

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

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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 1,854 families receiving early intervention services. From these responses, a random sample of 1,017 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 659.9. The standard deviation was 176.3, and the standard error of the sample mean was 5.5. The 95% confidence interval for the population mean was 649.1 – 670.8. 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 76.0%. The 95% confidence interval for the true population percentage is 73.3% – 78.5%. 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 74.3%. The 95% confidence interval for the true population percentage is 71.5% - 76.9%.

The percent of families who reported that early intervention services helped them *help their child develop and learn* (Indicator 4c) was 85.7%. The 95% confidence interval for the true population percentage is 83.4% - 87.7%.

3. Comparison to 2017 Outcomes

The observed percentage of families meeting the standards for Indicators 4a, 4b, and 4c were consistently lower than those obtained for a sample of families measured in 2017 who were administered the same version of the IFS as was used for the 2018 reporting. Specifically, the observed percentages of 76.0%, 74.3%, and 85.7% for Indicators 4a, 4b, and 4c were below the corresponding values of 79.6%, 75.7%, and 88.7% obtained for the 2017 sample.

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 94% 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 74% 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 1,854 families. A random sample of 1,017 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 1,854 (Table 3.1), and the representative sample of 1,017 (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.

Table 3.1. Distribution of Child's Race/Ethnicity in the Total Sample		
Gender	N	Percentage
White	1204	64.9%
Black or African-American	183	9.9%
Hispanic or Latino	148	8.0%
Asian	75	4.0%
American Indian or Alaskan Native	2	0.1%
Pacific Islander or Hawaiian Native	1	0.1%
Two or more races	208	11.2%
Refused or Missing	33	1.8%
Total	1854	100%

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

Gender	N	Percentage
White	564	55.5%
Black or African-American	182	17.9%
Hispanic or Latino	118	11.6%
Asian	53	5.2%
American Indian or Alaskan Native	1	0.1%
Pacific Islander or Hawaiian Native	1	0.1%
Two or more races	98	9.6%
Total	1017	100%

Note. The distribution of race/ethnicity for the children receiving early intervention services in Virginia under Part C are: White = 55.5%, Black/African American = 17.9%, Hispanic or Latino = 11.6%, Asian = 5.2%, American Indian or Alaskan Native = 0.1%, Pacific Islander of Hawaiian Native = 0.1%, Two or more races = 9.6%.

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.

Table 3.4. Distribution of Child's Gender in the Total Sample		
Gender	N	Percentage
Male	1100	59.3%
Female	734	39.6%
Missing	20	1.1%
Total	1854	100%

Table 3.5. Distribution of Child's Gender in the Representative Sample		
Gender	N	Percentage
Male	585	57.5%
Female	422	41.5%
Missing	10	1.0%
Total	1017	100%

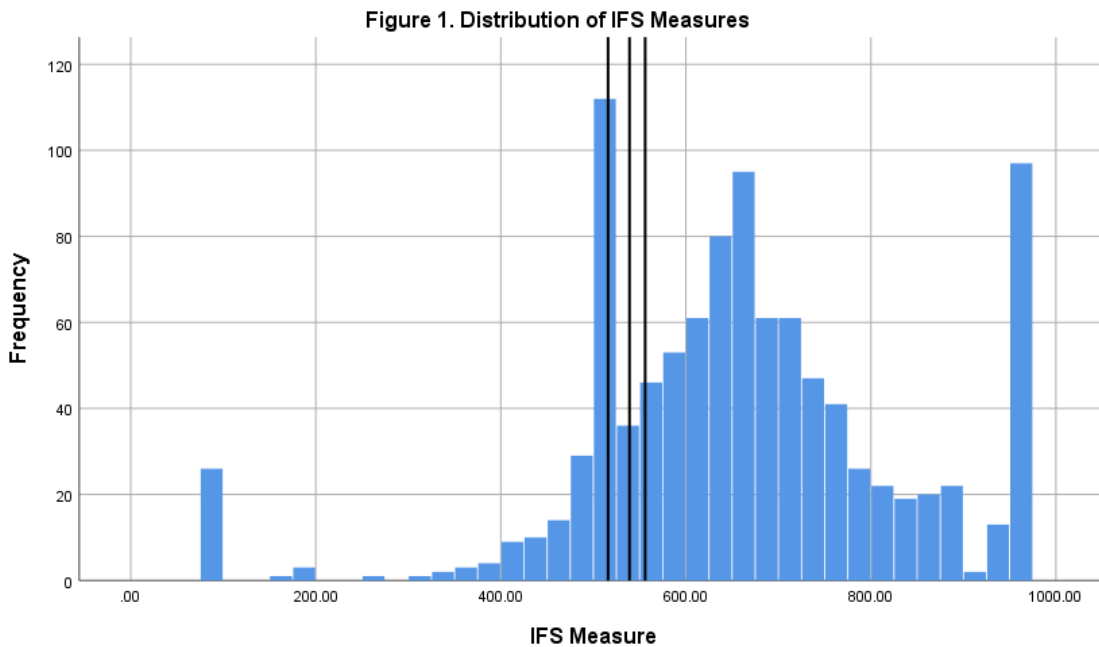
SECTION 4

RESULTS PERTAINING TO INDICATOR #4

4.1 Distribution of IFS Measures

Of the 1,017 respondents in the representative sample, all had valid responses to the IFS. The distribution of IFS measures for the 1,017 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.

