

Analysis of the Virginia Family Survey Data Addressing

Part C SPP/APR Indicator #4:

Final Report

Report prepared for the

The Social Science Research Center at Old Dominion University

Report prepared by: Randall D. Penfield

Date of Delivery: July 8, 2022

## TABLE OF CONTENTS

### **Section**

- 1 Executive Summary
- 2 Background
  - 2.1 Federal Requirements
  - 2.2 Survey Instrument
  - 2.3 Standards
- 3 Characteristics of the Sample Data
  - 3.1 Distribution of Race/Ethnicity in the Sample
  - 3.2 Distribution of Child's Gender in the Sample
- 4 Results Pertaining to Indicator #4
  - 4.1 Distribution of IFS Measures
  - 4.2 Interpretation of the Mean IFS measure
  - 4.3 Percentage Meeting Each of the Standards for Indicator #4
  - 4.4 Percentage Meeting Each of the Standards by Race/Ethnicity
  - 4.5 Percentage Meeting Each of the Standards by Program Location
  - 4.6 Comparison to 2021 Outcomes
- 5 Measurement Framework for the IFS
- 6 Results Pertaining to the Psychometric Properties of the Impact on Families Scale (IFS)
  - 6.1 Psychometric Properties of the IFS Measures
  - 6.2 Psychometric Properties of the IFS Items

7 Results of the Four Items Pertaining to the Family's Experience in Early Intervention

8 Calibration Methodology for the IFS

References

Appendix A: Item Response Frequencies for the Survey Items

Appendix B: Control File for the Winsteps Rasch Analysis of the IFS

Appendix C: Winsteps Output File of the IFS

## SECTION 1

### EXECUTIVE SUMMARY

In accordance with federal reporting requirements mandated by the U.S. Department of Education, Office of Special Education Programs (OSEP), Part C Lead Agencies under the Individuals with Disabilities Education Act must report annually on 14 performance indicators related to early intervention services for children ages birth to three. This report presents findings of a survey conducted by the State of Virginia to address Indicator #4, the “percent of families participating in Part C who report that early intervention services have helped the family a) know their rights, b) effectively communicate their children’s needs, and c) help their children develop and learn.”

The survey administered by the State of Virginia included one rating scale developed and validated by the National Center for Special Education Accountability Monitoring (NCSEAM), and four additional items pertaining to the family’s experience with early interventions. The 22-item Impact on Family Scale (IFS) measures the extent to which early intervention helped families achieve positive outcomes, including the three outcomes specified in Indicator #4.

Surveys were returned by 1,869 families receiving early intervention services. From these responses, a random sample of 1,262 families reflecting the distribution of race/ethnicity in the larger population was selected for data analysis.

Data from the IFS were analyzed through the Rasch measurement framework, which produces a measure for each survey respondent. Individual measures can range from 0 to 1,000. For the IFS, each family’s measure reflects the extent to which the family perceives that early intervention has helped them achieve positive family

outcomes. The IFS measures of all respondents were averaged to yield a mean measure reflecting the overall performance of the state in regard to the impact of early intervention on family outcomes.

As noted above, OSEP requires that the state's performance be reported as the *percent* of families who report that early intervention services helped them achieve specific outcomes. Deriving a percent from a continuous distribution requires application of a standard, or cut-score. The State of Virginia elected to apply the Part C standards recommended by a nationally representative stakeholder group convened by NCSEAM. The recommended standards, established based on item content expressed in the scale, were as follows: for Indicator 4a, know their rights, a measure of 539; for Indicator 4b, effectively communicate their children's needs, a measure of 556; and for Indicator 4c, help their children develop and learn, a measure of 516.

The following points represent the major findings related to Indicator #4:

### **1. Statewide Mean Measure on the IFS**

The mean measure on the IFS was 664.3. The standard deviation was 166.5, and the standard error of the sample mean was 4.7. The 95% confidence interval for the population mean was 655.1 – 673.5. This means that there is a 95% likelihood that the true value of the mean is between these two values.

### **2. Statewide Percent on Indicators 4a, 4b, and 4c**

The percent of families who reported that early intervention services helped them *know their rights* (Indicator 4a) was 77.7. The 95% confidence interval for the true population percentage is 75.3% – 79.9%. This means that there is a 95% likelihood that the true value of the state percentage for Indicator 4a is between these two values.

The percent of families who reported that early intervention services helped them *communicate their child's needs* (Indicator 4b) was 74.0%. The 95% confidence interval for the true population percentage is 71.5% - 76.3%.

The percent of families who reported that early intervention services helped them *help their child develop and learn* (Indicator 4c) was 87.5%. The 95% confidence interval for the true population percentage is 85.6% - 89.2%.

### **3. Comparison to 2021 Outcomes**

The observed percentage of families meeting the standards for Indicators 4a, 4b, and 4c were slightly higher than those obtained for a sample of families measured in 2021 who were administered the same version of the IFS as was used for the 2022 reporting. Specifically, the observed percentages of 77.7%, 74.0%, and 87.5% for Indicators 4a, 4b, and 4c in 2022 exceeded the values of 76.5%, 73.1%, and 86.3% observed in 2021.

### **4. Items Pertaining to the Family's Experience in Early Intervention**

The percentage of families responding that they agreed, strongly agreed, or very strong agreed was at or above 95% for each of the four items pertaining to the family's experience in receiving early intervention services. The percentage of families responding that they strongly agreed or very strongly agreed exceeded 75% for each of the four items.

## **SECTION 2**

### **BACKGROUND**

#### 2.1. Federal Requirements

State Lead Agencies under Part C of the Individuals with Disabilities Education Improvement Act (IDEA 2004) are currently required to report data annually addressing 14 key performance indicators. Each state was required to submit a State Performance Plan (SPP) to OSEP detailing its plan to collect data addressing the 14 indicators, as well as baseline data for indicators on which the states had previously been required to report data to the federal government. Indicator #4, the “percent of families participating in Part C who report that early intervention services have helped the family: (a) know their rights, (b) effectively communicate their children’s needs, and (c) help their children develop and learn,” is a new indicator in the federal accountability system. Thus, states did not have to report baseline data on this indicator until February 2007.

State-level performance on the indicator must be reported annually. Data on program-level performance on the indicator must be collected at least once in the 6-year period of the SPP.

#### 2.2. Survey Instrument

The Impact on Family Scale (IFS) was developed by the National Center for Special Education Accountability Monitoring (NCSEAM) to provide states with valid and reliable instruments to measure positive outcomes that families experience as a result of their participation in early intervention. Items were developed with substantial input from families and other key stakeholders across the country.

As part of its National Item Validation Study, NCSEAM collected data from a nationally representative sample of over 1,700 families participating in early intervention. Results of NCSEAM's data analyses supported the high reliability and validity of both scales. It was determined that scale reliabilities of .90 or above could be achieved with 22 items for the IFS. NCSEAM provided states with an appropriate sample item set for each scale, as well as instructions for customizing the scales by drawing on the larger bank of piloted items that NCSEAM made available on its website.

### 2.3. Standards

The State of Virginia elected to apply the standards recommended by NCSEAM as a way of deriving the percents to be reported for Indicators 4a, 4b, and 4c. To establish a recommended standard, NCSEAM convened a group of nationally representative stakeholders, including parents of children with disabilities, state directors of special education, state early intervention coordinators, district and program personnel, advocates, attorneys, and community representatives. Participants were invited to examine a set of items from the IFS, laid out in their calibration order (see Table 4.2). The items towards the bottom of the scale, having lower calibrations, are items that families tend to agree with most. The items towards the top of the scale, having higher calibrations, are items that families tend to agree with least. Because of the robust structure of the scale, a respondent who agrees with a given statement will have a very high likelihood of agreeing, or agreeing even more strongly, with all the items below it on the scale.

