

**SPECIAL EDUCATION DISPROPORTIONATE
REPRESENTATION SIMULATION PROJECT:
FINAL REPORT**

Report Submitted to the
MICHIGAN DEPARTMENT OF EDUCATION

by

CENTER FOR URBAN STUDIES
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EXECUTIVE SUMMARY

Special education disproportionate representation is defined as over- or under-representation of particular racial/ethnic groups in special education categories relative to those groups' representation in the district (or state) general education population. There are several measures used for calculating disproportionate representation (see Appendix A for calculation formulas). One measure is the **Risk Ratio (RR)**, which divides the risk of a particular racial/ethnic group being identified in a special education category by the risk of all *other* racial/ethnic groups in the district being identified in that special education category. The RR is simple and straightforward, but is not comparable across districts because the denominator value necessarily varies with district-level racial/ethnic distributions. Consequently, the **Weighted Risk Ratio (WRR)** was developed to withstand district-level demographic variations ("Methods for Assessing," 2004). The WRR used the same numerator as the Risk Ratio (the risk of a particular racial/ethnic group being identified in a special education category), but weights the risks of the other racial/ethnic groups in the district according to their representation in the state population.

Though the WRR offers improved district-level comparability over the RR, both measures have problems with validity when based on small numbers of students. Thus, districts where the comparison group (all racial/ethnic groups not in the racial/ethnic group of interest) consists of fewer than ten students are encouraged to use the **Alternate Risk Ratio (ARR)**. Together, the RR, the WRR, and the ARR constitute the three primary measures of calculating special education disproportionate representation. Each measure has specific strengths and limitations, including issues that likely will remain unidentified or unrecognized by state departments of education and/or researchers who study disproportionate representation.

For the last three years, the Wayne State University Center for Urban Studies (Center) has been under contract with the MDE to identify Michigan school districts that exhibit the statistical potential for special education disproportionate representation. During this time, Center researchers have observed several problems with the three measures used to calculate disproportionate representation. Due to the frequency with which these problems arise, MDE commissioned Center researchers to complete an in-depth evaluation of the measures used in disproportionate representation calculations in order to address these problems and identify potential solutions. Most of the problems we have encountered stem from the complexity of the WRR measurement and its use in Michigan's school districts.

Like several other states, Michigan has many small, racially homogenous districts, but also has a number of districts with large populations of racial/ethnic groups that are *not* highly represented at the state level. Because the WRR is highly sensitive to the state- and district-level racial/ethnic composition, this measure can behave unpredictably when applied to certain districts. More specifically, the WRR seems to be exaggerated in local districts where the state's second largest racial/ethnic group population is low or zero in the local district, and other minority racial/ethnic groups represent a higher local proportion of students with disabilities than in the state.

Faced with these anomalies, we identified the following research questions:

1. What are the discrepancies, both theoretical and methodological, with use of the WRR and the ARR in these local districts?
2. What responses or solutions to these discrepancies can we identify?

To answer these research questions we conducted three separate analyses. First, we completed a series of data simulations using various calculations of disproportionate representation. We inserted hypothetical data into the calculations for each type of measure and analyzed how each measure responded to manipulation of the data. In other words, by making simple changes to the data, typically by adding only a single student, the WRR can be made to vary widely. We present a series of tables that depict the results of these data simulations. After careful analysis of theoretical data, we applied the simulation analysis to actual district-level data from selected LEAs in Michigan.

Second, we consulted with a statistician from Wayne State University to help us identify the theoretical limitations of the WRR and ARR, and also to offer insight into the development of alternative measures that are free of the shortcomings of the WRR and ARR. We present the results of our work with this statistician, including the presentation of an alternative disproportionate representation measure.

Third, we conducted phone interviews with representatives from six states in order to identify what current practices those states use to measure special education disproportionate representation. Another goal of the interviews was to determine whether other states were experiencing similar problems with the WRR and ARR. We present summaries of these interviews and describe the overall findings with respect to disproportionate representation current practices.

Finally, based on these analyses, we offer a series of recommendations for the MDE. They are:

1. If the number of WHITE or BLACK students in any disability category in a given district is equal to zero, MDE should forego use of the WRR in favor of the RR for that disability category in that district. This recommendation also applies to Indicator 9, where the number of WHITE or BLACK students in a given district is equal to zero for All Disabilities.
2. When the number of WHITE or BLACK students in a given district is fewer than three, if the WRR value is greater than or equal to 2.5 and the RR value is less than or equal to 1.5 (so that the difference between the two measures is greater than or equal to one), MDE should consider foregoing use of the WRR (but NOT the ARR) in favor of the RR in that district.
3. Proposed Additional Measure for Exploratory Analysis of Disproportionate Representation: The measure below was recommended by a statistician as an additional indicator of district-level risk for disproportionate representation. WSU will experiment with this measure over the next 12 months before giving a formal recommendation for its inclusion. It is explored further in later sections.

$$\text{Optional Risk Ratio (ORR)} = \frac{R(i)}{\sum_{\text{all } j} P(j) \times R(j)}$$

Where...

R (i) = District-Level Risk (i racial/ethnic group)

P (j) = District-Level Composition (j racial/ethnic group)

R (j) = District-Level Risk (j racial/ethnic group)

INTRODUCTION

The Wayne State University Center for Urban Studies (Center) was asked to evaluate the validity of measures currently used to assess special education disproportionate representation in Michigan, especially with regard to their performance relative to certain kinds of small populations. This report represents the results of our analyses and our conclusions based on the research we have conducted.

MEASURES FOR CALCULATING DISPROPORTIONATE REPRESENTATION

Special education disproportionate representation is defined as over- or under-representation of particular racial/ethnic groups in special education categories relative to those groups' representation in the district (or state) general education population. As a general example, if Hispanic students constitute a percentage of a district's special education population that differs significantly from their percentage of the district (or state) general education population, that district is identified as having disproportionate representation among Hispanic students.

There are several measures used for calculating disproportionate representation (see Appendix A for calculation formulas). One measure is the **Risk Ratio (RR)**, which divides the risk of a particular racial/ethnic group being identified in a special education category by the risk of all *other* racial/ethnic groups in the district being identified in that special education category. The RR is simple and straightforward, but is not comparable across districts because the denominator value necessarily varies with district-level racial/ethnic distributions. Consequently, the **Weighted Risk Ratio (WRR)** was developed to withstand district-level demographic variations ("Methods for Assessing," 2004). The WRR used the same numerator as the RR (the risk of a particular racial/ethnic group being identified in a special education category), but weights the risks of the other racial/ethnic groups in the district according to their representation in the state population.

Though the WRR offers improved district-level comparability over the RR, both measures have problems with validity when based on small numbers of students. Thus, districts where the comparison group (all racial/ethnic groups not in the racial/ethnic group of interest) consists of fewer than ten students are encouraged to use the **Alternate Risk Ratio (ARR)**. Together, the RR, the WRR, and the ARR constitute the three primary measures of calculating special education disproportionate representation. Each measure has specific strengths and limitations, including issues that likely will remain unidentified or unrecognized by state departments of education and/or researchers who study disproportionate representation.

STATEMENT OF THE PROBLEM

For the last three years, the Center has been under contract with the MDE to identify Michigan school districts that exhibit special education disproportionate representation. During this time, Center researchers have observed several problems with the three measures used to calculate disproportionate representation. Due to the frequency with which these problems arise, MDE commissioned Center researchers to complete an in-depth evaluation of the measures used in disproportionate representation calculations in order to address these problems and identify potential solutions. Most of the problems we have encountered stem from the complexity of the WRR measurement and its use in Michigan's school districts.

First, it is helpful to understand how racial/ethnic groups may be rank-ordered on the basis of their representation in a state (or district) student population. We call the racial/ethnic group with the largest number of students the **largest group**, while the other racial/ethnic groups in that state or district are called the **minority groups**.¹ Further, minority groups may be rank-ordered by size, whereby the minority group with the largest number of students is called the **second largest group**, and the remaining minority groups in that state or district are called the **smaller minority groups**.

Like several other states, Michigan has many small, racially homogenous districts, but also has a number of districts with large populations of racial/ethnic groups that are *not* highly represented at the state level. In other words, Michigan contains several districts in which the largest group is *different* from the largest group at the state level. Because the WRR is highly sensitive to the state- and district-level racial/ethnic composition, this measure can behave unpredictably when applied to such districts. More specifically, the WRR seems to be exaggerated in local districts where the second largest group population is a low or zero count, and other smaller minority groups represent a much higher proportion of special education students.

RESEARCH QUESTIONS

MDE has found that its chosen measures for assessing disproportionate representation, the WRR and the ARR, appear to perform inconsistently. The results of WRR and ARR may be invalid in some districts that have distributions of minorities that vary substantially from the state distributions. These discrepancies gave rise to the following research questions:

1. What are the discrepancies, both theoretical and methodological, with use of the WRR and the ARR in these local districts?
2. What responses or solutions to these discrepancies can we identify?

¹ The term "minority" in this report should be taken to mean "any racial/ethnic subgroup in a population that is not the largest subgroup." In other words, it is *not* intended to mean "any subgroup other than White."

DESCRIPTION OF ANALYSES

To answer these research questions we conducted three separate analyses:

First, we conducted a series of data simulations using various calculations of disproportionate representation. We inserted hypothetical data into the calculations for each type of measure and analyzed how each measure responded to manipulation of the data. In other words, by making simple changes to the data, typically by adding only a single student, the WRR can be made to vary widely. We present a series of tables that depict the results of these data simulations. After careful analysis of theoretical data, we applied the simulation analysis to actual district-level data from selected LEAs in Michigan.

Second, we consulted with a statistician from Wayne State University to help us identify the theoretical limitations of the WRR and ARR, and also to offer insight into the development of alternative measures that are free of the shortcomings of the WRR and ARR. We present the results of our work with this statistician, including the presentation of an alternative disproportionate representation measure.

Third, we conducted phone interviews with representatives from six states in order to discern what current practices those states use to measure special education disproportionate representation. Another goal of these interviews was to determine whether other states were experiencing similar problems with the WRR and ARR. We present summaries of each of the interviews and describe the overall findings with respect to disproportionate representation current practices.

ANALYSIS ONE: DATA SIMULATIONS

THEORETICAL SIMULATIONS

The data tables presented below show the relevant results of our data simulation analyses. Each table shows a unique student population, consisting of multiple racial/ethnic groups, and the resulting measures that accompany this theoretical district. Through simple changes in the data, typically consisting of only a single student, the WRR can be made to vary widely. Some major theoretical limitations experienced in measuring disproportionate representation are explained. All disabilities student populations are used in the below examples because of their simplicity in explanation and reporting as compared to individual disability category data.

Data simulations begin on following page.

Variable Key

GenEdPop (#): Racial/Ethnic group population enrolled in General Education.

DistrictComp (%): Racial/Ethnic group population percentage of total enrollment in district.

AllDisPop (#): Racial/Ethnic group population enrolled in Special Education.

DisabilityComp (%): Racial/Ethnic group population percentage of special education enrollment in district.

RiskAll (%): Risk of being enrolled in Special Education.

WRRAll (Ratio): Weighted Risk Ratio for Racial/Ethnic group.

ARRAll (Ratio): Alternate Risk Ratio for Racial/Ethnic group.

ORRAll (Ratio): Optional Risk Ratio for Racial/Ethnic group.

RiskRatioAll (Ratio): Risk Ratio for Racial/Ethnic group.

StateRisk_AllDis (%): State-Level Risk for Racial/Ethnic group.

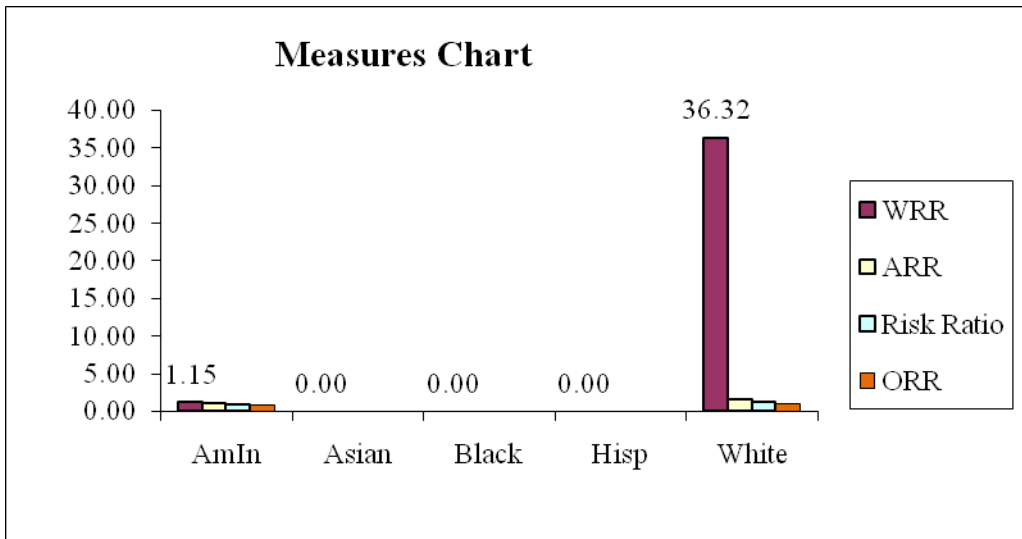
DstRisk_AllOthers (%): District-Level Risk for ALL other Racial/Ethnic groups.