Table 4.1. Properties of IFS Measures for the Representative Sample			
Sample Mean	Standard Deviation	Standard Error of the Sample Mean	95% Confidence Interval for the Population Mean
659.9	176.3	5.5	649.1 – 670.8

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 659.9 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.	47%	84%
656	...know about services in my community.	49%	87%
640	...know where to go for support to meet my FAMILY's needs.	53%	88%
625	...keep up friendships for my child and family.	50%	85%
609	...know where to go for support to meet my CHILD's needs.	61%	92%
577	...find information I need.	57%	91%
570	...improve my family's quality of life.	58%	93%
565	...feel that I can get the services and supports that my child and family need.	65%	93%
559	...feel more confident in my skills as a parent.	64%	93%
559	...feel that my child will be accepted and welcomed in the community.	62%	93%
557	...know how to make changes in family routines that will benefit my child.	64%	93%
556	...communicate more effectively with the people who work with my child and family.	62%	93%
554	...feel more confident in finding ways to meet my child's needs.	64%	94%
553	...understand how the Early intervention system works.	62%	94%
546	...feel that I can handle the challenges of parenting my child with his/her needs.	65%	94%
546	...understand the roles of the people who work with my child and family.	63%	94%
540	...figure out solutions to problems as they come up.	63%	93%
539	...know about my child's and family's rights concerning Early Intervention services.	60%	93%

534	...be able to evaluate how much progress my child is making.	66%	94%
526	...understand my child's needs.	72%	94%
498	...feel that my efforts are helping my child.	71%	95%
498	...do things with and for my child that are good for my child's development.	71%	95%

As seen in the table, over 94% of families agreed, with over 72% 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 93% of families agreed, with somewhat over 62% 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 93% of families agreed, with over 58% 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 85% of families agreed, with about 49% expressing strong or very strong agreement, that early intervention helped them keep up friendships for their child and family, know where to go for support to meet the

family's needs, and know about services in the community. 84% of families agreed, with 47% 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 1,017 respondents in the representative sample had an IFS measure. Table 4.3 presents the percentage of these 1,017 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).

Table 4.3. Percent of Respondents Meeting or Exceeding Each of the Standards for Indicator #4 (Using Representative Sample of n = 1,017)			
	Indicator 4A Percent of families who report that early intervention services helped them know their rights	Indicator 4B Percent of families who report that early intervention services helped them effectively communicate their children’s needs	Indicator 4C Percent of families who report that early intervention services helped them help their child develop and learn
Percentage	76.0%	74.3%	85.7%
	773 of 1017 met standard	756 of 1017 met standard	872 of 1017 met standard
95% Confidence Interval	73.3% - 78.5%	71.5% – 76.9%	83.4% – 87.7%

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.

Table 4.4. Percent of Respondents Meeting or Exceeding Each of the Standards for Indicator #4%, by Race/Ethnicity			
Race/Ethnicity	Indicator 4A Percent of families who report that early intervention services helped them know their rights	Indicator 4B Percent of families who report that early intervention services helped them effectively communicate their children's needs	Indicator 4C Percent of families who report that early intervention services helped them help their child develop and learn
White (N = 1,200)	76.9% 95% CI: 74.4% - 79.2%	74.1% 95% CI: 71.5% - 76.5%	85.8% 95% CI: 83.7% - 87.7%
Black or African American (N = 182)	73.1% 95% CI: 66.2% - 79.0%	72.0% 95% CI: 65.1% - 78.0%	87.4% 95% CI: 81.8% - 91.5%
Hispanic or Latino (N = 148)	78.4% 95% CI: 71.1% - 84.3%	74.3% 95% CI: 66.7% - 80.7%	85.1% 95% CI: 78.5% - 89.9%
Asian (N = 75)	78.7% 95% CI: 68.2% - 86.4%	76.0% 95% CI: 65.2% - 84.2%	89.3% 95% CI: 80.3% - 94.5%
American Indian Or Alaskan Native	100% 95% CI:	100% 95% CI:	100% 95% CI:

(N = 2)	---	---	---
Pacific Islander or Hawaiian Native (N = 1)	100% 95% CI: ---	100% 95% CI: ---	100% 95% CI: ---
Two or More Races (N = 208)	77.9% 95% CI: 71.8% - 83.0%	75.5% 95% CI: 69.2% - 80.8%	85.1% 95% CI: 79.6% - 89.3%

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.

