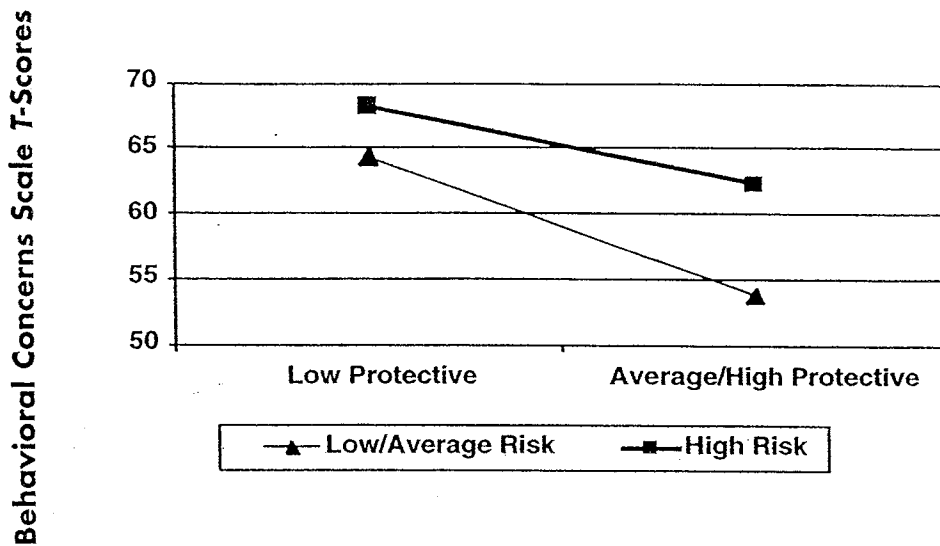


**Table 3.5**

**Mean Behavioral Concerns Scale *T*-Scores for Risk and Protective Factor Groups in DECA Construct Validity Study**

| Protective Factor Level | Risk Level | |
| --- | --- | --- |
| | Low/Average | High |
| Low | 64.3 | 68.2 |
| Average/High | 53.8 | 62.3 |

As shown in Figure 3.1, the results were consistent with resilience theory. The High Risk-Low Protective group had the highest mean score (*T* = 68.2) on the Behavioral Concerns Scale. The High Risk-Average/High Protective group's mean score was six points lower (*T* = 62.3). The Low/Average Risk-High Protective group had the lowest mean score (*T* = 53.8), a full one a half standard deviations lower than the High Risk-Low Protective group mean.

These results were examined using a 2-way ANOVA (Analysis of Variance). Main effects of both Total Risk ($F = 19.3$, $df = 1, 171$, $p < .001$; $eta = .101$) and Total Protective Factors ($F = 33.7$, $df = 1, 171$, $p < .001$; $eta = .165$) were found, and there was no interaction ($F = 2.8$, $p > .05$). These findings indicated that Protective Factors, as measured by the DECA, do indeed moderate risk. For children at both levels of risk, higher protective factor scores were associated with better outcomes than lower protective factor scores. These findings provide evidence that the DECA does measure protective factors related to resilience in young children. In addition, the higher $F$ and $eta$ (a measure of the degree of relationship between two variables) values for Protective Factors indicated that it was somewhat more strongly associated with Behavioral Concerns than the Total Risk Index.

# Summary

The studies reported in this chapter, when taken as a whole, provide convincing evidence that the DECA does measure what it purports to measure, namely, protective factors in preschool children. In the cross sectional research studies reported here, Protective Factor Scale scores were significantly associated with either the presence or absence of significant problem behaviors, a major negative outcome for preschool children. Most importantly, high protective factors were seen to moderate the effects of risk in preschool children as required by resilience theory.