In all tables below, the four measures analyzed are displayed in a bar graph for ease of comparison. Their order, from left to right, is as follows:

- Weighted Risk Ratio – Alternate Risk Ratio – Risk Ratio – Optional Risk Ratio –

White/ AmIn 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	300	5	5	5	500	815
DistrictComp	36.810%	0.613%	0.613%	0.613%	61.350%	
						Total
AllDisPop	50	0	0	0	100	150
DisabilityComp	33.333%	0%	0%	0%	66.667%	
RiskAll	16.667%	0%	0%	0%	20%	
WRRAll	1.15	0.00	0.00	0.00	36.32	
ARRAll	0.94	0.00	0.00	0.00	1.49	
ORRAll	0.91	0.00	0.00	0.00	1.09	
RiskRatioAll	0.86	0.00	0.00	0.00	1.26	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.417%	18.519%	18.519%	18.519%	15.873%	

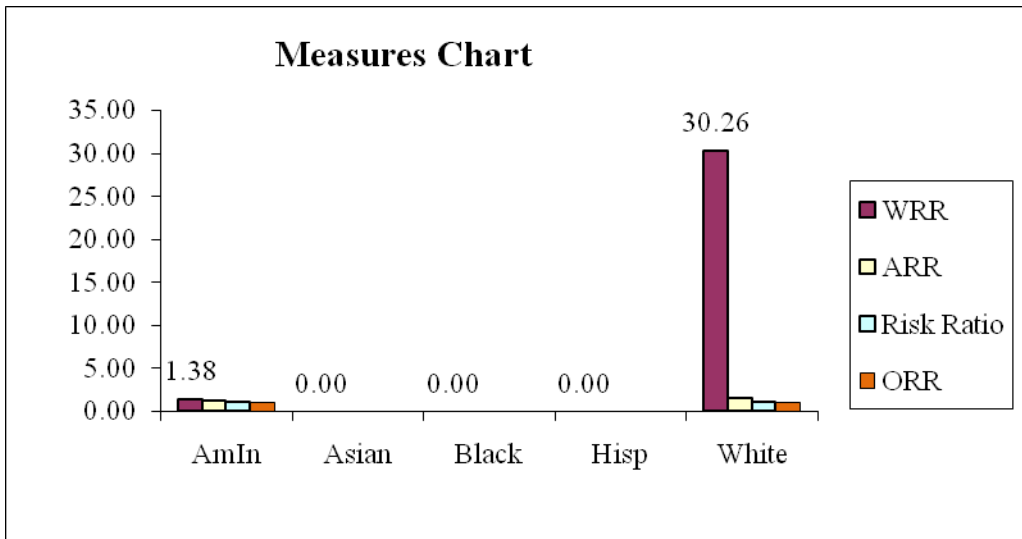


Summary

In this example, which is similar to the student population in a small Michigan public school district, the special education population is composed exclusively of White and American Indian students. This creates a problematic scenario for the WRR. Because there are so many American Indian students, the WRR for White student APPEARS to be dramatically elevated. In evaluating the ARR, RR, and Risk, it can be seen that the White students in this district are at a slightly higher risk of being identified for special education, but the value of 36.32 is clearly too high to be a true measure of risk. Hypothetically, this elevated WRR could be lowered by balancing the risk values of American Indian students with White students. The next example will outline the practical aspect of this hypothesis.

White/ AmIn 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	300	5	5	5	500	815
DistrictComp	36.810%	0.613%	0.613%	0.613%	61.350%	
						Total
AllDisPop	60	0	0	0	100	160
DisabilityComp	37.500%	0%	0%	0%	62.500%	
RiskAll	20%	0%	0%	0%	20%	
WRRAll	1.38	0.00	0.00	0.00	30.26	
ARRAll	1.13	0.00	0.00	0.00	1.49	
ORRAll	1.02	0.00	0.00	0.00	1.02	
RiskRatioAll	1.03	0.00	0.00	0.00	1.05	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.417%	19.753%	19.753%	19.753%	19.048%	



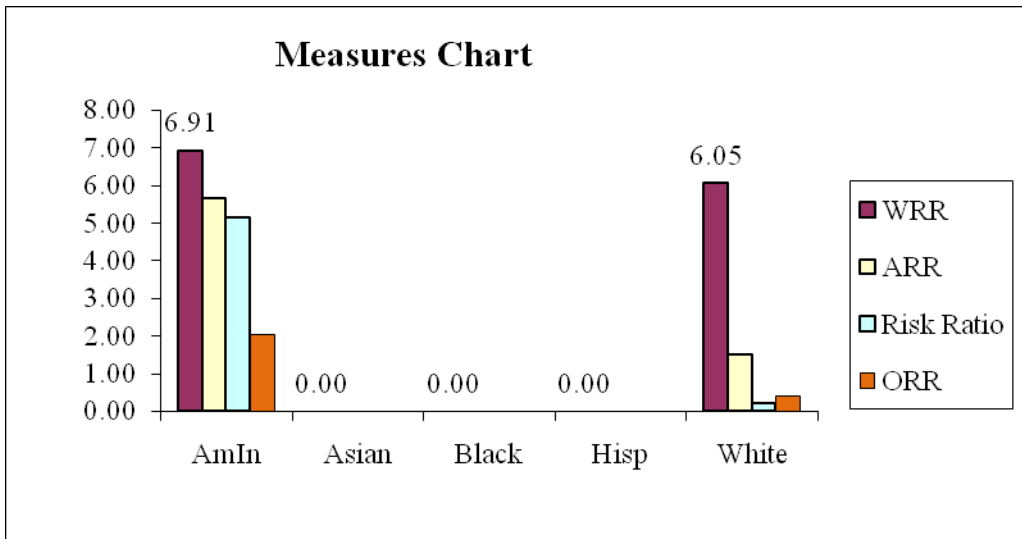
Summary

By adding ten American Indian students into the disability category, it can be seen that the risk values of White and American Indian students are now matched at 20%. However, the WRR for White students (30.26) is still far too high. In theory, by adding additional American Indian students into the disability category, the White WRR will decrease into an acceptable range. The next example depicts the outcome of this approach.

White/ AmIn 3

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	300	5	5	5	500	815
DistrictComp	36.810%	0.613%	0.613%	0.613%	61.350%	

	AmIn	Asian	Black	Hisp	White	Total
AllDisPop	300	0	0	0	100	400
DisabilityComp	75.000%	0%	0%	0%	25.000%	
RiskAll	100%	0%	0%	0%	20%	
WRRAll	6.91	0.00	0.00	0.00	6.05	
ARRAll	5.65	0.00	0.00	0.00	1.49	
ORRAll	2.04	0.00	0.00	0.00	0.41	
RiskRatioAll	5.15	0.00	0.00	0.00	0.21	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.417%	49.383%	49.383%	49.383%	95.238%	

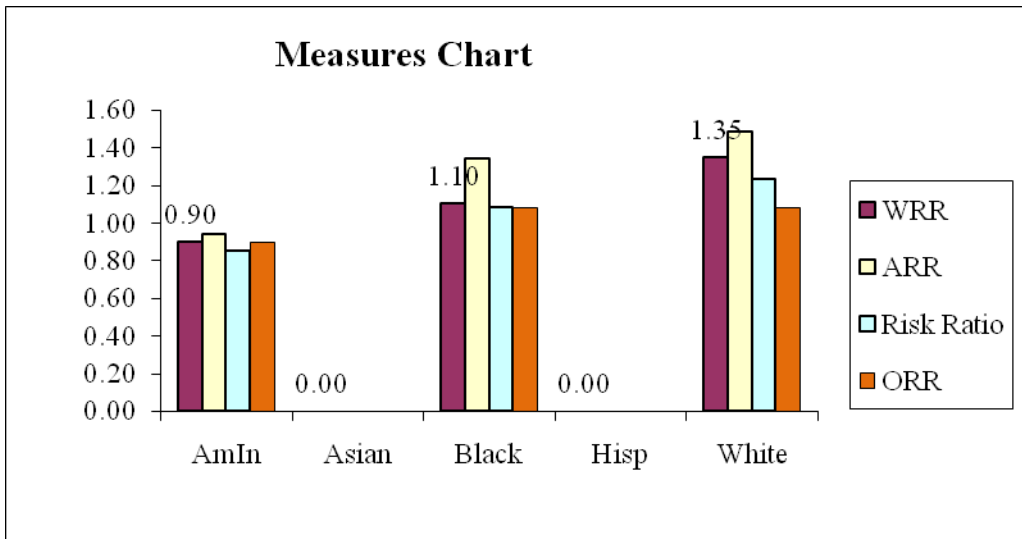


Summary

By adding more and more students into the American Indian disability group, we have effectively lowered the White WRR to 6.05. However, in order to lower the White WRR we had to add ALL American Indian students into the disability group (AmIn Risk =100%). This scenario has now crossed the line from practical to purely theoretical in nature, as it would almost certainly never happen in any district in the state. Returning to the original chart, we present another angle for analysis.

White/ AmIn 4

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	300	5	5	5	500	815
DistrictComp	36.810%	0.613%	0.613%	0.613%	61.350%	
						Total
AllDisPop	50	0	1	0	100	151
DisabilityComp	33.113%	0%	0.662%	0%	66.225%	
RiskAll	16.667%	0%	20%	0%	20%	
WRRAll	0.90	0.00	1.10	0.00	1.35	
ARRAll	0.94	0.00	1.34	0.00	1.49	
ORRAll	0.90	0.00	1.08	0.00	1.08	
RiskRatioAll	0.85	0.00	1.08	0.00	1.24	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.612%	18.642%	18.519%	18.642%	16.190%	

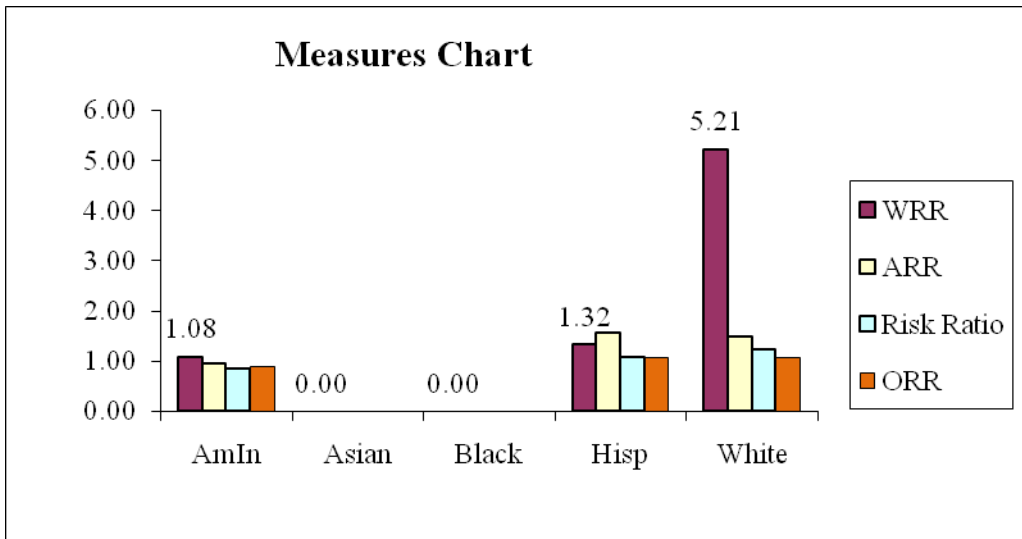


Summary

In this example, we have returned to the populations presented in the first simulation with one exception. We have added one Black student into the disability category. The effects of this addition are profound. The White WRR has decreased from 36.32 to 1.35. Additionally, this example is the only one of the lot where ALL measures used for White disproportionate representation are relatively equal. In all other examples, the WRR is much larger than the other measures for White students (ARR, RR, etc). The presence of a non-zero value in the composition of Black students appears to be more important than the risk values associated with the three racial groups represented in this table. Since the WRR compares BOTH risk values AND composition values, having no value for Black composition (and thus no value for Black Risk) has a dramatic effect on the White WRR. This type of balancing can also be accomplished by adding students of other racial categories into special education, but not nearly to the effect of the addition of a single Black student, as illustrated by the next table.

White/ AmIn 5

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	300	5	5	5	500	815
DistrictComp	36.810%	0.613%	0.613%	0.613%	61.350%	
						Total
AllDisPop	50	0	0	1	100	151
DisabilityComp	33.113%	0%	0%	0.662%	66.225%	
RiskAll	16.667%	0%	0%	20%	20%	
WRRAll	1.08	0.00	0.00	1.32	5.21	
ARRAll	0.94	0.00	0.00	1.56	1.49	
ORRAll	0.90	0.00	0.00	1.08	1.08	
RiskRatioAll	0.85	0.00	0.00	1.08	1.24	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.612%	18.642%	18.642%	18.519%	16.190%	

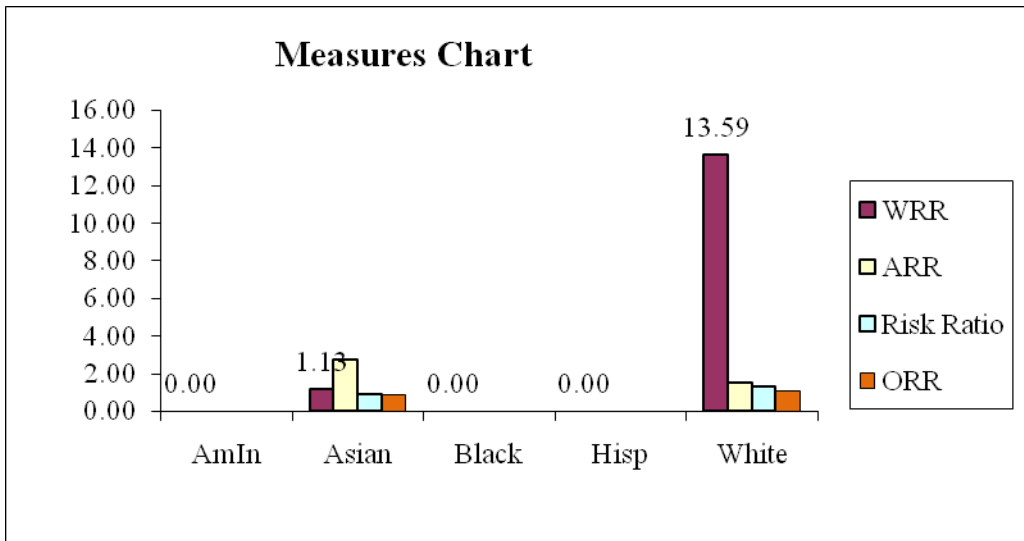


Summary

As seen above, the effect of adding one Hispanic student into the special education category is far less than was seen when one Black student was added. In this example, the White WRR drops quite a bit (to 5.21) but is still considerably higher than before the addition of a single Black student in special education. The addition of one Asian student has even less of an effect than the addition of one Hispanic student, with the White WRR lowering to 8.63. These examples show the importance of having AT LEAST one Black student enrolled in special education in order to generate an effective value for the WRR. As the next series of tables shows, the scenarios in which Black students are not represented in special education present problems with interpretation of the White WRR.