Program Location	N	Indicator 4A	Indicator 4B	Indicator 4C
Alexandria	50	66.0%	64.0%	68.0%
Alleghany-Highland	15	60.0%	60.0%	86.7%
Arlington	53	77.4%	73.6%	86.8%
Augusta-Highland	20	75.0%	75.0%	80.0%
Blue Ridge	80	80.0%	76.3%	83.8%
Central Virginia	68	77.9%	75.0%	91.2%
Chesapeake	70	82.9%	80.0%	88.6%
Chesterfield	74	73.0%	70.3%	83.8%
Crater District	11	72.7%	72.7%	72.7%
Cumberland Mountain	27	88.9%	88.9%	96.3%
Danville Pittsylvania	34	67.6%	67.6%	82.4%
DILENOWISCO	23	73.9%	73.9%	87.0%
Eastern Shore	8	62.5%	50.0%	75.0%
Fairfax Falls Church	299	77.6%	73.9%	87.6%
Goochland-Powhatan	14	57.1%	57.1%	71.4%
Hampton-Newport News	47	68.1%	68.1%	85.1%
Hanover County	20	100.0%	100.0%	100.0%

Harrisonburg-Rockingham	44	88.6%	84.1%	95.5%
Heartland	27	77.8%	77.8%	88.9%
Henrico	63	74.6%	69.8%	81.0%
Highlands	20	90.0%	90.0%	90.0%
Loudoun County	89	76.4%	74.2%	83.1%
Middle Peninsula Northern Neck	26	69.2%	69.2%	73.1%
Mount Rogers	24	79.2%	79.2%	87.5%
New River Valley	51	80.4%	80.4%	88.2%
Norfolk	40	70.0%	67.5%	92.5%
Piedmont	19	73.7%	68.4%	89.5%
Portsmouth	26	53.8%	53.8%	73.1%
Prince William	109	74.3%	67.9%	79.8%
Rappahannock Area	68	75.0%	75.0%	92.6%
Rappahannock Rapidan	19	84.2%	84.2%	84.2%
Richmond	31	74.2%	67.7%	80.6%
Roanoke Valley	30	83.3%	83.3%	93.3%
Rockbridge Area	21	66.7%	66.7%	85.7%
Shenandoah Valley	35	85.7%	85.7%	91.4%
Southside	19	68.4%	68.4%	84.2%
Stanton-Waynesboro	25	80.0%	72.0%	92.0%
Virginia Beach	89	76.4%	74.2%	84.3%
Western Tidewater	25	92.0%	92.0%	96.0%
Williamsburg	35	88.6%	80.0%	91.4%

4.6. Comparison to 2017 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 2017 study. The obtained percentage of families meeting indicators 4a, 4b, and 4c (76.0%, 74.3%, and 85.7%, respectively) were consistently lower than the values obtained in the 2017 study (79.6%, 75.7%, and 88.7%, respectively).

Table 4.6. Comparing the Obtained Outcomes in 2018 to the Values Obtained in 2017

	Target % for Indicator 4A Percent of families who report that early intervention services helped them know their rights	Target % for Indicator 4B Percent of families who report that early intervention services helped them effectively communicate their children's needs	Target % for Indicator 4C Percent of families who report that early intervention services helped them help their child develop and learn
Obtained Outcomes in 2018 for Representative Sample	76.0%	74.3%	85.7%
Obtained Outcomes in 2017 for Representative Sample	79.6%	75.7%	88.7%

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.

Table 5.1. IFS Items in Calibration Order	
Item Calibration	Item <u>Stem:</u> Over the past year, Early Intervention services have helped me and/or my family:
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.

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 measure¹ (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).² The validity of the IFS measures can be assessed using numerous approaches, several of which are described below.

¹ 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).

² 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).

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

Table 6.1. Calibration, Fit, and Discrimination of the IFS Items				
Item	Item Calibration	Infit	Outfit	Discrimination
Q1	677.5	2.01	2.06	0.75
Q2	656.0	1.67	1.88	0.77
Q3	569.8	1.07	1.26	0.81
Q4	608.8	1.05	1.01	0.83
Q5	639.8	1.11	1.11	0.83
Q6	545.9	0.91	0.87	0.82
Q7	559.3	0.92	0.98	0.82
Q8	624.8	1.26	1.40	0.82
Q9	576.8	0.85	0.87	0.85
Q10	556.8	0.83	0.80	0.84

Q11	540.4	0.91	0.96	0.84
Q12	564.5	0.71	0.62	0.85
Q13	552.9	0.99	1.00	0.82
Q14	534.4	0.86	0.96	0.83
Q15	559.1	0.96	1.01	0.82
Q16	553.9	0.62	0.57	0.86
Q17	555.9	0.80	0.83	0.84
Q18	545.5	0.80	0.82	0.85
Q19	538.9	1.04	1.12	0.82
Q20	497.8	0.74	0.70	0.83
Q21	526.1	0.70	0.62	0.83
Q22	498.1	0.93	1.00	0.81

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 exceeded 73%, and the percentage of families agreeing in any category was above 94%. 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

Item	% Strongly/ Very strongly agree	% Agree in any category
What I say about my child and family is understood and respected.	74%	96%
The people who work with my child and family answer our questions.	76%	96%
I can easily get in touch with my service coordinator.	75%	94%
The services provided to my child and family help reach the outcomes/goals that are important to my family.	73%	94%

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.