For indicator 4a, the stakeholder group agreed that families needed to endorse all items up to and including the item, "Over the past year, early intervention services



have helped me and/or my family know about my child's and family's rights concerning Early Intervention services.” For indicator 4b, the stakeholder group agreed that families needed to endorse all items up to and including the item, “Over the past year, early intervention services have helped me and/or my family communicate more effectively with the people who work with my child and family. For indicator 4c, the stakeholder group agreed that families needed to endorse all items up to and including the item, “Over the past year, early intervention services have helped me and/or my family understand my child's special needs.” These standards were operationalized by designating as the numerical standard the measure that, in each case, corresponds to the threshold item's calibration. For indicators 4a, 4b, and 4c, the measures representing the standards are 539, 556, and 516, respectively. This ensures that in each case, families with a measure at or above the standard have a .95 likelihood of agreeing with the threshold item.

## SECTION 3

### CHARACTERISTICS OF THE SAMPLE DATA

Surveys were returned by 1,869 families. A random sample of 1,262 cases was drawn to yield a final sample with a distribution of race/ethnicity that was representative of that observed in the population of families served under Part C for the State of Virginia.

#### 3.1. Distribution of Race/Ethnicity in the Sample

The two tables below display the distribution of race/ethnicity in the total survey sample of 1,869 (Table 3.1), and the representative sample of 1,262 (Table 3.2). As can be seen in the Table 3.2, the distribution of race/ethnicity in the representative sample is highly reflective of the distribution of race/ethnicity in the population of families receiving early intervention services in Virginia.

<b>Table 3.1. Distribution of Child's Race/Ethnicity in the Total Sample</b>		
<b>Gender</b>	<b>N</b>	<b>Percentage</b>
White	1056	56.5%
Black or African-American	252	13.5%
Hispanic or Latino	164	8.8%
Asian	94	5.0%
American Indian or Alaskan Native	5	0.3%
Pacific Islander or Hawaiian Native	4	0.2%
Two or more races	274	14.7%
Missing	20	1.1%
Total	1869	100%

**Table 3.2. Distribution of Child's Race/Ethnicity in the Representative Sample**

<b>Gender</b>	<b>N</b>	<b>Percentage</b>
White	654	51.8%
Black or African-American	251	19.9%
Hispanic or Latino	149	11.8%
Asian	63	5.0%
American Indian or Alaskan Native	1	0.1%
Pacific Islander or Hawaiian Native	2	0.2%
Two or more races	142	11.3%
<b>Total</b>	<b>1262</b>	<b>100%</b>

Note. The distribution of race/ethnicity for the children receiving early intervention services in Virginia under Part C are: White = 51.82%, Black/African American = 19.93%, Hispanic or Latino = 11.80%, Asian = 4.97%, American Indian or Alaskan Native = 0.08%, Pacific Islander of Hawaiian Native = 0.13%, Two or more races = 11.28%.

### 3.2. Distribution of Child's Gender in the Sample

Tables 3.4 and 3.5, below, display the distribution of child's gender in the total and representative samples, respectively.

<b>Table 3.4. Distribution of Child's Gender in the Total Sample</b>		
<b>Gender</b>	<b>N</b>	<b>Percentage</b>
Male	1132	60.6%
Female	687	36.8%
Missing	50	2.7%
Total	1869	100%

<b>Table 3.5. Distribution of Child's Gender in the Representative Sample</b>		
<b>Gender</b>	<b>N</b>	<b>Percentage</b>
Male	788	62.4%
Female	448	35.5%
Missing	26	2.1%
Total	1262	100%

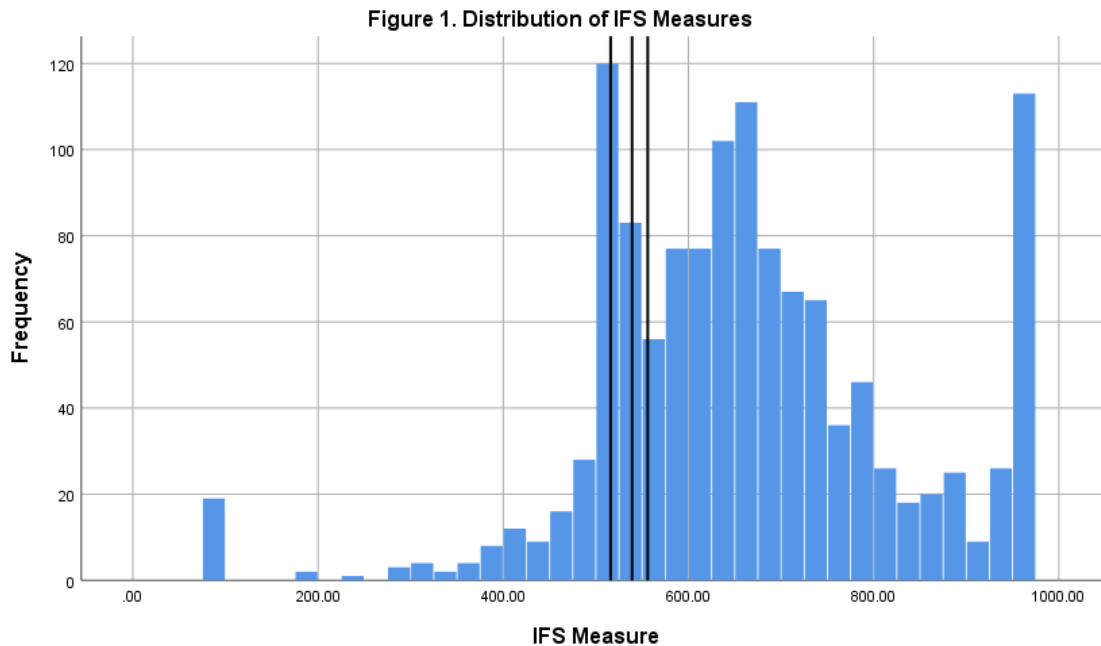
## SECTION 4

### RESULTS PERTAINING TO INDICATOR #4

#### 4.1 Distribution of IFS Measures

Of the 1,262 respondents in the representative sample, all had valid responses to the IFS. The distribution of IFS measures for the 1,262 respondents is shown in the figure below.

Each bar indicates the number of respondents with measures at the value indicated on the x-axis. The vertical black lines correspond to the three standards applied to Indicator 4a (539), 4b (556), and 4c (516).



As can be seen in Figure 1, the values representing the three standards lie in the lower half of the measure distribution. That is, the majority of respondents reported a level of impact (i.e., had an IFS measure) that exceeded the three standards.

The distribution of measures approximates a normal distribution, with two exceptions. The first exception is the unexpectedly high number of respondents with measures at the extreme positive end of the scale, represented by the high bar at the extreme right of the graph. These individuals responded in the “very strongly agree” category to each and every item. The second exception is the unexpectedly high number of respondents with measures at a value close to the standard values, represented by the high bar at the lowest standard value. Many of these individuals responded in the “agree” category to each and every item.

The statistical properties of the IFS measures are displayed in Table 4.1 below.

<b>Table 4.1. Properties of IFS Measures for the Representative Sample</b>			
<b>Sample Mean</b>	<b>Standard Deviation</b>	<b>Standard Error of the Sample Mean</b>	<b>95% Confidence Interval for the Population Mean</b>
664.3	166.5	4.7	655.1 – 673.5

#### 4.2. Interpretation of the Mean IFS Measure

The state’s performance on the IFS conveys information that goes beyond the three outcomes that are addressed in OSEP’s Indicator #4. A mean measure of 664.3 on the IFS indicates that the Virginia early intervention system is helping families to achieve many positive outcomes. These positive outcomes are evident from the response percentages displayed in Table 4.2, below. (The table also displays each item’s calibration value, to be discussed in Section 5.)