White/ Asian 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	300	5	5	500	815
DistrictComp	0.613%	36.810%	0.613%	0.613%	61.350%	
						Total
AllDisPop	0	50	0	0	100	150
DisabilityComp	0%	33.333%	0%	0%	66.667%	
RiskAll	0%	16.667%	0%	0%	20%	
WRRAll	0.00	1.13	0.00	0.00	13.59	
ARRAll	0.00	2.69	0.00	0.00	1.49	
ORRAll	0.00	0.91	0.00	0.00	1.09	
RiskRatioAll	0.00	0.86	0.00	0.00	1.26	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.519%	19.417%	18.519%	18.519%	15.873%	

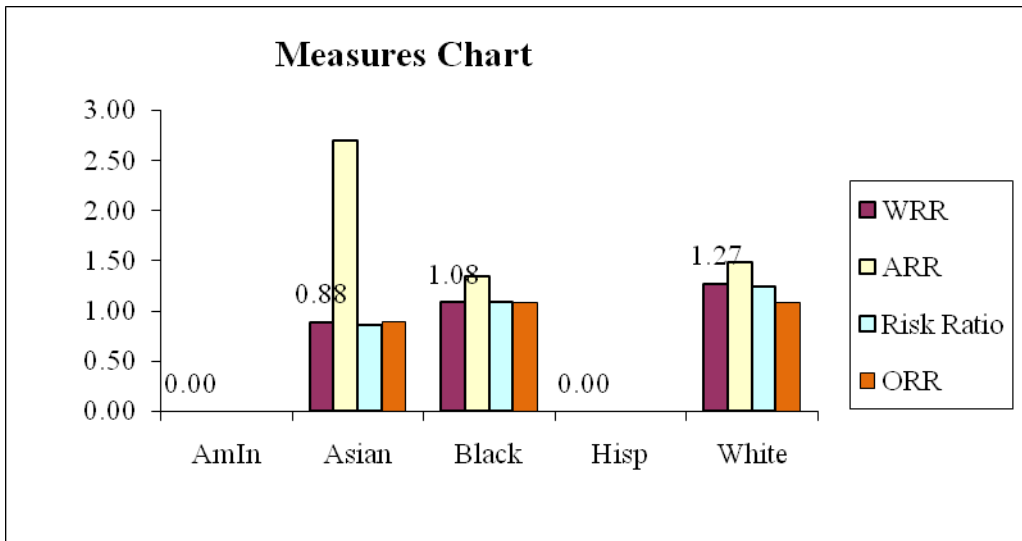


Summary

In this example, White students stay the largest group, but the second largest group has been shifted from American Indian to Asian. The result is an elevated White WRR, but not nearly as inflated as the White WRR seen in the first example of White/American Indian (White/AmIn1). Once again, the singular addition of an American Indian or Hispanic student will only moderately lower the White WRR. However, as previously seen in the White/American Indian examples, the addition of a single Black student into special education lowers the White WRR dramatically. This is portrayed in the next table.

White/ Asian 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	300	5	5	500	815
DistrictComp	0.613%	36.810%	0.613%	0.613%	61.350%	
						Total
AllDisPop	0	50	1	0	100	151
DisabilityComp	0%	33.113%	0.662%	0%	66.225%	
RiskAll	0%	16.667%	20%	0%	20%	
WRRAll	0.00	0.88	1.08	0.00	1.27	
ARRAll	0.00	2.69	1.34	0.00	1.49	
ORRAll	0.00	0.90	1.08	0.00	1.08	
RiskRatioAll	0.00	0.85	1.08	0.00	1.24	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.642%	19.612%	18.519%	18.642%	16.190%	

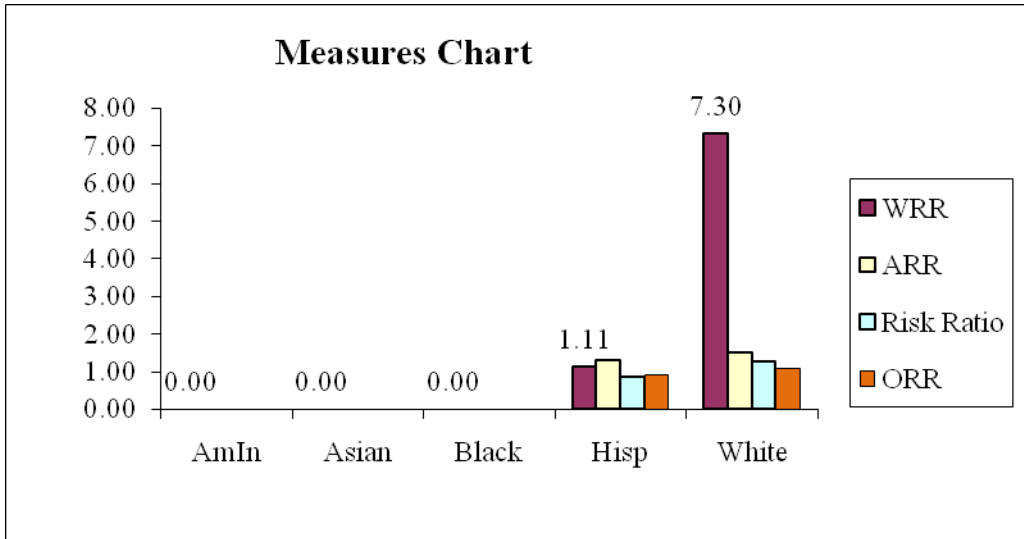


Summary

As seen before in the tables examining elevated White WRR with high American Indian student populations, this table shows the effect of adding a single Black student into the disability category. This table further outlines one of the primary problems districts in Michigan are having with the application of the WRR for White students in LEAs with limited ethnic diversity. The main problem we are experiencing occurs when an LEA has White students as the largest group enrolled in special education and any Non-Black minority group as the second largest group enrolled in special education, with no representation from the Black students in this LEA. In simple terms, LEAs are having problems when they have large a large composition of Hispanic, Asian, and/or American Indian students BUT NO Black students enrolled in special education.

White/ Hispanic 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	5	300	500	815
DistrictComp	0.613%	0.613%	0.613%	36.810%	61.350%	
						Total
AllDisPop	0	0	0	50	100	150
DisabilityComp	0%	0%	0%	33.333%	66.667%	
RiskAll	0%	0%	0%	16.667%	20%	
WRRAll	0.00	0.00	0.00	1.11	7.30	
ARRAll	0.00	0.00	0.00	1.30	1.49	
ORRAll	0.00	0.00	0.00	0.91	1.09	
RiskRatioAll	0.00	0.00	0.00	0.86	1.26	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.519%	18.519%	18.519%	19.417%	15.873%	

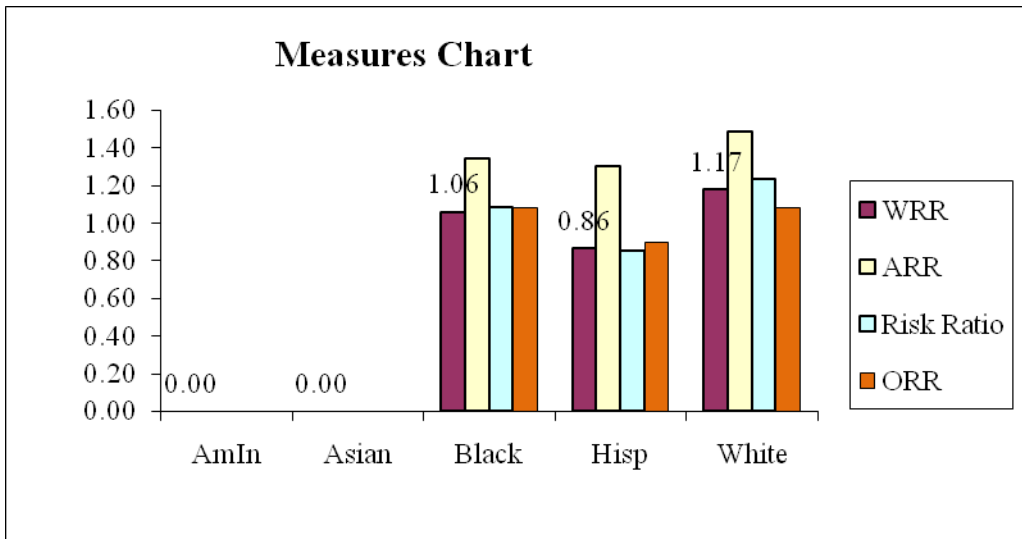


Summary

In this table, we see the results of a district with a large Hispanic special education student population. As seen previously in both the American Indian AND Asian tables, the end result is an elevated White WRR that can only really be lowered by adding at least one Black student into the special education population. This appears (again) in the next table.

White/ Hispanic 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	5	300	500	815
DistrictComp	0.613%	0.613%	0.613%	36.810%	61.350%	
						Total
AllDisPop	0	0	1	50	100	151
DisabilityComp	0%	0%	0.662%	33.113%	66.225%	
RiskAll	0%	0%	20%	16.667%	20%	
WRRAll	0.00	0.00	1.06	0.86	1.17	
ARRAll	0.00	0.00	1.34	1.30	1.49	
ORRAll	0.00	0.00	1.08	0.90	1.08	
RiskRatioAll	0.00	0.00	1.08	0.85	1.24	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.642%	18.642%	18.519%	19.612%	16.190%	

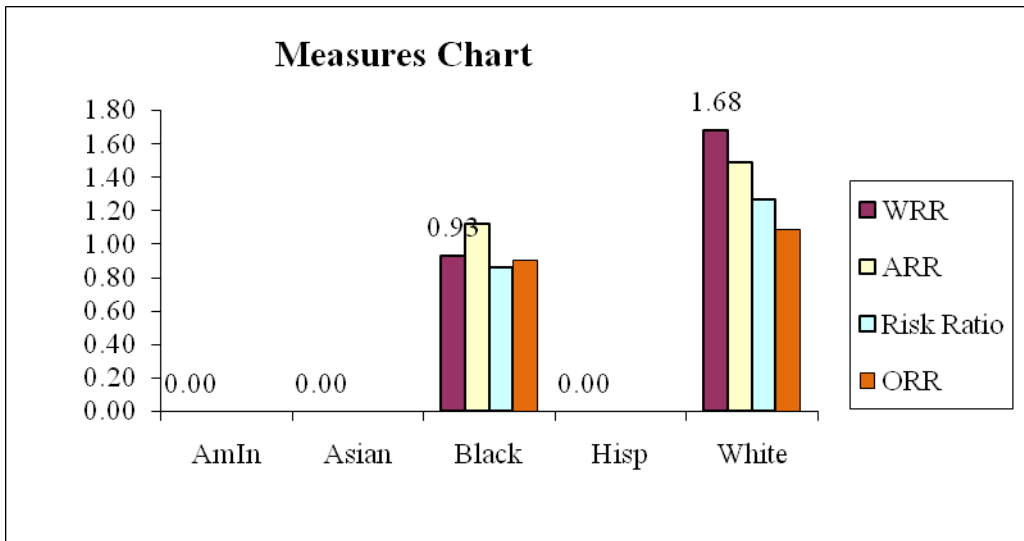


Summary

This table shows the measures resulting from adding a single Black student into the disability category. As we have seen in previous tables, this very slight alteration has a dramatic effect on the White WRR, lowering it from 7.30 to 1.17, and ultimately changing the state-determined disproportionate representation status of the LEA. The only racial/ethnic group that this type of WRR behavior is NOT seen in is the Black student group, as evidenced by our next table.