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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	64	3.5	3.5	3.5
	Strongly disagree	30	1.6	1.6	5.1
	Disagree	138	7.4	7.5	12.6
	Agree	544	29.3	29.6	42.3
	Strongly agree	273	14.7	14.9	57.2
	Very strongly agree	366	19.7	19.9	77.1
	Does not apply	420	22.7	22.9	100.0
	Total	1835	99.0	100.0	
Missing	System	19	1.0		
Total		1854	100.0		

...know about services in my community.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	48	2.6	2.6	2.6
	Strongly disagree	32	1.7	1.7	4.4
	Disagree	120	6.5	6.5	10.9
	Agree	672	36.2	36.6	47.5
	Strongly agree	374	20.2	20.4	67.8
	Very strongly agree	448	24.2	24.4	92.2
	Does not apply	143	7.7	7.8	100.0
	Total	1837	99.1	100.0	
Missing	System	17	.9		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	44	2.4	2.4	2.4
	Strongly disagree	17	.9	.9	3.3
	Disagree	49	2.6	2.7	6.0
	Agree	602	32.5	32.8	38.8
	Strongly agree	447	24.1	24.4	63.2
	Very strongly agree	570	30.7	31.1	94.3
	Does not apply	105	5.7	5.7	100.0
	Total	1834	98.9	100.0	
Missing	System	20	1.1		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	45	2.4	2.4	2.4
	Strongly disagree	20	1.1	1.1	3.5
	Disagree	73	3.9	4.0	7.5
	Agree	578	31.2	31.3	38.8
	Strongly agree	450	24.3	24.4	63.2
	Very strongly agree	609	32.8	33.0	96.3
	Does not apply	69	3.7	3.7	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	43	2.3	2.3	2.3
	Strongly disagree	20	1.1	1.1	3.4
	Disagree	127	6.9	6.9	10.3
	Agree	592	31.9	32.2	42.6
	Strongly agree	362	19.5	19.7	62.3
	Very strongly agree	493	26.6	26.9	89.2
	Does not apply	199	10.7	10.8	100.0
	Total	1836	99.0	100.0	
Missing	System	18	1.0		
Total		1854	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	42	2.3	2.3	2.3
	Strongly disagree	12	.6	.7	2.9
	Disagree	38	2.0	2.1	5.0
	Agree	529	28.5	28.7	33.7
	Strongly agree	437	23.6	23.7	57.4
	Very strongly agree	710	38.3	38.5	95.9
	Does not apply	76	4.1	4.1	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.3	2.3	2.3
	Strongly disagree	5	.3	.3	2.6
	Disagree	58	3.1	3.2	5.7
	Agree	544	29.3	29.6	35.3
	Strongly agree	437	23.6	23.8	59.1
	Very strongly agree	665	35.9	36.2	95.3
	Does not apply	87	4.7	4.7	100.0
	Total	1838	99.1	100.0	
Missing	System	16	.9		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	39	2.1	2.1	2.1
	Strongly disagree	24	1.3	1.3	3.4
	Disagree	141	7.6	7.7	11.1
	Agree	488	26.3	26.7	37.8
	Strongly agree	270	14.6	14.7	52.5
	Very strongly agree	362	19.5	19.8	72.3
	Does not apply	507	27.3	27.7	100.0
	Total	1831	98.8	100.0	
Missing	System	23	1.2		
Total		1854	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	15	.8	.8	3.1
	Disagree	91	4.9	5.0	8.0
	Agree	629	33.9	34.3	42.3
	Strongly agree	405	21.8	22.1	64.4
	Very strongly agree	566	30.5	30.8	95.2
	Does not apply	88	4.7	4.8	100.0
	Total	1835	99.0	100.0	
Missing	System	19	1.0		
Total		1854	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	8	.4	.4	2.7
	Disagree	67	3.6	3.6	6.3
	Agree	524	28.3	28.5	34.8
	Strongly agree	443	23.9	24.1	58.9
	Very strongly agree	654	35.3	35.6	94.5
	Does not apply	102	5.5	5.5	100.0
	Total	1839	99.2	100.0	
Missing	System	15	.8		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	38	2.0	2.1	2.1
	Strongly disagree	13	.7	.7	2.8
	Disagree	60	3.2	3.3	6.0
	Agree	559	30.2	30.3	36.3
	Strongly agree	436	23.5	23.6	60.0
	Very strongly agree	642	34.6	34.8	94.8
	Does not apply	96	5.2	5.2	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	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	45	2.4	2.4	2.4
	Strongly disagree	18	1.0	1.0	3.4
	Disagree	54	2.9	2.9	6.3
	Agree	545	29.4	29.5	35.9
	Strongly agree	446	24.1	24.2	60.0
	Very strongly agree	711	38.3	38.5	98.5
	Does not apply	27	1.5	1.5	100.0
	Total	1846	99.6	100.0	
Missing	System	8	.4		
Total		1854	100.0		