**Table 4.2. Percent of Families Expressing Agreement with IFS Items**

Item Calibration	Item <i>Stem:</i> Over the past year, Early Intervention services have helped me and/or my family:	% Strongly/ Very strongly agree	% Agree in any category
678	...participate in typical activities for children and families in my community.	50%	84%
656	...know about services in my community.	49%	87%
640	...know where to go for support to meet my FAMILY's needs.	52%	89%
625	...keep up friendships for my child and family.	46%	84%
609	...know where to go for support to meet my CHILD's needs.	60%	93%
577	...find information I need.	53%	92%
570	...improve my family's quality of life.	61%	94%
565	...feel that I can get the services and supports that my child and family need.	63%	94%
559	...feel more confident in my skills as a parent.	63%	94%
559	...feel that my child will be accepted and welcomed in the community.	62%	95%
557	...know how to make changes in family routines that will benefit my child.	63%	94%
556	...communicate more effectively with the people who work with my child and family.	63%	94%
554	...feel more confident in finding ways to meet my child's needs.	66%	95%
553	...understand how the Early intervention system works.	60%	94%
546	...feel that I can handle the challenges of parenting my child with his/her needs.	65%	95%
546	...understand the roles of the people who work with my child and family.	62%	95%
540	...figure out solutions to problems as they come up.	61%	95%
539	...know about my child's and family's rights concerning Early Intervention services.	58%	94%
534	...be able to evaluate how much progress my child is making.	65%	95%
526	...understand my child's needs.	68%	96%
498	...feel that my efforts are helping my child.	71%	96%

498	...do things with and for my child that are good for my child's development.	72%	96%
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As seen in the table, over 96% of families agreed, with over 68% expressing strong or very strong agreement, that early intervention helped them do things with and for their child that are good for their child's development, feel that their efforts are helping their child, and understand their child's special needs.

Over 94% of families agreed, with somewhat over 60% expressing strong or very strong agreement, that early intervention helped them be able to evaluate how much progress their child is making, figure out solutions to problems as they come up, understand the roles of the people who work with their child and family, understand how the early intervention system works, and communicate more effectively with the people who work with their child and family.

Approximately 94% of families agreed, with over 62% expressing strong or very strong agreement, that early intervention helped them feel that their family will be accepted and welcomed in the community, feel that they can get the services and supports that their child and family need, and improve their family's quality of life.

Approximately 84% of families agreed, with about 46% expressing strong or very strong agreement, that early intervention helped them keep up friendships for their child and family. 84% of families agreed, with 50% expressing strong or very strong agreement, that early intervention helped them participate in typical activities for children and families in their community.



For reference, the frequency distribution of responses to all the items in the IFS is provided in Appendix A.

#### 4.3. Percentage Meeting Each of the Standards for Indicator #4

All 1,262 respondents in the representative sample had an IFS measure. Table 4.3 presents the percentage of these 1,262 respondents in the representative sample for which the IFS measure meets or exceeds each of the three standards for Indicator #4, as well as a 95% confidence interval for the true population percentage. Note that the confidence interval is asymmetric about the sample percentage, in that there is a greater distance in the confidence interval below the sample percentage than above the sample percentage. The asymmetric confidence interval represents a more accurate confidence interval for percentages than normal-distribution based symmetric confidence intervals (due to the fact that percentages are bounded between 0 and 100). The asymmetric confidence interval reported here is the Score interval proposed by Wilson (1927), and described in greater detail in Agresti (1996) and Penfield (2003).

<b>Table 4.3. Percent of Respondents Meeting or Exceeding Each of the Standards for Indicator #4 (Using Representative Sample of n = 1,262)</b>			
	<b>Indicator 4A</b> Percent of families who report that early intervention services helped them know their rights	<b>Indicator 4B</b> Percent of families who report that early intervention services helped them effectively communicate their children's needs	<b>Indicator 4C</b> Percent of families who report that early intervention services helped them help their child develop and learn
<b>Percentage</b>	77.7%	74.0%	87.5%
	980 of 1262 met standard	934 of 1262 met standard	1104 of 1262 met standard
<b>95% Confidence Interval</b>	75.3% - 79.9%	71.5% – 76.3%	85.6% – 89.2%

#### 4.4 Percentage Meeting Each of the Standards by Race/Ethnicity

Table 4.4. presents the percentage of respondents with IFS measures that met or exceeded each of the three standards, by racial/ethnic category.

<b>Table 4.4. Percent of Respondents Meeting or Exceeding Each of the Standards for Indicator #4%, by Race/Ethnicity</b>			
<b>Race/Ethnicity</b>	<b>Indicator 4A Percent of families who report that early intervention services helped them know their rights</b>	<b>Indicator 4B Percent of families who report that early intervention services helped them effectively communicate their children’s needs</b>	<b>Indicator 4C Percent of families who report that early intervention services helped them help their child develop and learn</b>
White (N = 1055)	77.6%  95% CI: 75.0% - 80.0%	73.1%  95% CI: 70.3% - 75.7%	86.2%  95% CI: 83.9% - 88.1%
Black or African American (N = 251)	80.1%  95% CI: 74.7% - 84.6%	76.5%  95% CI: 70.9% - 81.3%	87.7%  95% CI: 83.0% - 91.2%
Hispanic or Latino (N = 163)	69.9%  95% CI: 62.5% - 76.5%	68.1%  95% CI: 60.6% - 74.8%	85.9%  95% CI: 79.7% - 90.4%
Asian (N = 94)	81.9%  95% CI: 72.9% - 88.4%	80.9%  95% CI: 71.7% - 87.5%	91.5%  95% CI: 84.1% - 95.6%
American Indian Or Alaskan Native (N = 5)	80.0%  95% CI: 37.6% - 96.4%	80.0%  95% CI: 37.6% - 96.4%	100%  95% CI: ---

Pacific Islander Or Hawaiian Native (N = 4)	75.0%  95% CI: 30.1% - 95.4%	75.0%  95% CI: 30.1% - 95.4%	75.0%  95% CI: 30.1% - 95.4%
Two or More Races (N = 273)	77.7%  95% CI: 72.4% - 82.2%	73.3%  95% CI: 67.7% - 78.2%	89.4%  95% CI: 85.2% - 92.5%

#### 4.5. Percentage Meeting Each of the Standards by Program Location

Table 4.5 presents the percentage of respondents with IFS measures that met or exceeded each of the three standards, by program location.

<b>Table 4.5. Percent of Respondents Meeting or Exceeding Each of the Standards for Indicator #4%, by Program Location</b>				
Program Location	N	Indicator 4A	Indicator 4B	Indicator 4C
Alexandria	22	82%	73%	82%
Alleghany Highlands	5	--	--	--
Arlington	26	81%	81%	81%
Augusta-Highland	21	76%	76%	86%
Blue Ridge	60	73%	73%	82%
Central Virginia	51	73%	67%	80%
Chesapeake	44	89%	84%	95%
Chesterfield	101	72%	69%	88%
Crater District	22	77%	64%	91%
Cumberland Mountain	22	77%	77%	100%
Danville Pittsylvania	21	81%	81%	90%
Dilenowisco	22	86%	86%	100%
Eastern Shore	19	79%	79%	89%
Fairfax	361	77%	74%	86%
Goochland-Powhatan	9	100%	89%	100%
Hampton-Newport News	47	62%	55%	81%

Hanover	35	83%	77%	94%
Harrisonburg-Rockingham	34	82%	82%	88%
Heartland	39	67%	64%	95%
Henrico	46	70%	61%	80%
Highlands	19	89%	84%	95%
Loudoun	125	76%	71%	86%
Middle Peninsula Northern Neck	22	73%	59%	86%
Mount Rogers	24	79%	79%	92%
New River Valley	35	83%	80%	94%
Norfolk	84	79%	76%	83%
Piedmont	29	83%	79%	90%
Portsmouth	43	79%	72%	88%
Prince William	69	75%	65%	87%
Rappahannock Area	59	85%	81%	88%
Rappahannock Rapidan	19	79%	74%	79%
Richmond	37	84%	78%	86%
Roanoke Valley	40	85%	85%	95%
Rockbridge Area	23	74%	70%	96%
Shenandoah Valley	50	74%	72%	80%
Southside	17	76%	76%	82%
Staunton-Waynesboro	19	79%	74%	84%
Virginia Beach	69	75%	74%	83%
Western Tidewater	34	76%	71%	85%
Williamsburg	40	78%	73%	88%

#### 4.6. Comparison to 2021 Outcomes

Table 4.6 presents the observed percentage of families meeting indicators 4a, 4b, and 4c, along with the values obtained for the representative sample in the 2021 study. Across all three indicators, the obtained percentage of families meeting the indicator was slightly higher in the 2022 study than what was found in the 2021 study.