White/ Black 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	300	5	500	815
DistrictComp	0.613%	0.613%	36.810%	0.613%	61.350%	
						Total
AllDisPop	0	0	50	0	100	150
DisabilityComp	0%	0%	33.333%	0%	66.667%	
RiskAll	0%	0%	16.667%	0%	20%	
WRRAll	0.00	0.00	0.93	0.00	1.68	
ARRAll	0.00	0.00	1.12	0.00	1.49	
ORRAll	0.00	0.00	0.91	0.00	1.09	
RiskRatioAll	0.00	0.00	0.86	0.00	1.26	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.519%	18.519%	19.417%	18.519%	15.873%	



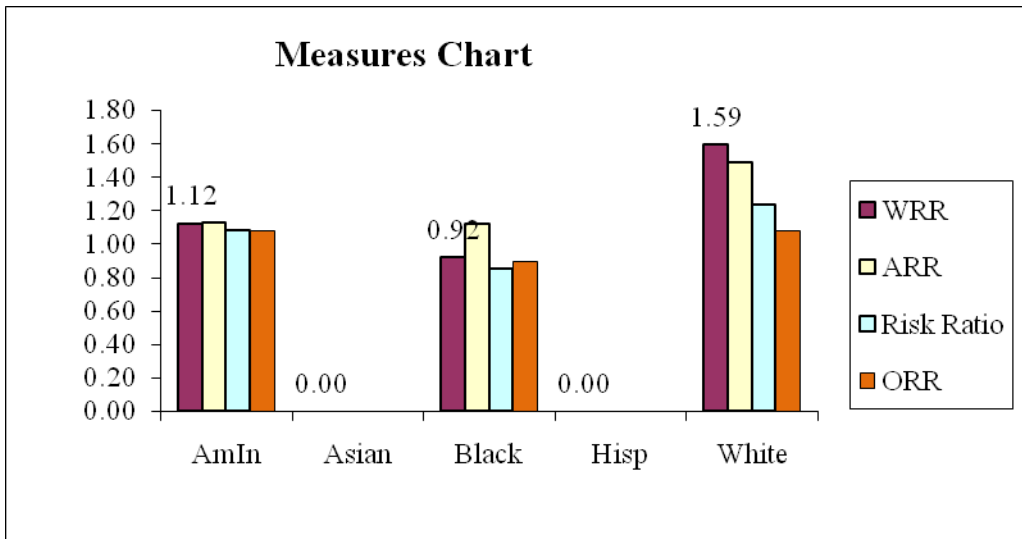
Summary

This table has similar population compositions to previous tables used in this review, with the main exception being that 300 Black students have been placed into the special education category. The extremely elevated White WRR seen in previous simulations is not present in this example. This is primarily due to the presence of Black students in the disability category, as the WRR operates under the assumption that every LEA in question is primarily composed of White and (to a lesser extent) Black students, with a small minority population composed of American Indian, Asian, and Hispanic students.

White/ Black 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	300	5	500	815
DistrictComp	0.613%	0.613%	36.810%	0.613%	61.350%	

	AmIn	Asian	Black	Hisp	White	Total
AllDisPop	1	0	50	0	100	151
DisabilityComp	0.662%	0%	33.113%	0%	66.225%	
RiskAll	20%	0%	16.667%	0%	20%	
WRRAll	1.12	0.00	0.92	0.00	1.59	
ARRAll	1.13	0.00	1.12	0.00	1.49	
ORRAll	1.08	0.00	0.90	0.00	1.08	
RiskRatioAll	1.08	0.00	0.85	0.00	1.24	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	18.519%	18.642%	19.612%	18.642%	16.190%	

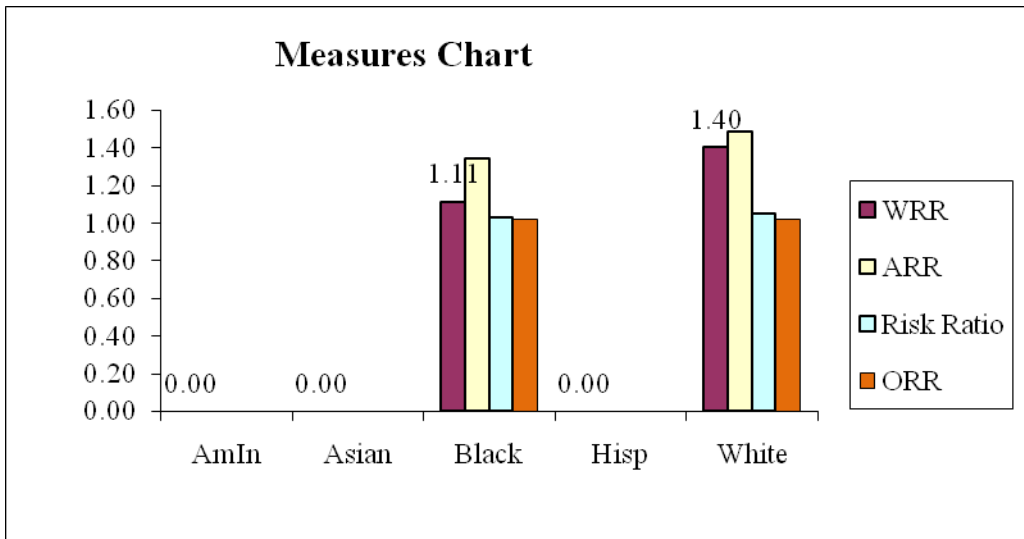


Summary

This table shows the minimal effect that the addition of a single American Indian student has on the White WRR. Previous examples have displayed the effect that the addition of a single Black student has on the White WRR, but this appears to be specific to Black students only. Again, this simulation outcome demonstrates the inherent problems associated with the WRR when atypical populations exist.

White/ Black 3

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	300	5	500	815
DistrictComp	0.613%	0.613%	36.810%	0.613%	61.350%	
						Total
AllDisPop	0	0	60	0	100	160
DisabilityComp	0%	0%	37.500%	0%	62.500%	
RiskAll	0%	0%	20%	0%	20%	
WRRAll	0.00	0.00	1.11	0.00	1.40	
ARRAll	0.00	0.00	1.34	0.00	1.49	
ORRAll	0.00	0.00	1.02	0.00	1.02	
RiskRatioAll	0.00	0.00	1.03	0.00	1.05	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.753%	19.753%	19.417%	19.753%	19.048%	

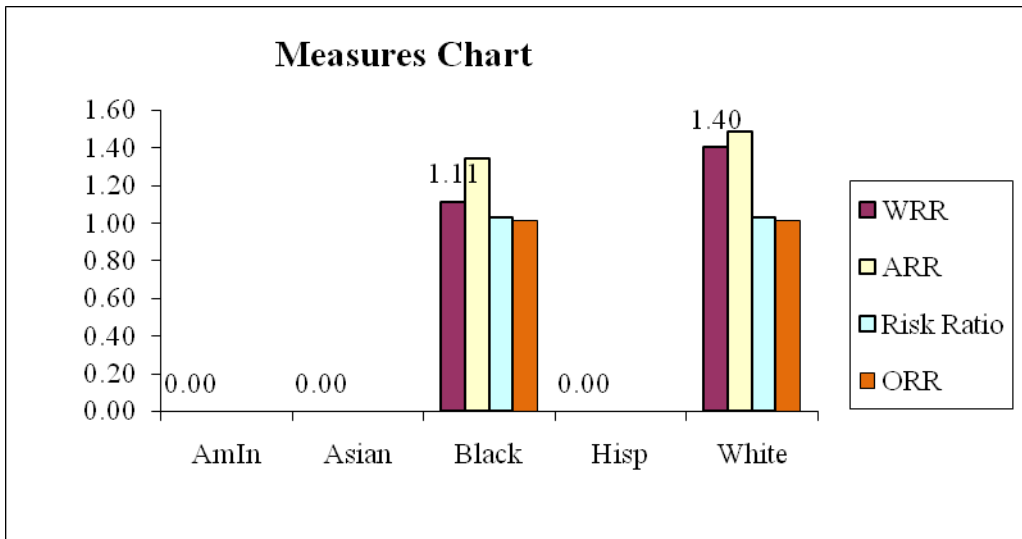


Summary

This table displays the effect of the addition of 10 Black students into the disability group, resulting in a total group enrollment of 60. This increases the Black risk to 20%, and makes it equal to the White risk. The effect of this addition is minimal among values for the White students. The White WRR decreases from 1.68 to 1.40 while the White ARR remains the same as the previous table (ARR=1.49).

White/ Black 4

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	500	5	500	1015
DistrictComp	0.493%	0.493%	49.261%	0.493%	49.261%	
						Total
AllDisPop	0	0	100	0	100	200
DisabilityComp	0%	0%	50%	0%	50%	
RiskAll	0%	0%	20%	0%	20%	
WRRAll	0.00	0.00	1.11	0.00	1.40	
ARRAll	0.00	0.00	1.34	0.00	1.49	
ORRAll	0.00	0.00	1.02	0.00	1.02	
RiskRatioAll	0.00	0.00	1.03	0.00	1.03	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.802%	19.802%	19.417%	19.802%	19.417%	

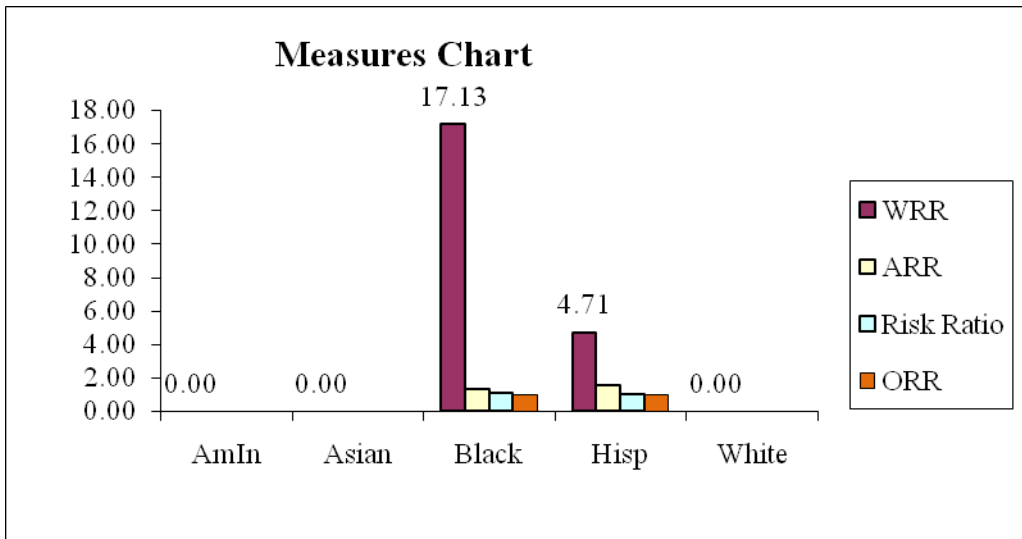


Summary

This table shows the outcome of a balanced special education group, with one half of the students enrolled in this category being Black and the other half being White. While the risk and RRs for both groups are the same (20%, and 1.03 respectively), the WRR and ARR are both higher for White students. Obviously this is a problem, and the simple solution is to apply numerous measures over time and chart trends in each individually AS WELL AS collectively.

Black/ Hispanic 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	1000	300	5	1315
DistrictComp	0.380%	0.380%	76.046%	22.814%	0.380%	
						Total
AllDisPop	0	0	200	60	0	260
DisabilityComp	0%	0%	76.923%	23.077%	0%	
RiskAll	0%	0%	20%	20%	0%	
WRRAll	0.00	0.00	17.13	4.71	0.00	
ARRAll	0.00	0.00	1.34	1.56	0.00	
ORRAll	0.00	0.00	1.01	1.01	0.00	
RiskRatioAll	0.00	0.00	1.05	1.02	0.00	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.847%	19.847%	19.048%	19.704%	19.847%	

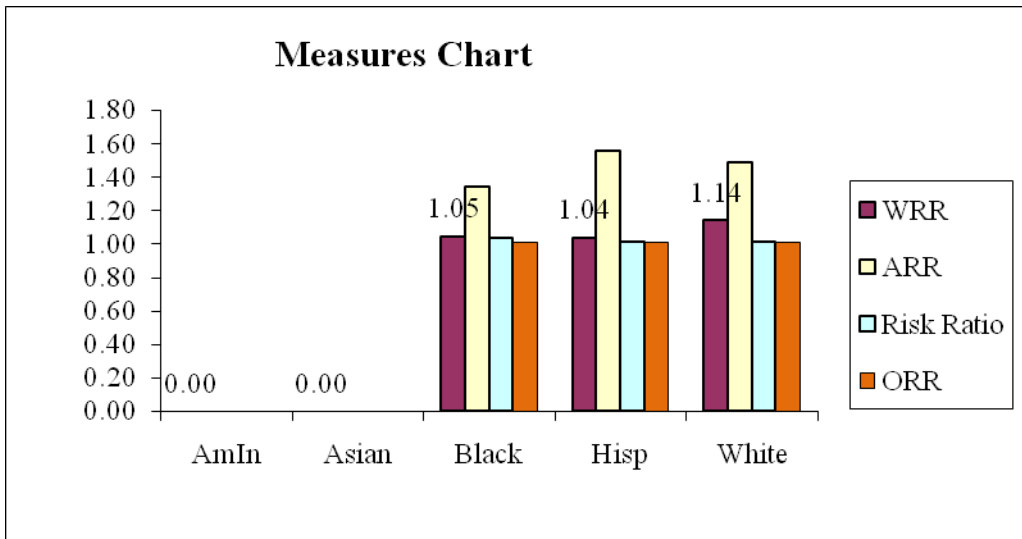


Summary

This table shows an example in which Black students are the largest group in a population, composing more than 76% of the district’s total population. Hispanic students are used as the second largest group. Without the presence of White students in the disability category, a similar problem emerges as was previously seen in the above examples without a Black student in the disability category. The next table shows the effect of adding a single White student into the disability category.