...understand how the Early intervention system works.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.3	2.3	2.3
	Strongly disagree	16	.9	.9	3.1
	Disagree	45	2.4	2.4	5.6
	Agree	599	32.3	32.5	38.1
	Strongly agree	439	23.7	23.8	61.9
	Very strongly agree	690	37.2	37.4	99.3
	Does not apply	13	.7	.7	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	42	2.3	2.3	2.3
	Strongly disagree	11	.6	.6	2.9
	Disagree	49	2.6	2.7	5.5
	Agree	535	28.9	29.0	34.5
	Strongly agree	442	23.8	23.9	58.5
	Very strongly agree	752	40.6	40.7	99.2
	Does not apply	15	.8	.8	100.0
	Total	1846	99.6	100.0	
Missing	System	8	.4		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	45	2.4	2.4	2.4
	Strongly disagree	7	.4	.4	2.8
	Disagree	53	2.9	2.9	5.7
	Agree	501	27.0	27.2	32.9
	Strongly agree	362	19.5	19.7	52.6
	Very strongly agree	650	35.1	35.3	87.9
	Does not apply	223	12.0	12.1	100.0
	Total	1841	99.3	100.0	
Missing	System	13	.7		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	45	2.4	2.4	2.4
	Strongly disagree	9	.5	.5	2.9
	Disagree	44	2.4	2.4	5.3
	Agree	528	28.5	28.6	33.9
	Strongly agree	460	24.8	24.9	58.9
	Very strongly agree	698	37.6	37.9	96.7
	Does not apply	60	3.2	3.3	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	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	38	2.0	2.1	2.1
	Strongly disagree	11	.6	.6	2.7
	Disagree	76	4.1	4.1	6.8
	Agree	525	28.3	28.5	35.3
	Strongly agree	423	22.8	23.0	58.3
	Very strongly agree	622	33.5	33.8	92.1
	Does not apply	146	7.9	7.9	100.0
	Total	1841	99.3	100.0	
Missing	System	13	.7		
Total		1854	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	30	1.6	1.6	1.6
	Strongly disagree	17	.9	.9	2.6
	Disagree	47	2.5	2.6	5.1
	Agree	585	31.6	31.8	36.9
	Strongly agree	417	22.5	22.7	59.6
	Very strongly agree	648	35.0	35.2	94.8
	Does not apply	95	5.1	5.2	100.0
	Total	1839	99.2	100.0	
Missing	System	15	.8		
Total		1854	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	41	2.2	2.2	2.2
	Strongly disagree	9	.5	.5	2.7
	Disagree	61	3.3	3.3	6.0
	Agree	617	33.3	33.5	39.5
	Strongly agree	394	21.3	21.4	60.8
	Very strongly agree	707	38.1	38.3	99.2
	Does not apply	15	.8	.8	100.0
	Total	1844	99.5	100.0	
Missing	System	10	.5		
Total		1854	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	40	2.2	2.2	2.2
	Strongly disagree	9	.5	.5	2.7
	Disagree	21	1.1	1.1	3.8
	Agree	456	24.6	24.7	28.5
	Strongly agree	404	21.8	21.9	50.4
	Very strongly agree	897	48.4	48.6	99.0
	Does not apply	18	1.0	1.0	100.0
	Total	1845	99.5	100.0	
Missing	System	9	.5		
Total		1854	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	9	.5	.5	2.6
	Disagree	44	2.4	2.4	5.0
	Agree	451	24.3	24.5	29.5
	Strongly agree	431	23.2	23.4	53.0
	Very strongly agree	844	45.5	45.9	98.9
	Does not apply	21	1.1	1.1	100.0
	Total	1839	99.2	100.0	
Missing	System	15	.8		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	41	2.2	2.2	2.2
	Strongly disagree	8	.4	.4	2.7
	Disagree	33	1.8	1.8	4.5
	Agree	455	24.5	24.7	29.2
	Strongly agree	416	22.4	22.6	51.8
	Very strongly agree	867	46.8	47.1	99.0
	Does not apply	19	1.0	1.0	100.0
	Total	1839	99.2	100.0	
Missing	System	15	.8		
Total		1854	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	43	2.3	2.3	2.3
	Strongly disagree	7	.4	.4	2.7
	Disagree	25	1.3	1.4	4.1
	Agree	399	21.5	21.7	25.8
	Strongly agree	422	22.8	22.9	48.7
	Very strongly agree	934	50.4	50.8	99.5
	Does not apply	10	.5	.5	100.0
	Total	1840	99.2	100.0	
Missing	System	14	.8		
Total		1854	100.0		