**Table 4.6. Comparing the Obtained Outcomes in 2022 to the Values Obtained in 2021**

	<b>Target % for Indicator 4A Percent of families who report that early intervention services helped them know their rights</b>	<b>Target % for Indicator 4B Percent of families who report that early intervention services helped them effectively communicate their children’s needs</b>	<b>Target % for Indicator 4C Percent of families who report that early intervention services helped them help their child develop and learn</b>
<b>Obtained Outcomes in 2022 for Representative Sample</b>	77.7%	74.0%	87.5%
<b>Obtained Outcomes in 2021 for Representative Sample</b>	76.5%	73.1%	86.3%

## SECTION 5

### MEASUREMENT FRAMEWORK FOR THE IFS

The measurement approach used by NCSEAM, known as the Rasch framework, applies a series of parametric models to estimate the properties of each survey item and each respondent in a way that places individuals and items on a common metric (Bond & Fox, 2001; Fischer & Molenaar, 1995; Rasch, 1960; Wright & Masters, 1982). The Rasch approach offers many advantages over typical approaches to survey development. First, it is possible to test whether the items administered belong together, that is, whether they are all related to the construct that the scale is supposed to measure. Ongoing confirmation of the fit of the items helps to maintain the quality of the measurement system. It is also possible to test whether the response categories are operating in the expected fashion. Often, the way in which respondents actually use the response categories does not correspond to the equidistant way in which they are laid out on paper. Extreme categories (e.g., “very strongly disagree”) are sometimes used so infrequently that it makes sense to combine them with an adjacent, less extreme, category (“very strongly disagree/strongly disagree”).

Second, it is possible to determine where each item is located on the measurement ruler. The item’s location is referred to as the item’s “calibration.” Typically, items in a test or survey are not all equal with respect to the amount of the attribute or quality that the items are measuring. It has been empirically demonstrated, in fact, that items in the IFS are not all of equal agreeability. Items

range from those that are most likely to draw agree responses to those that are least likely to draw agree responses. Highly agreeable items have low calibrations; less agreeable items have higher calibrations. Table 5.1, below, displays the IFS items in calibration order.

<b>Table 5.1. IFS Items in Calibration Order</b>	
<b>Item Calibration</b>	<b>Item <u>Stem</u>: Over the past year, Early Intervention services have helped me and/or my family:</b>
678	...participate in typical activities for children and families in my community.
656	...know about services in my community.
640	...know where to go for support to meet my FAMILY's needs.
625	...keep up friendships for my child and family.
609	...know where to go for support to meet my CHILD's needs.
577	...find information I need.
570	...improve my family's quality of life.
565	...feel that I can get the services and supports that my child and family need.
559	...feel more confident in my skills as a parent.
559	...feel that my child will be accepted and welcomed in the community.
557	...know how to make changes in family routines that will benefit my child.
556	...communicate more effectively with the people who work with my child and family.
554	...feel more confident in finding ways to meet my child's needs.
553	...understand how the Early intervention system works.
546	...feel that I can handle the challenges of parenting my child with his/her needs.
546	...understand the roles of the people who work with my child and family.
540	...figure out solutions to problems as they come up.
539	...know about my child's and family's rights concerning Early Intervention services.
534	...be able to evaluate how much progress my child is making.
526	...understand my child's needs.
498	...feel that my efforts are helping my child.
498	...do things with and for my child that are good for my child's development.



The fact that items have highly stable calibrations (agreeability levels) regardless of the population that is asked to respond to the items is a very important attribute of well-constructed measurement scales. This stability means that items with similar calibrations are, for all intents and purposes, interchangeable. As an example, this is why the SAT is the “same” test each time it is administered, even though it contains different items each time. The score achieved on any particular version of the SAT is comparable to the score achieved on any other version. Thus, a state can change some of the items on the survey from year to year, and still have validly comparable IFS measures across successive years.

Third, a Rasch analysis condenses information from a person’s responses to all the items in a scale into a single number. That number is the person’s measure on the scale. Since the Rasch framework puts measures on the same metric as item calibrations, a person’s measure on a scale can be meaningfully interpreted in terms of the items on the scale. A person with a higher measure is expressing more agreement with items, overall, than a person with a lower measure. When IFS measures from a representative sample of parents are aggregated, the average value represents a reliable and highly interpretable measure of the extent to which schools are facilitating parent involvement.

Fourth, a Rasch analysis yields an estimate of the reliability of both the calibration values (related to the items) and the measures (related to people’s responses). Scientific approaches to measurement require that the amount of

“error,” or imprecision, in the system be estimated, so that interpretations based on the measures can take this into consideration.

For a more detailed explanation of these concepts, please refer to Bond and Fox (2001) and Wright and Masters (1982).

## SECTION 6

### RESULTS PERTAINING TO THE PSYCHOMETRIC PROPERTIES OF THE IMPACT ON FAMILIES SCALE (IFS)

#### 6.1 Psychometric Properties of the IFS Measures

In assessing the quality of the person-level measures derived from the IFS, it is germane to consider the issues of reliability and validity. The reliability of the obtained IFS measures pertains to the extent to which a particular individual is expected to attain the same IFS measure if the IFS were to be administered to the individual multiple times. That is, reliability concerns the stability of the IFS measure<sup>1</sup> (Crocker & Algina, 1986; Lord, 1980; Traub, 1994); low reliability coincides with a low level of stability, and high reliability coincides with a high level of stability. Reliability can range from 0 (lack of any stability) to 1 (perfect stability). In contrast to reliability, the validity of the IFS measures concerns the extent to which they are actually representative of the intended trait (i.e., level of impact on family).<sup>2</sup> The validity of the IFS measures can be assessed using numerous approaches, several of which are described below.

Statistics used to express measurement reliability range from 0 (indicating lack of any stability) to 1 (indicating perfect stability). The reliability of the IFS

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<sup>1</sup> A definition of reliability that is more theoretically accurate describes reliability as the extent to which a given respondent's measure is determined by random error versus his or her true level of the trait being measured; low reliability coincides with a high level of measurement error, and high reliability coincides with a high low level of measurement error (Crocker & Algina, 1986; Lord, 1980; Traub, 1994).

<sup>2</sup> This definition of validity is a simplification of the definition now endorsed by the technical measurement community. The contemporary definition of validity describes it as the extent to which evidence and theory support the interpretations of the scale measures entailed by the proposed use of the scale (AERA/APA/NCME, 2014; Osterlind, 2006). That is, the validity of the IFS measures is based on how much evidence we have that the measures support the intended purposes of the use of the measures (i.e., are the measures behaving as they are supposed to behave, and leading to the correct decisions about individuals).

measures for the Virginia sample was measured in the Rasch framework to be .92. An alternative approach to estimating the reliability of the IFS measures is to employ Cronbach's alpha, which makes no assumptions about the fit of the responses to any particular model (Cronbach's alpha is based on the simpler true score model, and is commonly used in the behavioral sciences as a model-free index of reliability). The value of Cronbach's alpha was 0.97, which is consistent with the value of .92 obtained from the Rasch analysis. These results suggest that the measures obtained from the IFS serve as stable measures of the underlying trait.

Support for the validity of the measures obtained by the IFS comes from several lines of evidence. First, items for the IFS were developed in consultation with multiple groups of individuals, including parents, school personnel, district-level administrators, and advocates, with direct and extensive experience related to schools' efforts to encourage parent involvement and to ensure that parents are active participants in decision-making related to their child's education. Subsequent review of the items by expert panels, researchers, and NCSEAM's Parent/Family Involvement Workgroup confirmed that the item content maps onto the intended content domain of the IFS. Second, dimensionality analysis (i.e., principal components analysis and factor analysis) indicates that the items of the IFS are all measuring one primary construct, which is likely the intended one, i.e., positive family outcomes achieved as a result of early intervention services. A third line of evidence is related to a characteristic of items known as discrimination, discussed in section 6.1 below. The high discrimination indices of

the IFS items (see Table 6.1) indicate that the items are providing useful information concerning the construct that is intended to be measured. All of these types of evidence support the claim that the measures obtained using the IFS are valid.