Black/ Hispanic 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	1000	300	5	1315
DistrictComp	0.380%	0.380%	76.046%	22.814%	0.380%	
						Total
AllDisPop	0	0	200	60	1	261
DisabilityComp	0%	0%	76.628%	22.989%	0.383%	
RiskAll	0%	0%	20%	20%	20%	
WRRAll	0.00	0.00	1.05	1.04	1.14	
ARRAll	0.00	0.00	1.34	1.56	1.49	
ORRAll	0.00	0.00	1.01	1.01	1.01	
RiskRatioAll	0.00	0.00	1.03	1.01	1.01	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.924%	19.924%	19.365%	19.803%	19.847%	

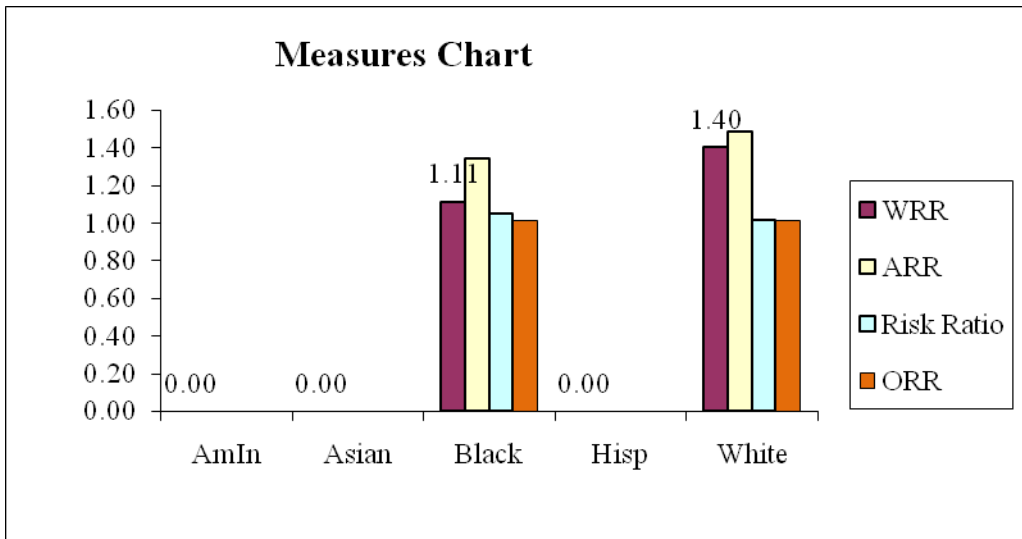


Summary

This table shows the effects of the addition of a single white student into the disability category. Notice the similar effects previously seen when one Black student was added to the disability group in the above examples.

Black/ White 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	5	5	1000	5	300	1315
DistrictComp	0.380%	0.380%	76.046%	0.380%	22.814%	
						Total
AllDisPop	0	0	200	0	60	260
DisabilityComp	0%	0%	76.923%	0%	23.077%	
RiskAll	0%	0%	20%	0%	20%	
WRRAll	0.00	0.00	1.11	0.00	1.40	
ARRAll	0.00	0.00	1.34	0.00	1.49	
ORRAll	0.00	0.00	1.01	0.00	1.01	
RiskRatioAll	0.00	0.00	1.05	0.00	1.02	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	19.847%	19.847%	19.048%	19.847%	19.704%	



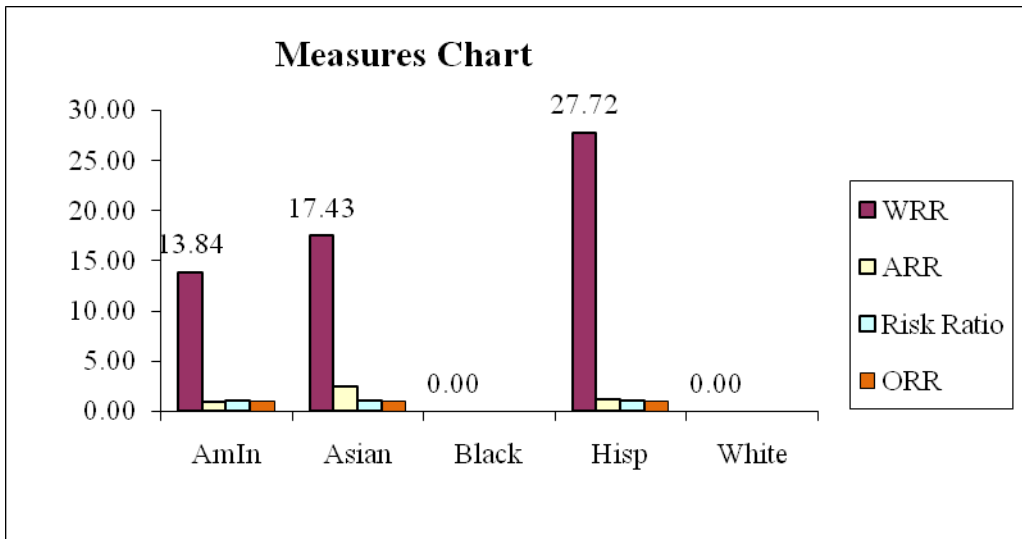
Summary

This table shows an example in which Black students are the largest group in a district, composing more than 76% of the total population. White students are added as the second largest group, and the results are similar to those seen when White and Black students are the largest and second largest groups, respectively.

AmIn/Asian/ Hispanic 1

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	100	100	5	100	5	310
DistrictComp	32.258%	32.258%	1.613%	32.258%	1.613%	

	AmIn	Asian	Black	Hisp	White	Total
AllDisPop	15	15	0	15	0	45
DisabilityComp	33.333%	33.333%	0%	33.333%	0%	
RiskAll	15.000%	15.000%	0%	15.000%	0%	
WRRAll	13.84	17.43	0.00	27.72	0.00	
ARRAll	0.85	2.42	0.00	1.17	0.00	
ORRAll	1.03	1.03	0.00	1.03	0.00	
RiskRatioAll	1.05	1.05	0.00	1.05	0.00	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	14.286%	14.286%	14.754%	14.286%	14.754%	

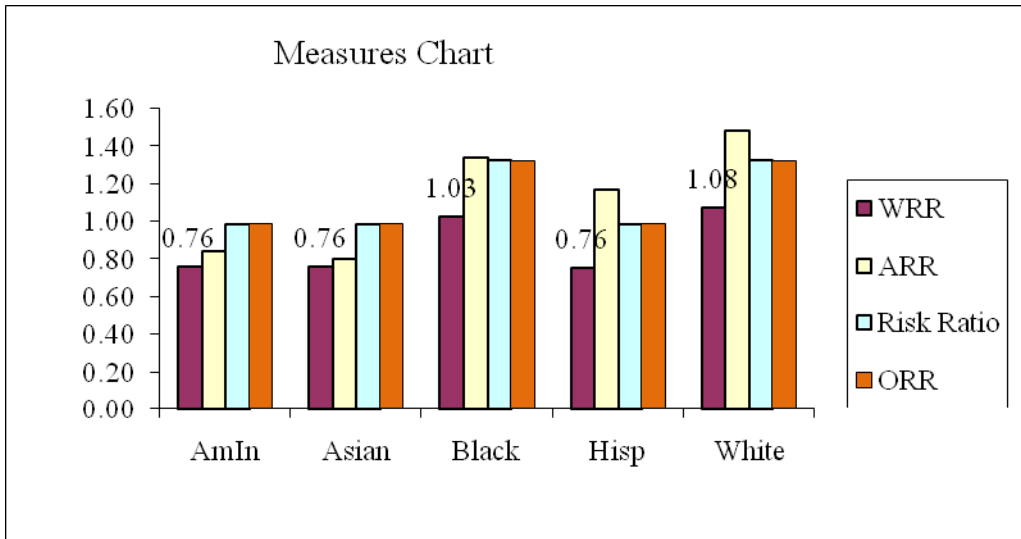


Summary

This table depicts a scenario in which the three smallest minority groups make up the entire disability population. This further demonstrates the need for non-zero values in the two largest (by state composition) groups. In Michigan, those two groups are White and Black. A single student from each is added in the following table; please see the result this brings.

AmIn/ Asian/ Hispanic 2

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	100	100	5	100	5	310
DistrictComp	0.3226	0.3226	0.0161	0.3226	0.0161	
AllDisPop	15	15	1	15	1	Total 47
DisabilityComp	31.915%	31.915%	2.128%	31.915%	2.128%	
RiskAll	15.000%	15.000%	20.000%	15.000%	20.000%	
WRRAll	0.76	0.76	1.03	0.76	1.08	
ARRAll	0.85	0.80	1.34	1.17	1.49	
ORRAll	0.99	0.99	1.32	0.99	1.32	
RiskRatioAll	0.98	0.98	1.33	0.98	1.33	Total
StateRisk_AllDis	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	15.238%	15.238%	15.082%	15.238%	15.082%	



Summary

This table adds a single Black and White student into the disability population. As previously seen in the examples where Black or White student population was equal to zero, the WRR measures for the other racial/ethnic groups all drop significantly. This is representative of the theoretical problems experienced in calculating the potential for racial and ethnic disproportionate representation in special education enrollment using the WRR and ARR.

PRACTICAL (DATA-BASED) SIMULATIONS

The data tables below show the application of the theory shown in the tables above in actual district-level data from the 2007-2008 academic year. These special case study LEAs fall into three basic categories, each of which helps explain the practical limitations experienced in the determination of racial/ethnic disproportionate representation in special education. LEA names have been masked to preserve report anonymity.

Selected districts with unique populations and large differentials between the WRR or ARR and the RR are listed below.

High White and American Indian Compositions (**without** students in other racial/ethnic groups)

1. LEA1
2. LEA2

High White and American Indian Compositions (**with** students in other racial/ethnic groups)

1. LEA3

Very High White Composition (>95%)

1. LEA4

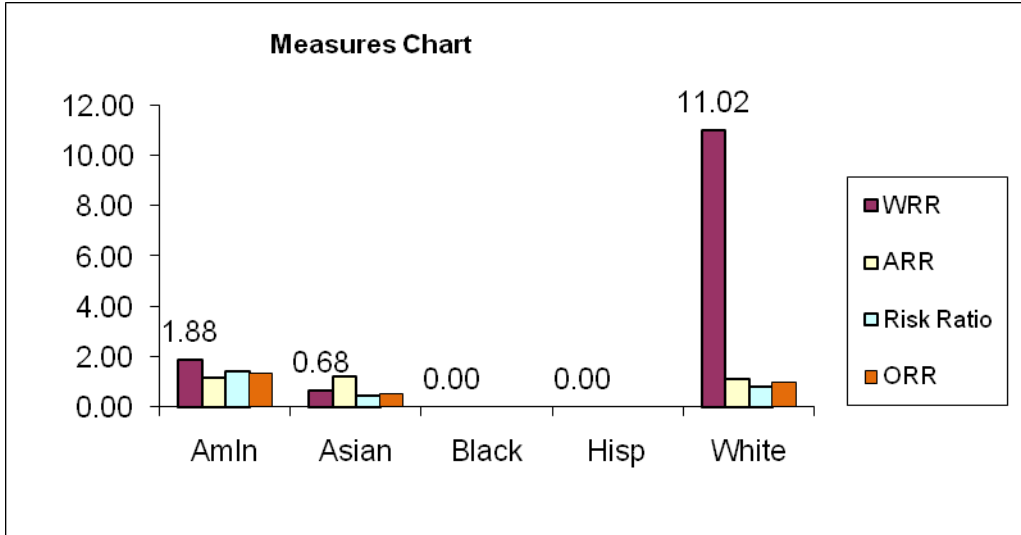
All practical LEA simulation analyses are conducted using Operating District population numbers.
All practical LEA simulation analyses are conducted using All Disabilities as the group.

Simulations begin on the following page.

LEA Name: LEA1

Category: All Disabilities
Year: 2007-2008

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	134	13	3	10	563	723
DistrictComp	18.534%	1.798%	0.415%	1.383%	77.870%	
						Total
SpEdPop	28	1	0	0	85	114
DisabilityComp	24.561%	0.877%	0%	0%	74.561%	
RiskAll	20.896%	7.692%	0%	0%	15.098%	
WRRAll	1.88	0.68	0.00	0.00	11.02	
ARRAll	1.18	1.24	0.00	0.00	1.12	
ORRAll	1.33	0.49	0.00	0.00	0.96	
RiskRatioAll	1.43	0.48	0.00	0.00	0.83	Total
StateRisk_AllOthers	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	14.601%	15.915%	15.833%	15.989%	18.125%	



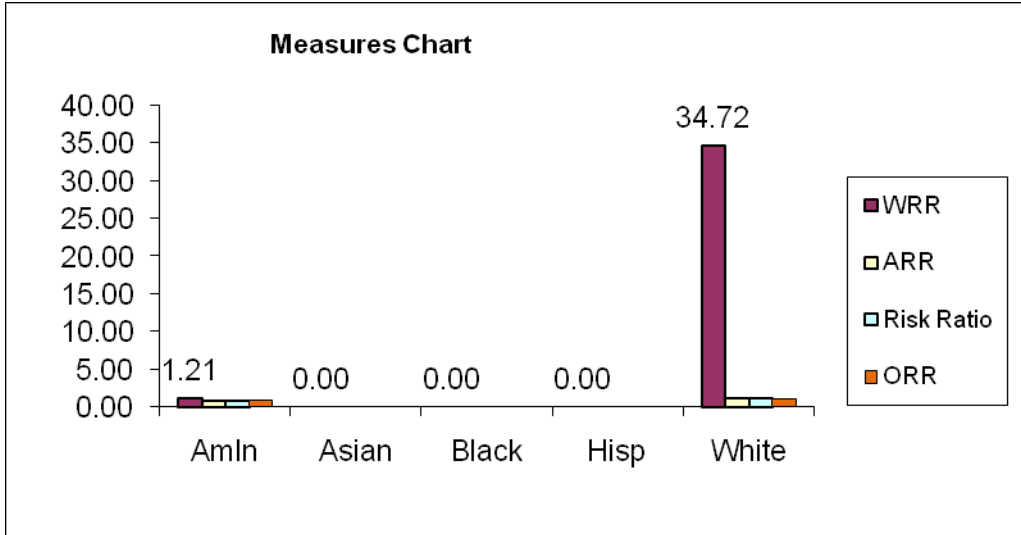
Summary

This table, which is representative of the student population in LEA1, shows a student population dominated by White and American Indian students. As seen in theoretical examples above, the elevated White WRR can be attributed to the zero value for Black student population in the special education category. If a single Black student was placed into the disability category, the White WRR drops substantially. Additionally, when examining the Risk and RR values for American Indian students, it should be noted that they are both higher than the same values for White students in this LEA.