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

		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	17	.9	.9	3.8
	Agree	366	19.7	19.9	23.7
	Strongly agree	393	21.2	21.4	45.1
	Very strongly agree	1006	54.3	54.8	99.8
	Does not apply	3	.2	.2	100.0
	Total	1837	99.1	100.0	
Missing	System	17	.9		
Total		1854	100.0		

I can easily get in touch with my service coordinator.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very strongly disagree	52	2.8	2.8	2.8
	Strongly disagree	13	.7	.7	3.5
	Disagree	36	1.9	2.0	5.5
	Agree	362	19.5	19.7	25.2
	Strongly agree	356	19.2	19.4	44.6
	Very strongly agree	998	53.8	54.4	99.0
	Does not apply	18	1.0	1.0	100.0
	Total	1835	99.0	100.0	
Missing	System	19	1.0		
Total		1854	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	52	2.8	2.8	2.8
	Strongly disagree	10	.5	.5	3.4
	Disagree	40	2.2	2.2	5.6
	Agree	394	21.3	21.5	27.0
	Strongly agree	377	20.3	20.5	47.6
	Very strongly agree	945	51.0	51.5	99.1
	Does not apply	17	.9	.9	100.0
	Total	1835	99.0	100.0	
Missing	System	19	1.0		
Total		1854	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, 2019 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:\Users\Randy Penfield\Documents\Consulting\Virginia\2019\VA_2018_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, 2019 ZOU530WS.TXT Jun 22 2018 9: 9
 INPUT: 1854 PERSON 22 ITEM REPORTED: 1848 PERSON 22 ITEM 5 CATS WINSTEPS 3.92.1

```

MEASURE      PERSON - MAP - ITEM
              <more>|<rare>
900 .##### +
     .      |
     .      |
     . T    |
     .#     |
     .      |
     .#     |
     .#     |
800 .#      +
     .#     |
     .#     |
     .#     |
     .## S  |
     .#     |
     .##   |
700 .##    +
     .##   |
     .##   | q1
     .###  |
     ##### T q2
     .###  | q5
     .## M | q8
     .###  | S
600 .##    + q4
     .##   |
     .#     |
     .###  M q9
     .##   | 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 20: EACH "." IS 1 TO 19
  
```


TABLE 3.1 Virginia Impact all individuals, 2019 ZOU530WS.TXT Jun 22 2018 9: 9
 INPUT: 1854 PERSON 22 ITEM REPORTED: 1848 PERSON 22 ITEM 5 CATS WINSTEPS 3.92.1

SUMMARY OF 1587 MEASURED (NON-EXTREME) PERSON

	TOTAL	COUNT	MEASURE	REAL	INFIT		OUTFIT	
	SCORE			S.E.	MNSQ	ZSTD	MNSQ	ZSTD
MEAN	77.6	20.5	633.79	25.82	1.00	-.4	1.00	-.4
P.SD	18.7	2.5	115.43	10.02	.72	2.1	.82	2.1
S.SD	18.7	2.5	115.46	10.03	.72	2.1	.82	2.1
MAX.	109.0	22.0	897.28	76.45	7.84	8.4	8.01	7.9
MIN.	11.0	3.0	151.73	18.06	.04	-6.3	.04	-5.8
REAL RMSE	27.70	TRUE SD	112.05	SEPARATION	4.05	PERSON RELIABILITY		.94
MODEL RMSE	24.70	TRUE SD	112.75	SEPARATION	4.57	PERSON RELIABILITY		.95
S.E. OF PERSON MEAN = 2.90								

MAXIMUM EXTREME SCORE: 226 PERSON 12.2%
 MINIMUM EXTREME SCORE: 35 PERSON 1.9%
 LACKING RESPONSES: 6 PERSON

SUMMARY OF 1848 MEASURED (EXTREME AND NON-EXTREME) PERSON

	TOTAL	COUNT	MEASURE	REAL	INFIT		OUTFIT	
	SCORE			S.E.	MNSQ	ZSTD	MNSQ	ZSTD
MEAN	79.6	20.5	663.27	37.46				
P.SD	21.5	2.6	171.67	30.17				
S.SD	21.5	2.6	171.72	30.17				
MAX.	110.0	22.0	969.89	112.73				
MIN.	11.0	3.0	79.68	18.06				
REAL RMSE	48.09	TRUE SD	164.80	SEPARATION	3.43	PERSON RELIABILITY		.92
MODEL RMSE	46.67	TRUE SD	165.21	SEPARATION	3.54	PERSON RELIABILITY		.93
S.E. OF PERSON MEAN = 3.99								