## 6.2 Psychometric Properties of the IFS Items

Table 6.1, below, gives the calibration of each item (previously presented in Table 5.1 above), along with indices of the item's fit to the Rasch model. The column labeled "Item Calibration" provides the value of the location parameter of the item. The higher the value of the item calibration, the greater the overall positive impact of early intervention services on family outcomes. The "Infit" and "Outfit" columns provide two measures of how well the Rasch model fits the responses provided to each item. In general, values of 1.0 indicate very good fit. Values approaching 2 suggest poorer fit (Bond & Fox, 2001).

<b>Table 6.1. Calibration, Fit, and Discrimination of the IFS Items</b>				
<b>Item</b>	<b>Item Calibration</b>	<b>Infit</b>	<b>Outfit</b>	<b>Discrimination</b>
Q1	677.5	2.46	2.71	0.71
Q2	656.0	1.75	2.41	0.74
Q3	569.8	1.15	1.27	0.78
Q4	608.8	1.12	1.11	0.81
Q5	639.8	1.19	1.18	0.81
Q6	545.9	0.89	0.93	0.82
Q7	559.3	0.85	0.97	0.82
Q8	624.8	1.29	1.42	0.80
Q9	576.8	0.89	0.85	0.84
Q10	556.8	0.81	0.85	0.83
Q11	540.4	0.85	0.95	0.84
Q12	564.5	0.72	0.69	0.84
Q13	552.9	1.07	1.23	0.80
Q14	534.4	0.87	0.91	0.82

Q15	559.1	0.90	0.95	0.81
Q16	553.9	0.58	0.59	0.85
Q17	555.9	0.75	0.73	0.84
Q18	545.5	0.79	0.76	0.84
Q19	538.9	1.25	1.40	0.80
Q20	497.8	0.81	0.76	0.81
Q21	526.1	0.69	0.66	0.83
Q22	498.1	0.94	0.93	0.80

The rightmost column of the table presents an index of discrimination for each item, calculated as the item-measure correlation coefficient. The values in this column are all relatively high ( $> 0.7$ ), indicating that each item is discriminating well between respondents who had more positive versus more negative perceptions of schools' facilitation of parent involvement.

While Item Q1 ("Over the past year, early intervention services helped me and/or my family participate in typical activities for children and families in my community") displays a less than ideal level of fit, it nevertheless has a strong discrimination index, which provides evidence that it is a useful item. Therefore, this item appears to be measuring the intended construct relatively well, but is not a very good fit for the Rasch framework, which employs specific assumptions concerning the properties of the items.

## SECTION 7

### RESULTS OF THE FOUR ITEMS PERTAINING TO THE FAMILY'S EXPERIENCE IN EARLY INTERVENTION

The survey contained four items that were not part of the IFS, but that addressed family's experiences with the early intervention services they received. These items were:

1. What I say about my child and family is understood and respected.
2. The people who work with my child and family answer our questions.
3. I can easily get in touch with my service coordinator.
4. The services provided to my child and family help reach the outcomes/goals that are important to my family.

Table 7.1 displays the percentage of families reporting: (a) strongly or very strongly agreeing with each of the four items, and (b) any category of agree for each of the four items. Across the four items, the percentage of families strongly or very strongly agreeing met or exceeded 75%, and the percentage of families agreeing in any category met or exceeded 95%. The percentage of respondents in each of the possible response categories for each item is displayed in Appendix A.

**Table 7.1. Percent of Families Expressing Agreement with Items Pertaining to Experiences with Early Interventions**

<b>Item</b>	<b>% Strongly/ Very strongly agree</b>	<b>% Agree in any category</b>
What I say about my child and family is understood and respected.	75%	97%
The people who work with my child and family answer our questions.	78%	97%
I can easily get in touch with my service coordinator.	77%	96%
The services provided to my child and family help reach the outcomes/goals that are important to my family.	75%	95%



## SECTION 8

### CALIBRATION METHODOLOGY FOR THE IFS

The Rasch calibrations of the IFS were conducted using the Winsteps software program. All items were fit using the Rating Scale Model (Wright & Masters, 1982). The metric of the current calibration was set by fixing the parameters of all items to those obtained in the previous year's analysis. Note that previous calibrations fixed the parameters for 18 of the 22 items to calibrated values obtained by Dr. William Fisher, Consultant to NCSEAM, for a large dataset of five states. Four new items were added to the IFS scale (Items 6, 10, 16, and 21), and the parameters of these four items were estimated during an initial calibration of the updated IFS scale in the 2012 equating study. The parameters of the IFS items for this year's analysis were fixed to those established in the 2012 equating study. The mean and logit scale of the current calibration were also set equal to those generated in the larger analysis on five states conducted by Dr. Fisher. These equating procedures were conducted so that the scale measures obtained in the current calibration have equivalent meanings across multiple years and to those of other states' data calibrated by Dr. Fisher.

Based on the analysis of the current data and on the results of Dr. Fisher's combined multi-state analysis, it was decided to combine the response categories "very strongly disagree" and "strongly disagree" into a single category. The rationale for combining the two categories was based on two factors: (a) low response rates (i.e., < 5%) in these two categories making their corresponding

threshold parameter estimates relatively unstable, and (b) the two category threshold estimates were not far enough apart to indicate that the two categories served to meaningfully distinguish between individuals having substantially different levels of the trait being measured. As a result, the final analysis was based on five-category response structure for each item. The control file used in the current analysis is given in Appendix B. The pertinent output related to the Rasch analysis of the IFS is given in Appendix C.

## REFERENCES

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Appendix A: Item Response Frequencies for the Items of the Survey

**...participate in typical activities for children and families in my community.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	54	2.9	2.9	2.9
	Strongly disagree	26	1.4	1.4	4.3
	Disagree	143	7.7	7.7	12.0
	Agree	488	26.1	26.3	38.4
	Strongly agree	266	14.2	14.4	52.8
	Very strongly agree	452	24.2	24.4	77.2
	Does not apply	423	22.6	22.8	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**...know about services in my community.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	51	2.7	2.8	2.8
	Strongly disagree	22	1.2	1.2	3.9
	Disagree	148	7.9	8.0	11.9
	Agree	632	33.8	34.1	46.1
	Strongly agree	383	20.5	20.7	66.7
	Very strongly agree	439	23.5	23.7	90.4
	Does not apply	177	9.5	9.6	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**...improve my family's quality of life.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	39	2.1	2.1	2.1
	Strongly disagree	10	.5	.5	2.6
	Disagree	53	2.8	2.9	5.5
	Agree	579	31.0	31.2	36.8
	Strongly agree	454	24.3	24.5	61.3
	Very strongly agree	608	32.5	32.8	94.1
	Does not apply	110	5.9	5.9	100.0
	Total	1853	99.1	100.0	
Missing	System	16	.9		
Total		1869	100.0		

**...know where to go for support to meet my CHILD's needs.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	15	.8	.8	3.0
	Disagree	67	3.6	3.6	6.6
	Agree	590	31.6	31.9	38.5
	Strongly agree	458	24.5	24.7	63.2
	Very strongly agree	603	32.3	32.6	95.8
	Does not apply	78	4.2	4.2	100.0
	Total	1851	99.0	100.0	
Missing	System	18	1.0		
Total		1869	100.0		

**...know where to go for support to meet my FAMILY's needs.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.2	2.3	2.3
	Strongly disagree	19	1.0	1.0	3.3
	Disagree	123	6.6	6.7	10.0
	Agree	598	32.0	32.3	42.3
	Strongly agree	398	21.3	21.5	63.8
	Very strongly agree	463	24.8	25.0	88.9
	Does not apply	206	11.0	11.1	100.0
	Total	1849	98.9	100.0	
Missing	System	20	1.1		
Total		1869	100.0		