LEA Name: LEA2

Category: All Disabilities
Year: 2007-2008

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	218	2	4	0	291	515
DistrictComp	42.330%	0.388%	0.777%	0.000%	56.505%	
						Total
SpEdPop	32	0	0	0	49	81
DisabilityComp	39.506%	0%	0%	0%	60.494%	
RiskAll	14.679%	0%	0%	0%	16.838%	
WRRAll	1.21	0.00	0.00	0.00	34.72	
ARRAll	0.83	0.00	0.00	0.00	1.25	
ORRAll	0.93	0.00	0.00	0.00	1.07	
RiskRatioAll	0.89	0.00	0.00	0.00	1.18	Total
StateRisk_AllOthers	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	16.498%	15.789%	15.851%	15.728%	14.286%	



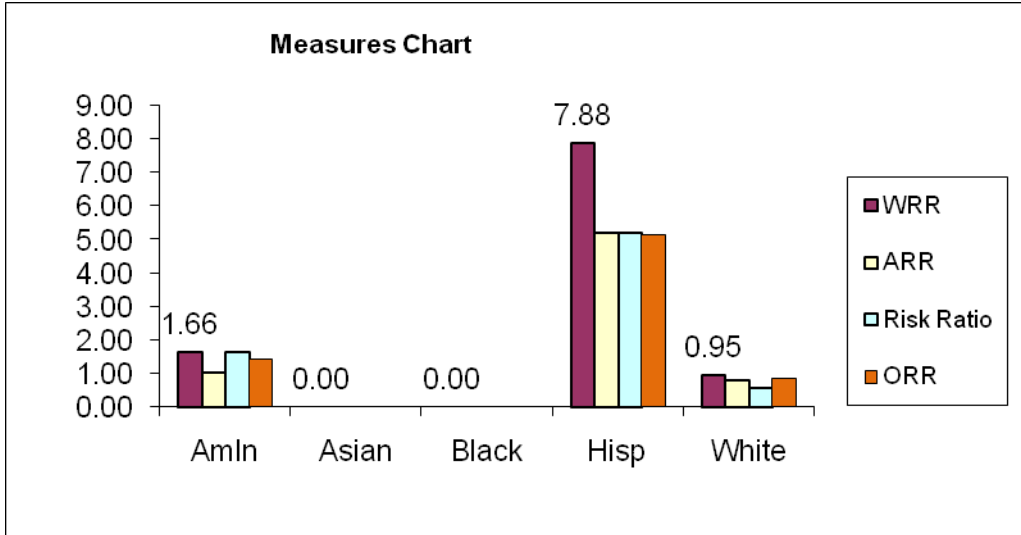
Summary

This table shows the student population data from LEA2. This student population is similar to the one previously examined, made up almost exclusively of White and American Indian students in the general education group, and exclusively in the special education category. As we have seen in previous examples, the lack of at least one Black student in the special education category creates an inflated White WRR. Although the White risk and RR are slightly higher than the American Indian values, the WRR presented is far too high to be an accurate indicator of disproportionate representation in the LEA.

LEA Name: LEA3

Category: All Disabilities
Year: 2007-2008

	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	179	2	1	3	554	739
DistrictComp	24.222%	0.271%	0.135%	0.406%	74.966%	
						Total
SpEdPop	33	0	0	2	61	96
DisabilityComp	34.375%	0%	0%	2.083%	63.542%	
RiskAll	18.436%	0%	0%	66.667%	11.011%	
WRRAll	1.66	0.00	0.00	7.88	0.95	
ARRAll	1.04	0.00	0.00	5.19	0.82	
ORRAll	1.42	0.00	0.00	5.13	0.85	
RiskRatioAll	1.64	0.00	0.00	5.22	0.58	Total
StateRisk_AllOthers	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	11.250%	13.026%	13.008%	12.772%	18.919%	



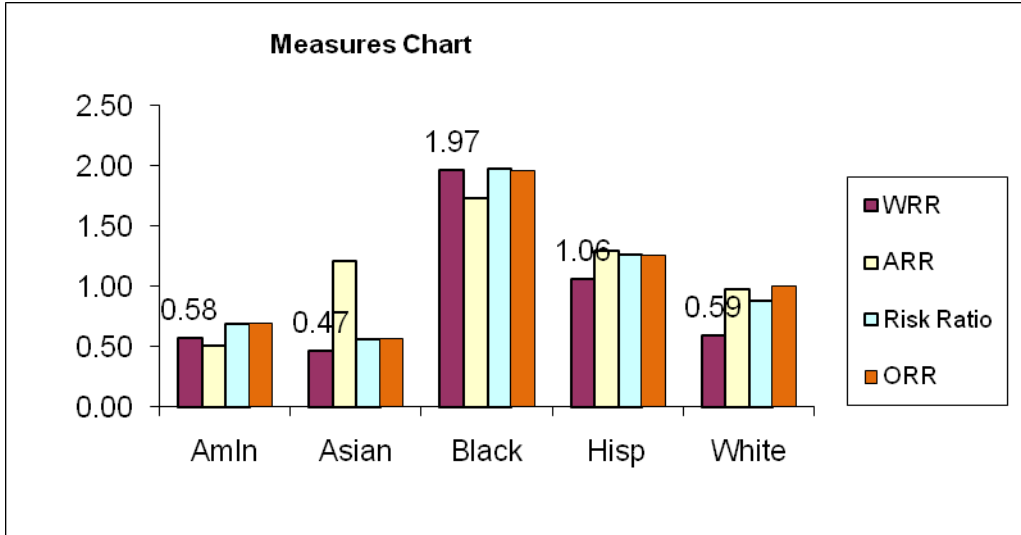
Summary

This table shows the student population data from LEA3. This LEA has an issue with calculating a valid and accurate measure for risk using only 3 students in the total group and 2 students in the group of interest. Current MDE Business Rules for calculating disproportionate representation dictate that this district would not be included in the calculations for disproportionality among Hispanic students because their enrollment population for this disability category is fewer than ten.

LEA Name: LEA4

Category: All Disabilities
Year: 2007-2008

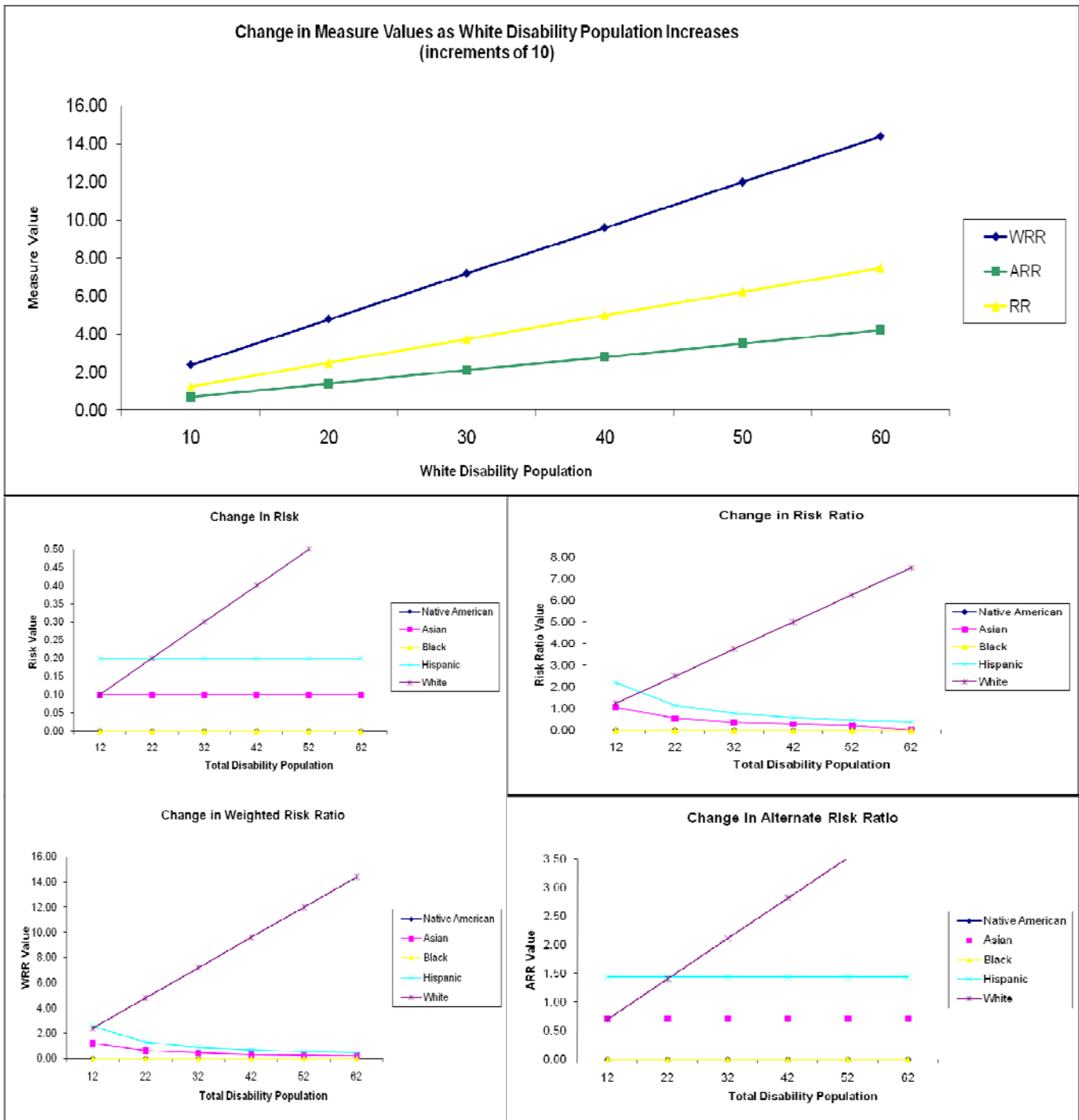
	AmIn	Asian	Black	Hisp	White	Total
GenEdPop	11	40	27	36	3271	3385
DistrictComp	0.325%	1.182%	0.798%	1.064%	96.632%	
						Total
SpEdPop	1	3	7	6	431	448
DisabilityComp	0.223%	0.670%	1.563%	1.339%	96.205%	
RiskAll	9.091%	7.500%	25.926%	16.667%	13.176%	
WRRAll	0.58	0.47	1.97	1.06	0.59	
ARRAll	0.51	1.21	1.74	1.30	0.98	
ORRAll	0.69	0.57	1.96	1.26	1.00	
RiskRatioAll	0.69	0.56	1.97	1.26	0.88	Total
StateRisk_AllOthers	17.706%	6.190%	14.927%	12.846%	13.459%	13.585%
DstRisk_AllOthers	13.248%	13.303%	13.133%	13.198%	14.912%	



Summary

Student population data from LEA3 is displayed in the table above. It is predominantly composed of White students in both the general and special education categories, with every racial/ethnic group contributing at least one student in the disability category. This table serves as a proper example of how the WRR, ARR, and RR work when the cells are adequately populated with data. There are no zero counts for White or Black students, and the ratios are higher in the racial/ethnic groups with higher risk values. Black students have the highest risk of identification and, as expected, also have elevated values for the WRR, ARR, and RR.

Figure 1. Change in Measure Values as White Disability Population Increases



The above graphs show how the various measures change as White students are added into the disability category. Note the higher slope of the line for WRR as compared to ARR and RR. The smaller graphs show the changes in individual disproportionate representation measures as White disability population increases, and act in coordination with the larger measures graph.

ANALYSIS TWO: MEETING WITH STATISTICAL CONSULTANT

Due to the technical nature of the statistical measures used in this project, outside consultation was arranged with a professor (Tze-Chien “TC” Sun, Ph.D.) in the mathematics department at Wayne State University. His assessment returned several conclusions for the various measures used in the determination of disproportionate representation in special education, as well the introduction of a new measure for district-level risk assessment. In addition to his analyses of the measures used in the disproportionate representation calculations, he offered statistical recommendations for when and how each measure should be applied in practice.

Discussion of the current measures (Composition, Risk, RR, WRR, ARR) lead to the conclusion that no single measure stands out as being consistently accurate and reliable enough to be used alone. The resolution to this conclusion was the recommendation of selective and combinatorial use of all five measures, which have their individual strengths and weaknesses, but when used together can depict the true disproportionate representation in a district.

Dr. Sun next focused on the stability of each measure, based primarily on student size in any given racial/ethnic group or specific disability category. All measures analyzed were found to be more stable when applied at the state level, owing to the fact that the student layer size is far greater when every child in the state is included in the count. Small student sizes, such as those typically seen in district-level data, have the ability to cause large variability in all measures analyzed. The outcome of this conclusion was the recommendation that any measure of true state-level disproportionate representation should be compared to measures at the state level (e.g., Risk [district-level] / Composition x Risk [district-level]). This new measure, coined the Optional Risk Ratio (ORR) combines risk values from the district and weights the risk based on composition, and typically falls between the WRR and ARR in practice. It differs from the other two ratios in that it includes the group of interest in the denominators for risk at the district level. Due to this inclusion, the denominator is based on a larger number of students and produces more stable results, especially when the comparison group population numbers are low. WSU plans to analyze it on the 2008-2009 school year data in conjunction with the current measures in order to enhance our understanding of racial/ethnic disproportionate representation in special education populations. After this trial year analysis, WSU will make a formal recommendation to the MDE regarding the ORR and its use in future in formal disproportionality analysis.