PERSON RAW SCORE-TO-MEASURE CORRELATION = .87
 CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .99 SEM = 1.88

SUMMARY OF 22 MEASURED (NON-EXTREME) ITEM

	TOTAL	COUNT	MEASURE	REAL	INFIT		OUTFIT	
	SCORE			S.E.	MNSQ	ZSTD	MNSQ	ZSTD
MEAN	6687.9	1724.6	567.41	2.64	.99	-1.7	1.02	-.6
P.SD	716.5	127.6	45.74	.31	.31	5.3	.36	5.2
S.SD	733.4	130.6	46.81	.31	.32	5.5	.37	5.4
MAX.	7560.0	1831.0	677.50	3.76	2.01	9.9	2.06	9.9
MIN.	4699.0	1324.0	497.80	2.43	.62	-9.9	.57	-9.9
REAL RMSE	2.65	TRUE SD	45.66	SEPARATION	17.21	ITEM	RELIABILITY	1.00
MODEL RMSE	2.52	TRUE SD	45.67	SEPARATION	18.09	ITEM	RELIABILITY	1.00
S.E. OF ITEM MEAN = 9.98								

ITEM RAW SCORE-TO-MEASURE CORRELATION = -.85
 Global statistics: please see Table 44.
 UMEAN=568.3000 USCALE=58.9100

TABLE 3.2 Virginia Impact all individuals, 2019 ZOU530WS.TXT Jun 22 2018 9: 9
 INPUT: 1854 PERSON 22 ITEM REPORTED: 1848 PERSON 22 ITEM 5 CATS WINSTEPS 3.92.1

SUMMARY OF CATEGORY STRUCTURE. Model="R"

CATEGORY LABEL	OBSERVED SCORE	OBSVD COUNT	SAMPLE %	OBSVD AVRGE	SAMPLE EXPECT	INFIT MNSQ	OUTFIT MNSQ	ANDRICH THRESHOLD	CATEGORY MEASURE
1	1	1255	3	-200.3	-239	1.42	1.46	NONE	-295.89
2	2	1489	4	-91.15	-125	1.12	1.13	-220.93A	-185.38
3	3	12058	32	-8.44	-3.67	1.01	1.13	-147.88A	-45.97
4	4	8968	24	88.71	84.73	.87	.82	55.95A	93.44
5	5	14171	37	194.49	199.5	1.01	1.06	128.99A	(203.95)
MISSING		2715	7	36.67					

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.	---ZONE---	50% CUM. PROBABILITY	COHERENCE M->C	C->M RMSR	ESTIM DISCR	OBSERVED-EXPECTED RESIDUAL DIFFERENCE
1	NONE		-295.89	-INF	-247.18	77%	37%	1.2868	-11.4% -58.3
2	-220.93A	3.22	-185.38	-247.18	-127.29	-233.39	36%	33%	.9102 .86 -36.9% -549.5
3	-147.88A	1.52	-45.97	-127.29	35.36	-137.30	74%	70%	.5734 1.08 6.8% 822.0
4	55.95A	.94	93.44	35.36	155.24	45.40	51%	66%	.5019 1.00 2.7% 237.7
5	128.99A	.99	(203.95)	155.24	+INF	141.45	80%	68%	.6087 1.04 -4.7% -451.9

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

Category Matrix : Confusion Matrix : Matching Matrix							
Predicted Scored-Category Frequency							
Obs Cat Freq	1	2	3	4	5	Total	
1	957.65	132.43	130.43	26.56	7.93	1255.00	
2	140.02	394.16	766.24	149.89	38.68	1489.00	
3	196.96	1290.13	6804.41	2816.76	949.73	12058.00	
4	14.46	183.17	2705.48	3404.27	2660.62	8968.00	
5	4.21	38.58	829.46	2332.80	10965.94	14171.00	
Total	1313.29	2038.49	11236.03	8730.29	14622.90	37941.00	