**...feel that I can handle the challenges of parenting my child with his/her needs.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	10	.5	.5	2.7
	Disagree	45	2.4	2.4	5.1
	Agree	546	29.2	29.5	34.6
	Strongly agree	484	25.9	26.1	60.8
	Very strongly agree	682	36.5	36.8	97.6
	Does not apply	44	2.4	2.4	100.0
	Total	1851	99.0	100.0	
Missing	System	18	1.0		
Total		1869	100.0		

**...feel more confident in my skills as a parent.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	7	.4	.4	2.5
	Disagree	55	2.9	3.0	5.5
	Agree	552	29.5	29.8	35.3
	Strongly agree	492	26.3	26.6	61.9
	Very strongly agree	633	33.9	34.2	96.1
	Does not apply	73	3.9	3.9	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**...keep up friendships for my child and family.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	14	.7	.8	2.9
	Disagree	172	9.2	9.3	12.2
	Agree	522	27.9	28.2	40.4
	Strongly agree	286	15.3	15.5	55.9
	Very strongly agree	344	18.4	18.6	74.4
	Does not apply	473	25.3	25.6	100.0
	Total	1851	99.0	100.0	
Missing	System	18	1.0		
Total		1869	100.0		

**...find information I need.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	41	2.2	2.2	2.2
	Strongly disagree	14	.7	.8	3.0
	Disagree	81	4.3	4.4	7.3
	Agree	686	36.7	37.0	44.4
	Strongly agree	396	21.2	21.4	65.8
	Very strongly agree	539	28.8	29.1	94.9
	Does not apply	95	5.1	5.1	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**...know how to make changes in family routines that will benefit my child.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	41	2.2	2.2	2.2
	Strongly disagree	9	.5	.5	2.7
	Disagree	50	2.7	2.7	5.4
	Agree	543	29.1	29.3	34.7
	Strongly agree	464	24.8	25.1	59.8
	Very strongly agree	644	34.5	34.8	94.6
	Does not apply	100	5.4	5.4	100.0
	Total	1851	99.0	100.0	
Missing	System	18	1.0		
Total		1869	100.0		

**...figure out solutions to problems as they come up.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.2	2.3	2.3
	Strongly disagree	10	.5	.5	2.8
	Disagree	44	2.4	2.4	5.2
	Agree	585	31.3	31.6	36.8
	Strongly agree	452	24.2	24.4	61.1
	Very strongly agree	629	33.7	33.9	95.1
	Does not apply	91	4.9	4.9	100.0
	Total	1853	99.1	100.0	
Missing	System	16	.9		
Total		1869	100.0		

**...feel that I can get the services and supports that my child and family need.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	18	1.0	1.0	3.1
	Disagree	55	2.9	3.0	6.1
	Agree	559	29.9	30.2	36.2
	Strongly agree	445	23.8	24.0	60.2
	Very strongly agree	698	37.3	37.6	97.9
	Does not apply	39	2.1	2.1	100.0
	Total	1854	99.2	100.0	
Missing	System	15	.8		
Total		1869	100.0		



**...understand how the Early intervention system works.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	43	2.3	2.3	2.3
	Strongly disagree	9	.5	.5	2.8
	Disagree	56	3.0	3.0	5.8
	Agree	629	33.7	33.9	39.8
	Strongly agree	460	24.6	24.8	64.6
	Very strongly agree	647	34.6	34.9	99.5
	Does not apply	9	.5	.5	100.0
	Total	1853	99.1	100.0	
Missing	System	16	.9		
Total		1869	100.0		

**...be able to evaluate how much progress my child is making.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	38	2.0	2.0	2.0
	Strongly disagree	15	.8	.8	2.9
	Disagree	41	2.2	2.2	5.1
	Agree	549	29.4	29.6	34.6
	Strongly agree	500	26.8	26.9	61.6
	Very strongly agree	705	37.7	38.0	99.5
	Does not apply	9	.5	.5	100.0
	Total	1857	99.4	100.0	
Missing	System	12	.6		
Total		1869	100.0		

**...feel that my child will be accepted and welcomed in the community.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	36	1.9	1.9	1.9
	Strongly disagree	5	.3	.3	2.2
	Disagree	41	2.2	2.2	4.4
	Agree	535	28.6	28.8	33.3
	Strongly agree	378	20.2	20.4	53.6
	Very strongly agree	642	34.3	34.6	88.2
	Does not apply	218	11.7	11.8	100.0
	Total	1855	99.3	100.0	
Missing	System	14	.7		
Total		1869	100.0		

**...feel more confident in finding ways to meet my child's needs.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.2	2.3	2.3
	Strongly disagree	7	.4	.4	2.6
	Disagree	48	2.6	2.6	5.2
	Agree	521	27.9	28.1	33.3
	Strongly agree	497	26.6	26.8	60.0
	Very strongly agree	688	36.8	37.0	97.1
	Does not apply	54	2.9	2.9	100.0
	Total	1857	99.4	100.0	
Missing	System	12	.6		
Total		1869	100.0		

**...communicate more effectively with the people who work with my child and family.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	36	1.9	1.9	1.9
	Strongly disagree	10	.5	.5	2.5
	Disagree	53	2.8	2.9	5.3
	Agree	535	28.6	28.9	34.2
	Strongly agree	452	24.2	24.4	58.6
	Very strongly agree	614	32.9	33.2	91.8
	Does not apply	152	8.1	8.2	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**...understand the roles of the people who work with my child and family.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	38	2.0	2.1	2.1
	Strongly disagree	8	.4	.4	2.5
	Disagree	42	2.2	2.3	4.8
	Agree	578	30.9	31.2	36.0
	Strongly agree	428	22.9	23.1	59.1
	Very strongly agree	640	34.2	34.6	93.7
	Does not apply	116	6.2	6.3	100.0
	Total	1850	99.0	100.0	
Missing	System	19	1.0		
Total		1869	100.0		

**...know about my child's and family's rights concerning Early Intervention services.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	6	.3	.3	2.5
	Disagree	66	3.5	3.6	6.0
	Agree	657	35.2	35.4	41.4
	Strongly agree	413	22.1	22.3	63.7
	Very strongly agree	647	34.6	34.9	98.5
	Does not apply	27	1.4	1.5	100.0
	Total	1856	99.3	100.0	
Missing	System	13	.7		
Total		1869	100.0		

**...do things with and for my child that are good for my child's development.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	36	1.9	1.9	1.9
	Strongly disagree	5	.3	.3	2.2
	Disagree	26	1.4	1.4	3.6
	Agree	446	23.9	24.0	27.6
	Strongly agree	457	24.5	24.6	52.2
	Very strongly agree	865	46.3	46.6	98.8
	Does not apply	22	1.2	1.2	100.0
	Total	1857	99.4	100.0	
Missing	System	12	.6		
Total		1869	100.0		

**...understand my child's needs.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	39	2.1	2.1	2.1
	Strongly disagree	7	.4	.4	2.5
	Disagree	36	1.9	1.9	4.4
	Agree	497	26.6	26.8	31.2
	Strongly agree	459	24.6	24.8	56.0
	Very strongly agree	795	42.5	42.9	98.9
	Does not apply	21	1.1	1.1	100.0
	Total	1854	99.2	100.0	
Missing	System	15	.8		
Total		1869	100.0		

**...feel that my efforts are helping my child.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	40	2.1	2.2	2.2
	Strongly disagree	7	.4	.4	2.5
	Disagree	29	1.6	1.6	4.1
	Agree	448	24.0	24.2	28.3
	Strongly agree	449	24.0	24.2	52.5
	Very strongly agree	861	46.1	46.5	99.0
	Does not apply	18	1.0	1.0	100.0
	Total	1852	99.1	100.0	
Missing	System	17	.9		
Total		1869	100.0		