Further analysis of each measure was conducted, to center in on their meaning, purpose, and contribution to the overall understanding of disproportionate representation within a specific district. Composition was found to be the most basic measure of the racial/ethnic makeup of a particular district. It is virtually independent of state-level data, as it is based on the student count in each district. Risk values measure the number of students from a particular racial/ethnic group that are enrolled in special education, but risk is only dependent upon the racial/ethnic group in question. Similar to composition, it does not calculate overall risk at the district or state level, but simply the number of students of a particular racial/ethnic group enrolled in special education. The three ratios (RR, WRR, and ARR) are the best measures of total group risk. However, the RR only depends upon the risk calculated in two groups within a given district, such as the risk of White students enrolled in special education versus the risk of Non-White students enrolled in special education. The RR is not rooted (or weighted) in larger or more stable populations, so its main weakness is that it fails to measure a risk value that can be compared across all districts. The WRR does this somewhat effectively by weighting the risk using state-level composition values, but is susceptible to large variations in districts with atypical student compositions or zero values for White and/or Black students in the special education category. The ARR simply utilizes the fact that all measures are more stable at the state-level, and uses data from state sums.

Through further analyses in the data simulation program created at the Center, useful examples of the interplay between each measure can be created, but it is highly unlikely that a single measure will be identified that satisfies all the requirements that a thorough analysis of risk requires.

The alternative disproportionate representation measure (ORR) developed by Dr. Sun is detailed below. The ORR is included in data simulations and reports, but its future use, if any, will be formally established following its trial period of use at WSU.

$$\text{ORR} = \frac{R(i)}{\sum_{\text{all } j} P(j) \times R(j)}$$

Where...

R (i) = District-Level Risk (i racial/ethnic group)

P (j) = District-Level Composition (j racial/ethnic group)

R (j) = District-Level Risk (j racial/ethnic group)

ANALYSIS THREE: INTERVIEWS REGARDING CURRENT PRACTICES

METHOD FOR STATE SELECTION

Six states were approved for current practice interviews by the MDE with assistance from the Center. So as to keep states anonymous, throughout this report we will refer to these states as State A, State B, State C, State D, State E, State F, and State G.

The first step in the selection procedure identified states that employ the same disproportionate representation calculation measures Michigan uses and that have a clear second largest group. A list of states that use the WRR either alone or in conjunction with the ARR was compiled as well. Using enrollment data from www.schooldatairect.org, we judged a state to have a clear second largest group if the second largest group's school enrollment was at least two-thirds of the state's total minority group enrollment, and no other minority group exceeded 10% enrollment in the state.

The two lists were presented and compared on a 50-state summary chart. Using this chart, seven states meeting both criteria were identified. Three additional states were added to this list for their use of WRR and ARR, even though they lack a large minority group. This list of recommendations, along with the chart described above, was sent to MDE for consideration. MDE then selected the final six states for analysis.

After selecting candidates for current practice interviews, the MDE expressed concern over recent determinations from the Federal Office of Special Education Programs (OSEP). As a federal regulator exercising authority granted by the Individuals with Disabilities in Education Improvement Act of 2004 (IDEA 2004), OSEP annually reviews each state's Annual Performance Report (APR) and, if necessary, its updated State Performance Plan (SPP) to determine the validity, reliability, and compliance level of the twenty SPP indicators. Based on its performance in addressing these indicators, the state may "meet requirements" or require assistance, intervention, or substantial intervention. MDE wished to avoid interviewing states that attained a determination other than "meets requirements" as a result of their disproportionate representation indicators (SPP 9 and 10).

The Center responded to this concern and decided to summarize OSEP's determinations for FY2006, which had been released in June of 2008. Using publically available records, the Center summarized OSEP's categorization method and constructed several tables listing each state's FFY 2006 determinations. Each state selected as an interview candidate by MDE was highlighted on the determination chart. Only one, State F, attained a determination other than "meets requirements" as a result of a disproportionate representation indicator. However, this problem pertained to procedural issues rather than disproportionate representation calculations themselves. The Center then sent its findings to MDE. After reviewing the document, MDE gave final approval to the six interview candidates. All respondents from these states had experience calculating disproportionate representation. Some analysts were affiliated with an independent contractor consulted by the states, while others were employed directly by their states' departments of education.

SUMMARY OF STATES' EXPERIENCES WITH WRR ANOMALIES

Of the six respondents, four reported experiencing statistical problems using the WRR for certain districts, and one additional state found similar problems with the ARR. With the exception of State B, respondents from the states identifying problems with the WRR believe they are caused by unusual enrollment patterns, as we perceive to be the case in Michigan. The respondent for State F, a state that found similar problems with the ARR, also expressed concern for the statistical limitations of that measure and consulted Westat, Inc. for guidance.

Variations appear in how these states have chosen to address these statistical problems. Three states (A, B, and D) have adjusted, or are considering adjusting, their minimum N sizes, either for the group considered, the comparison group, or both. Three (A, D, and F) consider supplemental measures, such as composition and the simple RR, to account for potential exaggerations of the WRR or ARR. A third party contractor has advised two others to consider the simple risk ratio in conjunction with the WRR. These states would, presumably, examine the magnitude of the gap between the two measures for each group of interest to determine whether the WRR is exaggerated. Two states (A and F) have decided to employ composition in conjunction with WRR (or ARR, in State F). Both of these states have constructed a set of conditions that must be present for composition to be considered.

Most of the practices and suggestions described here were not, however, articulated in these states' most recent SPPs and APRs, perhaps because of their recent consideration. For example, efforts to incorporate supplementary measures when calculating WRR were not described in the states' FY 2006 annual reports. However, changes in N size limitations were more consistently reported in the SPPs and APRs. While the reasons for this are beyond the scope of this research, the nonappearance of official documentation calls attention to the issue of OSEP determinations. In short, because of the absence of these emerging methods in official reports, OSEP has not yet determined their validity, reliability, and compliance with IDEA 2004 requirements.

STATE A

According to respondents from State A, certain districts in which the second largest group was not African American (the second largest group in the state) experienced problems with the WRR, sometimes resulting in very large WRRs for White students. The state has, consequently, raised the N size for the group of interest from 10 to 20. In addition, the state has decided not to calculate WRRs for a racial/ethnic group if that group's composition in the district is greater than 85%. Instead, the state will use the composition index to calculate disproportionate representation for these racial/ethnic groups. This rule applies to all racial/ethnic groups, including White students. Furthermore, State A is considering the use of multiple year allowances for districts (as Michigan does) before they are flagged for disproportionate representation.

STATE B

The respondent from State B pointed out that the WRR has caused isolated problems in certain districts, but such problems were primarily attributable to special education centers rather than to racial/ethnic composition disparities. The respondent was not aware of statistical problems pertaining to districts with large American Indian populations (this state's second largest group) or any other large minority group, as Michigan has experienced. Furthermore, early trials (e.g. simulations) of the RR,

WRR, and ARR did not demonstrate significant differences for this state's districts in terms of flagging disproportionate representation, even for districts with high American Indian populations. The state's primary concern has been its high number of rural districts. The chief method for addressing this problem has been expanding cell size limits (now at $N > 10$ for the group of interest) and the institution of a minimum comparison group N size of 10 in FY 2006. Since this state does not employ the ARR as Michigan does for low comparison group cell sizes, the institution of a minimum comparison group size has reduced the number of districts considered. The state is also considering expanding the cell size limit for the group of interest to a number greater than 10. In addition, in FY 2006, State B has raised its WRR cutoff point for overrepresentation from 2.0 to 2.5, although such a change would probably not address the particular problems Michigan is facing with the WRR.

STATE C

Officials from State C referred us to their data contractor for discussion of the state's current practices. The contractor indicated that, indeed, the problems Michigan encountered with the WRR have arisen for other states as well, including State C. However, with the inability to set business rules and calculation procedures, the firm simply recommends that states examine the basic RR in addition to the WRR to determine whether a noteworthy discrepancy exists. Since this problem has only recently come to the contractor's attention, more specific recommendations to address this have not yet emerged, although the contractor believes several states wish to increase their minimum N sizes to confront such WRR anomalies.

STATE D

The respondent from State D claimed to have experienced the same statistical problems using the WRR as Michigan, specifically in two of its districts having high American Indian populations. However, the analyst indicated that the issue could not be addressed using current business rules. The state has attempted to neutralize such statistical issues by requiring a minimum N size of 10 in a given cell in order to use risk ratio analysis, and a total enrollment of 100 students for any given racial/ethnic group. The respondent also noted that State D requires that the risk level for the given group exceed the state's risk level for white students in that category by at least one percent if the group is to be considered for over-representation. A similar restriction is used for under-representation (one-fifth or less than the national risk for the disability category). In the same manner, the risk level for white students at the district level is compared to the risk level for white students at the state level.

STATE E

The respondent from State E was not familiar with any problems concerning the WRR as used by the state. However, the state has been advised by their data contractor that suspected exaggerations of the WRR, as experienced by Michigan, should be examined by comparing each WRR to the simple RR—with the implication that a type of "risk gap" might be codified in calculation methods. This advice also was dispensed to State C, though it is not known whether such a plan is currently practiced or whether OSEP would approve of its validity.

STATE F

The respondent from State F acknowledged instances of the WRR's erratic behavior, but did not believe these problems were sufficiently pronounced to warrant corrective action. This may be due to the state's lack of a second largest group statewide; the percentages of African American and Hispanic students are almost equal. The respondent was more concerned about anomalies caused by the ARR, which State F uses for comparison group sizes under ten (like Michigan). Such anomalies, like the WRR in certain Michigan districts, seem to exaggerate the ARR in certain districts. Given the small enrollment numbers inherently involved in ARR calculations, officials from State F discussed the issue with Westat, Inc., which recommended nothing specific beyond "having something else in place." Hence, the state has decided to use composition in addition to ARR, which appears to be eliminating most anomalies. For example, if ARR is to be used, the group's district enrollment must be compared to its statewide enrollment. If a discrepancy beyond 10% exists, a composition measure is employed. Such changes are new and are not described in the state's most recent SPP and APR. In addition, State F is considering other alternatives to using RRs for measuring disproportionate representation. The respondent expressed concern over the statistical basis of the RR, noting that its premise involves using samples, whereas in practice, populations are used in calculations.

DISCUSSION

RECOMMENDATIONS FOR PRACTICE

Based on these analyses, we recommend the following guidelines for district selection of disproportionate representation calculation measures.

- 1. If the number of WHITE or BLACK students in any disability category in a given district is equal to zero, MDE should forego use of the WRR in favor of the RR for that district. This recommendation also applies to Indicator 9, where the number of WHITE or BLACK students in a given district is equal to zero for All Disabilities.**

This recommendation is made because the WRR is rooted in state composition and district risk data. Recall that the denominator in the WRR formula sums the product of district-level risk for each racial/ethnic group (p) and state-level composition data for those racial/ethnic groups (R). When a district has zero students of any racial/ethnic group in a given disability category, some of the risk values in the WRR denominator equal zero ($[p * R] = [0 * R] = 0$). This means that the sum in the denominator (the number by which the numerator is divided) is reduced, which artificially inflates the numerator. As a consequence, the WRR becomes artificially inflated in these situations.

In Michigan, the two groups that have the highest proportion of the state composition (R) are White (71%) and Black (20%). Thus, in order for the WRR calculation to function properly, calculations for SPP Indicators 9 or 10 must not include a zero value for either White or Black students in a given district. This scenario may differ in other states where the largest and second largest groups differ from Michigan's (e.g., where the largest and second largest groups are White and Hispanic or White and American Indian). Nonetheless, in Michigan the problematic calculation occurs when zero values are present for either White students or Black students with disabilities for a given district. When this situation occurs, continued usage of the WRR is inappropriate for the district in question. This recommendation applies to calculations done for Indicators 9 and 10.

- 2. When the number of WHITE or BLACK students in a given district is very low, if the WRR value is greater than or equal to 2.5 and the RR value is less than or equal to 1.5 (so that the difference between the two measures is greater than or equal to one), MDE should consider foregoing use of the WRR (but NOT the ARR) in favor of the RR for that district.**

This recommendation is really a special case of Recommendation 1 (above). When the number of white or black students is small (1 or 2) and the WRR substantially diverges from the RR and the other disproportionate representation calculation measures, this may indicate essentially the same problem exists as in 1 (above). This really is a matter of common sense. Consider an example in which a district's Composition, Risk, and RR measures all range between 1.2 and 1.4, while the WRR for that same district is 2.9. The severe divergence of the WRR from the other measures suggests that its use may be problematic, and this divergence can be especially problematic if the anomalous WRR "flags" a district as having disproportionate representation when the other measures do not. Therefore, in these situations closer inspection of the alternate measures, particularly the RR, is warranted. This recommendation does not apply to districts using the ARR, as it is dependant more upon state enrollment totals.

3. Proposed Additional Measure for Exploratory Analysis of Disproportionate Representation: Optional Risk Ratio (ORR)

$$\text{Optional Risk Ratio (ORR)} = \frac{R(i)}{\sum_{\text{all } j} P(j) \times R(i)}$$

Where...