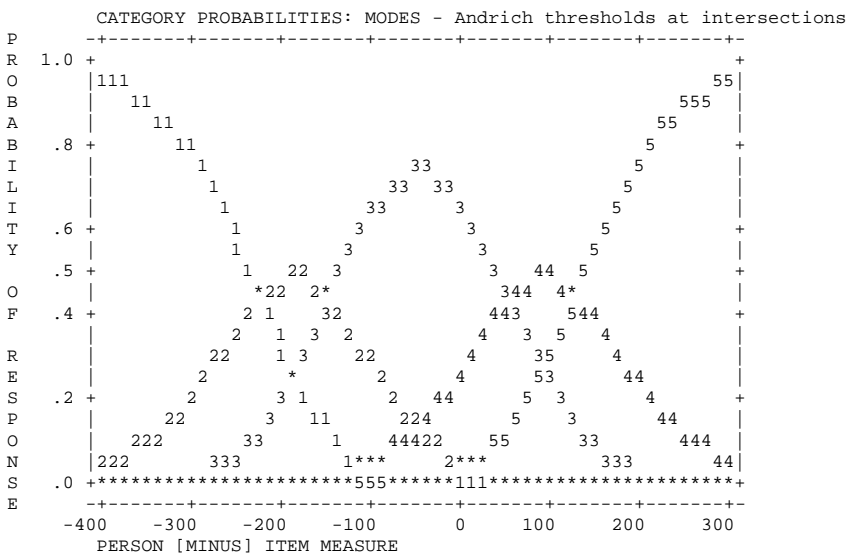


TABLE 10.1 Virginia Impact all individuals, 2019 ZOU530WS.TXTm Jun 22 2018 9: 9
 INPUT: 1854 PERSON 22 ITEM REPORTED: 1848 PERSON 22 ITEM 5 CATS WINSTEPS 3.92.1

PERSON: REAL SEP.: 3.43 REL.: .92 ... ITEM: REAL SEP.: 17.21 REL.: 1.00

ITEM STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	REAL MEASURE	REAL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-CORR.	AL-EXP.	EXACT OBS%	MATCH EXP%	DISPLACE	ITEM	
1	4924	1415	677.50A	3.76	2.01	9.9	2.06	9.9	A	.75	.85	41.0	57.7	-39.24	q1
2	6072	1694	656.00A	3.13	1.67	9.9	1.88	9.9	B	.77	.84	43.1	57.0	-38.61	q2
8	4699	1324	624.80A	3.13	1.26	5.5	1.40	7.2	C	.82	.85	59.4	57.7	4.36	q8
3	6603	1729	569.80A	2.57	1.07	1.8	1.26	5.0	D	.81	.82	61.6	60.6	6.38	q3
19	7134	1829	538.90A	2.53	1.04	1.0	1.12	2.2	E	.82	.80	68.2	62.1	21.88	q19
5	6006	1637	639.80A	2.62	1.11	2.8	1.11	2.5	F	.83	.84	58.8	58.3	-34.64	q5
4	6790	1775	608.80A	2.47	1.05	1.3	1.01	.3	G	.83	.83	61.8	59.0	-34.41	q4
15	6359	1618	559.10A	2.61	.96	-1.0	1.01	.3	H	.82	.82	67.1	61.3	.45	q15
13	7151	1831	552.90A	2.45	.99	-.3	1.00	.1	I	.82	.81	66.7	61.6	6.91	q13
22	7479	1820	498.10A	2.60	.93	-1.9	1.00	.1	J	.81	.77	70.5	64.5	23.30	q22
7	6868	1751	559.30A	2.49	.92	-2.3	.98	-.5	K	.82	.81	68.0	61.3	-.27	q7
11	6802	1748	540.40A	2.54	.91	-2.3	.96	-.7	k	.84	.80	67.9	62.0	25.96	q11
14	7284	1831	534.40A	2.49	.86	-3.9	.96	-.8	j	.83	.80	69.7	62.0	11.97	q14
6	7015	1768	545.90A	2.51	.91	-2.3	.87	-2.6	i	.82	.81	67.9	61.9	4.27	q6
9	6575	1747	576.80A	2.47	.85	-4.2	.87	-2.8	h	.85	.82	67.5	60.4	11.01	q9
10	6797	1737	556.80A	2.51	.83	-4.7	.80	-4.2	g	.84	.81	68.2	61.4	3.27	q10
17	6578	1695	555.90A	2.54	.80	-5.7	.83	-3.5	f	.84	.81	69.0	61.3	9.88	q17
18	6804	1744	545.50A	2.53	.80	-5.5	.82	-3.7	e	.85	.80	71.2	61.9	18.23	q18
20	7560	1827	497.80A	2.60	.74	-7.6	.70	-4.9	d	.83	.77	73.4	64.5	17.87	q20
12	7145	1819	564.50A	2.43	.71	-8.9	.62	-9.2	c	.85	.82	71.3	60.9	-9.09	q12
21	7433	1818	526.10A	2.52	.70	-8.9	.62	-7.7	b	.83	.79	74.9	62.5	-1.19	q21
16	7056	1784	553.90A	2.48	.62	-9.9	.57	-9.9	a	.86	.81	73.2	61.3	-3.25	q16
MEAN	6687.9	1724.6	567.41	2.64	.99	-1.7	1.02	-.6				65.5	61.0	.23	
P.SD	716.5	127.6	45.74	.31	.31	5.3	.36	5.2				8.5	1.9	19.49	