**What I say about my child and family is understood and respected.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	34	1.8	1.8	1.8
	Strongly disagree	6	.3	.3	2.2
	Disagree	20	1.1	1.1	3.2
	Agree	395	21.1	21.4	24.6
	Strongly agree	414	22.2	22.4	47.0
	Very strongly agree	971	52.0	52.5	99.6
	Does not apply	8	.4	.4	100.0
	Total	1848	98.9	100.0	
Missing	System	21	1.1		
Total		1869	100.0		

**The people who work with my child and family answer our questions.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	36	1.9	2.0	2.0
	Strongly disagree	10	.5	.5	2.5
	Disagree	16	.9	.9	3.4
	Agree	333	17.8	18.1	21.4
	Strongly agree	393	21.0	21.3	42.7
	Very strongly agree	1046	56.0	56.7	99.5
	Does not apply	10	.5	.5	100.0
	Total	1844	98.7	100.0	
Missing	System	25	1.3		
Total		1869	100.0		

**I can easily get in touch with my service coordinator.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	37	2.0	2.0	2.0
	Strongly disagree	9	.5	.5	2.5
	Disagree	33	1.8	1.8	4.3
	Agree	335	17.9	18.1	22.4
	Strongly agree	380	20.3	20.6	42.9
	Very strongly agree	1042	55.8	56.4	99.3
	Does not apply	13	.7	.7	100.0
	Total	1849	98.9	100.0	
Missing	System	20	1.1		
Total		1869	100.0		

**The services provided to my child and family help reach the outcomes/goals that are important to my family.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.2	2.3	2.3
	Strongly disagree	9	.5	.5	2.8
	Disagree	42	2.2	2.3	5.0
	Agree	369	19.7	20.0	25.1
	Strongly agree	389	20.8	21.1	46.2
	Very strongly agree	981	52.5	53.2	99.4
	Does not apply	11	.6	.6	100.0
	Total	1843	98.6	100.0	
Missing	System	26	1.4		
Total		1869	100.0		

## Appendix B: Control File for the Winsteps Rasch Analysis of the IFS

```
&INST ; THIS FILE MUST BE SAVED AS ASCII DOS TEXT BEFORE USE WITH WINSTEPS
Title="Virginia Impact all individuals, 2023 Data New Form"
ITEM1=2
DELIMITER=TAB ;           specifies a tab as a delimiter
;FITI=7
;FITP=7
ITLEN=15 ;max length of item label
LCONV=0.0001
RCONV=0.001
RESCOR=2
NEWSCR="112345"
DATA=C:\Virginia\2023\VA_2022_Data.txt; Name of data file
NI=22
XWIDE = 1
CODES = "123456"
IAFILE=*
1 677.5
2 656.0
3 569.8
4 608.8
5 639.8
6 545.9
7 559.3
8 624.8
9 576.8
10 556.8
11 540.4
12 564.5
13 552.9
14 534.4
15 559.1
16 553.9
17 555.9
18 545.5
19 538.9
20 497.8
21 526.1
22 498.1
*
SAFILE=*
  2 = -220.93
  3 = -147.88
  4 = 55.95
  5 = 128.99
*
NAME1 = 1; Column containing person name
NAMLEN = 15; Length of person name
PRCOMP=S
UDECIM=2
UMEAN=568.3
USCALE=58.91
CSV=S
HLINES=N
IFILE=ItemStats.sav ;Name of file containing item-level statistics
PFILE=PersonStats.sav ;Name of file containing person-level statistics
REALSE=Y
TABLES=1110000001001100000000100011
&END
q1
q2
q3
q4
q5
q6
q7
q8
q9
q10
```

q11  
q12  
q13  
q14  
q15  
q16  
q17  
q18  
q19  
q20  
q21  
q22  
END NAMES

## Appendix C: Selected Winsteps Output for the IFS

TABLE 1.2 Virginia Impact all individuals, 2023 ZOU705WS.TXT Jun 27 2022 14:26  
 INPUT: 1869 PERSON 22 ITEM REPORTED: 1864 PERSON 22 ITEM 5 CATS WINSTEPS 4.4.7

```
-----
MEASURE      PERSON - MAP - ITEM
              <more>|<rare>
900 .##### +
    . |
    . |
    . T|
    .# |
    . |
    .# |
800 # +
    .## |
    .# |
    .# |
    .## S|
    .# |
    ## |
700 .## +
    .### |
    .## | q1
    .### |
    .##### |T q2
    .### | q5
    .### M| q8
    ##### |S
600 .## + q4
    .### |
    .## | q9
    .## |M q12 q15 q3 q7
    .### | q10 q13 q16 q17 q18 q6
    .## | q11 q14 q19
    .##### |S q21
500 .#### S|
    .# + q20 q22
    .# |
    . |T
    . |
    . |
    . |
    . |
400 . T+
    . |
    . |
    . |
    . |
300 . +
    . |
    . |
    . |
    . |
200 . +
    . |
    . |
    . |
    . |
100 .# +
    <less>|<freq>
EACH "#" IS 19: EACH "." IS 1 TO 18
```



TABLE 3.1 Virginia Impact all individuals, 2023 ZOU705WS.TXT Jun 27 2022 14:26  
 INPUT: 1869 PERSON 22 ITEM REPORTED: 1864 PERSON 22 ITEM 5 CATS WINSTEPS 4.4.7

SUMMARY OF 1624 MEASURED (NON-EXTREME) PERSON

	TOTAL SCORE	COUNT	MEASURE	REAL S.E.	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	77.5	20.6	632.53	25.95	1.05	-.22	1.07	-.19
SEM	.5	.1	2.88	.25	.02	.05	.02	.05
P.SD	18.8	2.5	116.16	10.17	.80	2.11	.95	2.08
S.SD	18.8	2.5	116.20	10.17	.80	2.11	.95	2.08
MAX.	109.0	22.0	897.28	85.91	8.70	9.91	9.90	9.91
MIN.	8.0	2.0	194.20	18.06	.04	-6.13	.04	-5.62
REAL RMSE	27.87	TRUE SD	112.77	SEPARATION	4.05	PERSON RELIABILITY	.94	
MODEL RMSE	24.64	TRUE SD	113.52	SEPARATION	4.61	PERSON RELIABILITY	.95	
S.E. OF PERSON MEAN = 2.88								

MAXIMUM EXTREME SCORE: 216 PERSON 11.6%  
 MINIMUM EXTREME SCORE: 24 PERSON 1.3%  
 LACKING RESPONSES: 5 PERSON

SUMMARY OF 1864 MEASURED (EXTREME AND NON-EXTREME) PERSON

	TOTAL SCORE	COUNT	MEASURE	REAL S.E.	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	79.4	20.5	662.87	36.55				
SEM	.5	.1	3.80	.68				
P.SD	21.0	2.7	164.09	29.16				
S.SD	21.0	2.7	164.13	29.17				
MAX.	110.0	22.0	969.89	115.46				
MIN.	5.0	1.0	79.68	18.06				
REAL RMSE	46.76	TRUE SD	157.29	SEPARATION	3.36	PERSON RELIABILITY	.92	
MODEL RMSE	45.15	TRUE SD	157.76	SEPARATION	3.49	PERSON RELIABILITY	.92	
S.E. OF PERSON MEAN = 3.80								

PERSON RAW SCORE-TO-MEASURE CORRELATION = .84  
 CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .99 SEM = 1.94

SUMMARY OF 22 MEASURED (NON-EXTREME) ITEM

	TOTAL SCORE	COUNT	MEASURE	REAL S.E.	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	6727.2	1736.8	567.41	2.65	1.03	-1.29	1.10	-.05
SEM	149.3	26.6	9.98	.08	.09	1.29	.11	1.20
P.SD	684.2	122.1	45.74	.37	.40	5.92	.51	5.51
S.SD	700.3	125.0	46.81	.38	.41	6.06	.53	5.64
MAX.	7584.0	1848.0	677.50	4.09	2.46	9.90	2.71	9.90
MIN.	4828.0	1378.0	497.80	2.42	.58	-9.90	.59	-9.63
REAL RMSE	2.68	TRUE SD	45.66	SEPARATION	17.06	ITEM RELIABILITY	1.00	
MODEL RMSE	2.49	TRUE SD	45.67	SEPARATION	18.33	ITEM RELIABILITY	1.00	
S.E. OF ITEM MEAN = 9.98								