The authors of the DECA and their colleagues at the Devereux Early Childhood Initiative have begun multi-year longitudinal research studies to clarify further the role of Initiative, Self-control, and Attachment as measured by the DECA in buffering preschool children from risk and in fostering healthy social and emotional growth. Until those results are available, however, early care and education professionals can utilize the DECA with confidence based on the studies reported here.
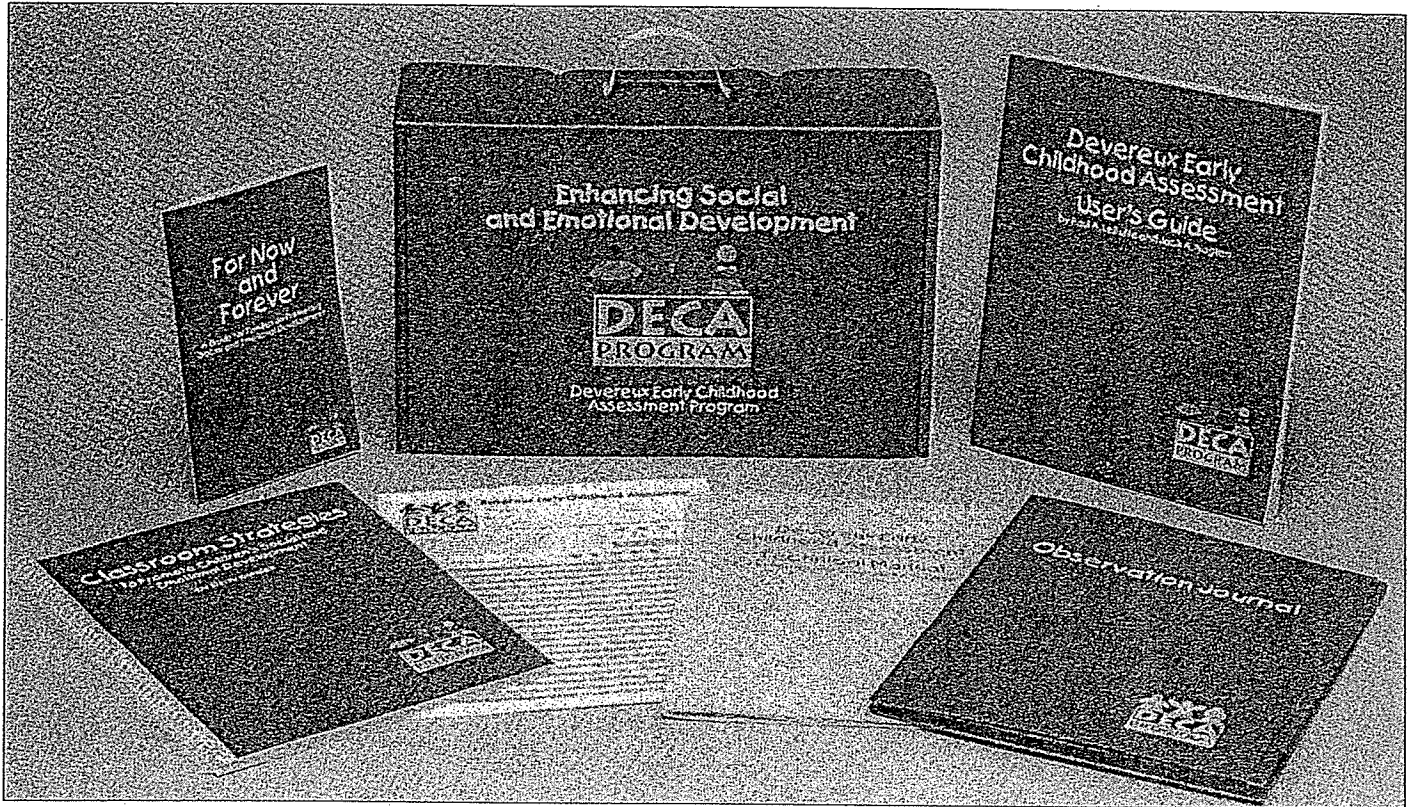
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