ITEM RAW SCORE-TO-MEASURE CORRELATION = -.87  
 Global statistics: please see Table 44.  
 UMEAN=568.3000 USCALE=58.9100

TABLE 3.2 Virginia Impact all individuals, 2023 ZOU705WS.TXT Jun 27 2022 14:26  
 INPUT: 1869 PERSON 22 ITEM REPORTED: 1864 PERSON 22 ITEM 5 CATS WINSTEPS 4.4.7

SUMMARY OF CATEGORY STRUCTURE. Model="R"

CATEGORY LABEL	OBSERVED SCORE	OBSVD COUNT	SAMPLE %	INFINIT	OUTFIT	ANDRICH THRESHOLD	CATEGORY MEASURE
1	1	1151	3	-205.0	-233	NONE	-295.89
2	2	1474	4	-94.31	-129	-220.93A	-185.38
3	3	12275	32	-6.56	-2.37	-147.88A	-45.97
4	4	9471	25	88.27	81.27	55.95A	93.44
5	5	13838	36	192.08	200.9	128.99A	(203.95)
MISSING		2799	7	48.32			

OBSERVED AVERAGE is mean of measures in category. It is not a parameter estimate.

CATEGORY LABEL	STRUCTURE MEASURE	S.E.	SCORE-TO-MEASURE AT CAT.	50% CUM. PROBABILITY	COHERENCE M->C	ESTIM DISCR	OBSERVED-EXPECTED RESIDUAL DIFFERENCE
1	NONE		-295.89)	-INF	75%	43%	-2.2%
2	-220.93A	3.13	-185.38-247.18-127.29	-233.39	37%	34%	-39.6%
3	-147.88A	1.52	-45.97-127.29	35.36	72%	69%	5.4%
4	55.95A	.92	93.44 35.36 155.24	45.39	51%	63%	5.1%
5	128.99A	.98	(203.95)155.24 +INF	141.46	79%	68%	-5.8%

M->C = Does Measure imply Category?  
 C->M = Does Category imply Measure?

Obs Cat Freq	1	2	3	4	5	Total
1	791.35	167.18	147.68	32.02	12.76	1151.00
2	159.34	387.85	739.73	150.23	36.86	1474.00
3	192.32	1252.43	6939.64	2931.94	958.67	12275.00
4	16.28	201.27	2894.15	3542.89	2816.42	9471.00
5	5.93	48.81	892.90	2328.21	10562.14	13838.00
Total	1165.22	2057.54	11614.10	8985.29	14386.85	38209.00

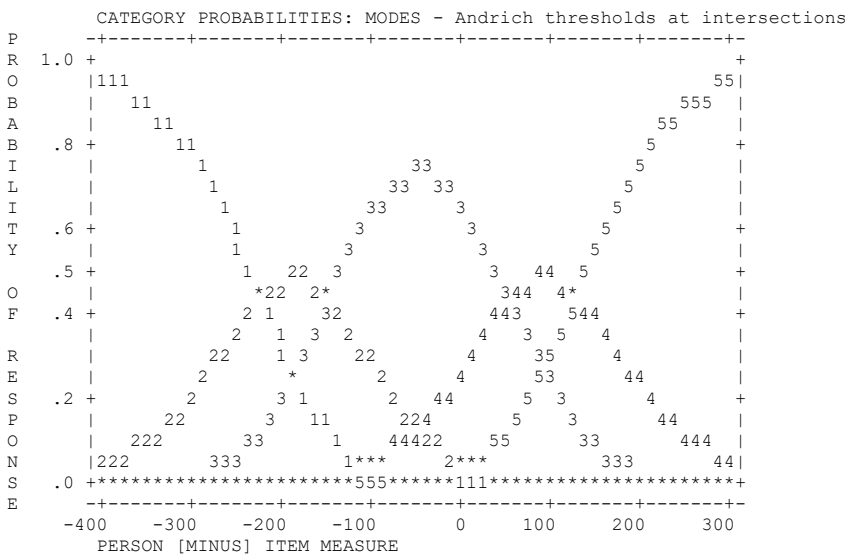


TABLE 10.1 Virginia Impact all individuals, 2023 ZOU705WS.TXTm Jun 27 2022 14:26  
 INPUT: 1869 PERSON 22 ITEM REPORTED: 1864 PERSON 22 ITEM 5 CATS WINSTEPS 4.4.7

PERSON: REAL SEP.: 3.36 REL.: .92 ... ITEM: REAL SEP.: 17.06 REL.: 1.00

ITEM STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	REAL S.E.	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD	CORR.	PTMEASUR-AL EXP.	EXACT OBS%	MATCH EXP%	DISPLACE	ITEM
1	5154	1429	677.50A	4.09	2.46	9.90	2.71	9.90	A .71	.84	35.6	57.6	-64.85	q1
2	5992	1675	656.00A	3.20	1.75	9.90	2.41	9.90	B .74	.84	43.3	57.6	-38.13	q2
8	4828	1378	624.80A	3.10	1.29	6.32	1.42	7.75	C .80	.84	58.1	59.2	5.46	q8
19	7036	1829	538.90A	2.74	1.25	6.19	1.40	6.84	D .80	.79	64.0	62.0	31.55	q19
3	6748	1743	569.80A	2.65	1.15	3.95	1.27	5.25	E .78	.81	60.9	60.8	-2.50	q3
13	7126	1844	552.90A	2.50	1.07	1.81	1.23	4.43	F .80	.80	64.9	61.6	13.90	q13
5	6008	1643	639.80A	2.69	1.19	4.69	1.18	3.87	G .81	.84	55.6	58.9	-34.35	q5
4	6806	1773	608.80A	2.54	1.12	3.19	1.11	2.46	H .81	.83	62.1	59.6	-37.62	q4
7	6946	1779	559.30A	2.46	.85	-4.34	.97	-.55	I .82	.80	67.2	61.4	1.57	q7
11	6848	1762	540.40A	2.49	.85	-4.33	.95	-.93	J .84	.79	69.0	61.8	24.60	q11
15	6450	1637	559.10A	2.56	.90	-2.53	.95	-.89	K .81	.80	67.9	61.4	-3.80	q15
22	7550	1834	498.10A	2.55	.94	-1.76	.93	-1.08	k .80	.76	68.4	63.8	23.43	q22
6	7124	1807	545.90A	2.45	.89	-3.14	.93	-1.36	j .82	.79	67.3	61.5	9.24	q6
14	7307	1848	534.40A	2.45	.87	-3.68	.91	-1.63	i .82	.79	69.1	62.0	16.25	q14
9	6554	1757	576.80A	2.45	.89	-2.93	.85	-3.44	h .84	.82	68.2	60.6	14.90	q9
10	6855	1751	556.80A	2.47	.81	-5.53	.85	-3.08	g .83	.80	68.8	61.4	.85	q10
20	7584	1835	497.80A	2.55	.81	-5.28	.76	-3.94	f .81	.76	70.0	63.8	19.88	q20
18	6776	1734	545.50A	2.51	.79	-5.96	.76	-5.06	e .84	.80	71.8	61.7	16.48	q18
17	6635	1700	555.90A	2.52	.75	-7.33	.73	-5.79	d .84	.80	69.9	61.3	7.33	q17
12	7115	1815	564.50A	2.42	.72	-8.37	.69	-7.34	c .84	.81	71.2	61.1	-7.53	q12
21	7420	1833	526.10A	2.48	.69	-9.38	.66	-6.87	b .83	.78	74.5	62.3	7.92	q21
16	7136	1803	553.90A	2.45	.58	-9.90	.59	-9.63	a .85	.80	73.6	61.2	-3.43	q16
MEAN	6727.2	1736.8	567.41	2.65	1.03	-1.3	1.10	-.1			64.6	61.0	.05	
P.SD	684.2	122.1	45.74	.37	.40	5.9	.51	5.5			9.2	1.6	23.43	