$R(i)$ = District-Level Risk (i racial/ethnic group)

$P(i)$ = District-Level Composition (i racial/ethnic group)

$R(j)$ = District-Level Risk (j racial/ethnic group)

This new measure was recommended by our contributing statistician, Dr. T.C. Sun. He felt that a measure such as this was better able to reflect risk in a particular racial/ethnic group compared to the population as a whole rather than just the comparison group (excluding the group of interest). It has advantages when applied to districts with small number of students in the comparison group, but its main disadvantage lies in the fact that risk within the group of interest is built into the measure. This could create problems in districts where the risk of identification for special education categories varies greatly among racial/ethnic groups. WSU will apply this measure as an additional indicator for exploratory research into disproportionality. The ORR will not be applied to district data in the determination of statistical disproportionality in special education, and will only appear in WSU-specific internal documents and research. After 12 months of exploratory application, WSU will make a formal recommendation to the MDE regarding future use of the ORR in the determination of Disproportionality.

REFERENCES

Westat. "Methods for Assessing Racial/Ethnic Disproportionate Representation in Special Education: A Technical Assistance Guide" (prepared for the Office of Special Education Programs, U.S. Department of Education under Contract No. ED01CO0082/0008) (2004). Rockville, MD: Author.

APPENDICES

APPENDIX A: CALCULATING DISPROPORTIONATE REPRESENTATION GLOSSARY

The following information is adapted from a document prepared by Westat, Inc. called “Method for Assessing Racial/Ethnic Disproportionate Representation in Special Education: A Technical Assistance Guide.” Unless otherwise indicated, all measures use district-level data.

COMPOSITION MEASURES

Composition (C): Expressed as a percentage, Composition answers the question, “What percentage of students receiving special education and related services for the *disability category of interest* is from a particular racial/ethnic group?”

$$\text{Composition (C)} = \frac{\text{\# of [racial/ethnic group] students in disability category}}{\text{Total \# of students in disability category}} \times 100$$

Example: What percentage of students in the Cognitive Impairment (CI) category is Hispanic?

$$\text{Composition (C)} = \frac{250 \text{ Hispanic students in OHI category}}{1000 \text{ students in disability category}} \times 100$$

$$C = .25 \times 100$$

$$C = 25\%$$

So, 25% of students receiving special education and related services for OHI (OHI) are Hispanic. In other words, the Composition for Hispanic students in the CH category is 25%.

RISK MEASURES

Risk (R): Expressed as a percentage, Risk answers the question, “What percentage of students from the *racial/ethnic group of interest* receives special education and related services for a particular disability category?”

$$\text{Risk (R)} = \frac{\text{\# of [racial/ethnic group] students in disability category}}{\text{Total \# of [racial/ethnic group] students}} \times 100$$

Example: What percentage of Hispanic students are in the Cognitive Impairment (CI) category?

$$\text{Risk (R)} = \frac{85 \text{ Hispanic students in CI category}}{1000 \text{ total Hispanic students}} \times 100$$

$$R = .085 \times 100$$

$$R = 8.5\%$$

So, 8.5% of Hispanic students receive special education and related services for cognitive impairment (CI). In other words, the Risk for Hispanic students in the CI category is 8.5%.

Risk Ratio (RR): Expressed as a positive number, Risk Ratio answers the question, “What risk do students from the racial/ethnic group of interest have of receiving special education and related services for a particular disability category *as compared to the risk for all other students?*” A value of zero indicates that a racial/ethnic group has *no* risk of receiving services for a given disability category, while a value of one indicates even or equivalent risk between the racial/ethnic group of interest and all other students. RR values less than one indicate that the risk of the racial/ethnic group of interest is *less than* that of all other students, while RR values greater than one indicate that the risk of the racial/ethnic group of interest is *greater than* that of all other students.

$$\text{Risk Ratio (RR)} = \frac{\text{Risk (\%)} \text{ for [racial/ethnic group] students}}{\text{Risk (\%)} \text{ for comparison group (all other students)}}$$

Example: What is the risk for Hispanic students in the Cognitive Impairment (CI) category?

$$\text{Risk Ratio (RR)} = \frac{12.5\% \text{ CI risk for Hispanic students}}{7.5\% \text{ CI risk for non-Hispanic (all other) students}}$$

$$\text{RR} = 0.125 / 0.075$$

$$\text{RR} = 1.66$$

So, the RR for Hispanic students receiving special education and related services for CI is 1.66. This means that, compared to all other students, Hispanic students have a *higher risk* of receiving special education and related services for CI; in other words, Hispanic students’ risk is 1.66 times the risk of all other students.

Alternate Risk Ratio (ARR): Expressed as a positive number, Alternate Risk Ratio allows for application of risk ratios in districts having *fewer than ten students in the comparison group* (i.e., all other racial/ethnic groups). As a corrective, the ARR uses *district-level risk* for the racial/ethnic group of interest (in the numerator) and *state-level risk* for the comparison group (in the denominator).

$$\text{Alternate Risk Ratio (ARR)} = \frac{\text{District risk (\%)} \text{ for [racial/ethnic group] students}}{\text{State risk (\%)} \text{ for comparison group (all other racial/ethnic groups)}}$$

Example: What is the risk for Hispanic students in the Cognitive Impairment (CI) category in a district that has fewer than ten students in one of its other racial/ethnic groups?

$$\text{Alternate Risk Ratio (ARR)} = \frac{12.5\% \text{ CI district risk for Hispanic students}}{10\% \text{ CI state risk for Non-Hispanic (all other) students}}$$

$$\text{ARR} = 0.125 / 0.010$$

$$\text{ARR} = 1.25$$

So, the ARR for Hispanic students receiving special education and related services for CI is 1.25. This means that, compared to other students in the state, Hispanic students in this district have a *higher risk* of receiving special education and related services for CI; in other words, Hispanic students' risk is 1.25 times the risk of Non-Hispanic students in the state.

Weighted Risk Ratio (WRR): Expressed as a positive number, the WRR allows for comparisons of RRs across school districts and enables states to rank districts in order of disproportionate representation. The WRR uses district-level risk for the racial/ethnic group of interest in the numerator, and weighted risk for all other students in the denominator. To calculate the weighted risk for all other students used in the denominator, the district-level risk for each racial/ethnic group in the comparison group (i.e., all other students) is multiplied by the state composition for each racial/ethnic group in the comparison group, and these products are summed.

$$\text{Weighted Risk Ratio (WRR)} = \frac{[1-p_{(i)}] * R_{(i)}}{\sum [p_{(j)} R_{(j)}]}$$

Where...

$p_{(i)}$ = State-level proportion of students from racial/ethnic group (i)

$R_{(i)}$ = District-level risk for racial/ethnic group (i)

$p_{(j)}$ = State-level proportion of students from the (j)-th racial/ethnic group

$R_{(j)}$ = District-level risk for the (j)-th racial/ethnic group

Example: What is the risk for Hispanic students in the Cognitive Impairment (CI) category in a district compared to the risk for all other students, weighted according to the state's racial/ethnic composition?

$$\text{Weighted Risk Ratio (WRR)} = \frac{[1-\text{state Hispanic proportion}] * [\text{district Hispanic CI risk}]}{\sum [\text{state composition for each comparison group}] * [\text{district CI risk for each comparison group}]}$$

So, the WRR allows for comparison on one district's risk for Hispanic students receiving special education and related services for CI to other districts' risk.

Risk Gap: One state has instituted a “risk gap” for disproportionate representation measurement. This calculation is used in conjunction with the WRR and ARR, and it represents an additional requirement a district must satisfy in order to be flagged for disproportionate representation. The formula for this measure is articulated in the state’s most recent (FFY 2006) State Performance Plan (SPP):

$$\text{Risk gap} = \text{Weighted risk ratio}_i - \text{Weighted risk ratio}_{\text{Caucasian}}$$

Where i is the racial/ethnic group of interest

The state’s SPP indicates that the risk gap must be greater than 1.00 for the district to be considered for overrepresentation and less than -1.00 to be considered for underrepresentation. The state does not describe how it uses the risk gap (if at all) if the racial/ethnic group of interest is White students. As indicated above, the state uses this measure in conjunction with the WRR and ARR (with cutoff points of >2.00 for overrepresentation and <0.25 for underrepresentation). As with Michigan, this state established a minimum N size of 10, and there must be fewer than 10 students in the comparison group to use ARR. OSEP determined that this state “meets requirements” in June 2008, implying that it found this method valid and reliable.

**APPENDIX B: MICHIGAN DEPARTMENT OF EDUCATION BUSINESS RULES FOR
CALCULATING SPECIAL EDUCATION DISPROPORTIONATE REPRESENTATION, JULY
2008**

1. Disproportionate representation calculations use data from both the fall Single Record Student Database (SRSD)² and the December 1st Michigan Compliance Information System (MI-CIS)³ of the year being reviewed (e.g. SRSD Fall 2007, and MI-CIS December 1, 2007). Only students with disabilities, ages 6 through 21, per the Individuals with Disabilities Education Act (IDEA) Part B definition, are counted. Students placed by state agencies in residential facilities within district boundaries are excluded.
2. Calculations are only performed for districts with 30 or more students with disabilities.
3. Calculations are only performed for districts with a total enrollment (including special education) comparison group of ≥ 100 in the operating district.
4. Calculations are only performed for racial/ethnic subgroups (American Indian, Asian, Black, Hispanic, and White) with 10 or more students in all disabilities and/or a given disability category (cognitive impairment, emotional impairment, specific learning disability, speech and language impairment, other health impairment and autism spectrum disorder).
5. A Weighted Risk Ratio (WRR) is used to determine disproportionate representation for a particular racial/ethnic subgroup when there are at least 10 students with disabilities in all other racial/ethnic subgroups (disability comparison group). See the following URL page 16 to 18:
<http://www.ideadata.org/docs/Disproportionality%20Technical%20Assistance%20Guide.pdf>
6. An Alternate Risk Ratio (ARR) is used to determine disproportionate representation for a particular racial/ethnic subgroup when there are fewer than 10 students with disabilities in all other racial/ethnic subgroups (disability comparison group). See the following URL page 21 to 22:
<http://www.ideadata.org/docs/Disproportionality%20Technical%20Assistance%20Guide.pdf>
7. A Risk Ratio (RR) is used to determine disproportionate representation when the racial/ethnic distribution of the district's student population varies significantly from the state racial distribution (which is used to calculate WRRs and ARR). The RR compares identification rates by race/ethnicity against the district's total student population.
8. Two sets of the three ratios (WRR, ARR and/or RR) are calculated for each district, using the Operating district and Resident district data, for each racial/ethnic group across all disabilities and for each racial/ethnic group within each of the six designated disability categories. If there is an Operating district ratio but no Resident district ratio (due to a small number of resident students), the Operating district ratio is used to determine disproportionate representation. If there is no Operating district ratio, but there is a Resident district ratio, the district is not considered. Public School Academies (PSAs)⁴ have only one set of ratios as they are only Operating districts.
9. The lower of the district's Operating district ratio or Resident district ratio is used to determine Over-Representation. Districts are considered to have Over-Representation when the appropriate ratio

² Single Record Student Database (SRSD) is the statewide data system for all schools/students.

³ The Michigan Compliance Information System (MI-CIS) is the statewide special education data system.

⁴ Public School Academies are Michigan's term for charter schools. These schools constitute their own LEA.

(WRR, ARR or RR) is greater than 2.5 for two consecutive years for any racial/ethnic group across all disabilities or for any racial/ethnic group within a single disability category.

10. The higher of the district's Operating district ratio or Resident district ratio is used to determine Under-Representation. Districts are considered to have Under-Representation when the appropriate ratio (WRR or ARR) < 0.4 for two consecutive years for any racial/ethnic group across disabilities or for any racial/ethnic group within a disability category.
11. LEAs identified as having disproportionate representation per the above business rules will go through data verification. Upon completion of the verification process, the results will be reviewed in conjunction with data from multiple sources to determine appropriate focused monitoring activities.

Designating Race/Ethnicity for Students

SRSD Fall 2007 and December 1 Count in MI-CIS (Field 22)

In the SRSD and MI-CIS manuals, a district reports the race/ethnicity for each student. There are six (6) categories of race/ethnicity which are reported: American Indian, Asian, Black, Native Hawaiian/Other Pacific Islander, White and Hispanic. This gives six (6) possible racial/ethnic groups to be reported in Field 22. A **number 1** aligned with a racial/ethnic group indicates that it has the first priority.

When a student indicates a single race/ethnicity, the designation for race/ethnicity is clear. The student is then counted in that group.

Designating Race/Ethnicity for Students Indicating Multiple Priorities

In the case of multiple number ones (1s), the student is indicating more than one racial/ethnic group. When this occurs, CEPI categorizes the student as **multiracial/ethnic**. CEPI evaluates student records only in terms of the designation of code "1" for racial/ethnic groups.

The Office of Special Education Programs (OSEP) of the US Department of Education utilizes a different racial/ethnic group classification system than that used by CEPI. First, students who are classified in Michigan as Native Hawaiian/Other Pacific Islander are placed in the OSEP category Asian. Second, OSEP does not recognize the classification of multiracial/ethnic. Therefore, the multiracial/ethnic students must be classified into one racial/ethnic group. OSEP recommends distributing multiracial students proportionately into the other race/ethnicity categories.

Proportional Allocation of Multiracial/ethnic Students

The following is a step-by-step process for this proportional allocation:

1. Subtract the multiracial students from the population total
2. Calculate the proportion of each remaining racial/ethnic category for this new total
3. Multiply the multiracial total by the calculated proportions of the remaining racial/ethnic categories
4. Add the results to the appropriate racial/ethnic group
5. This process is followed for each remaining racial/ethnic group until the multiracial students are distributed proportionally across all groups.

Example: Reported values:

White = 2705.0, Black = 88.0, Asian = 25.0,

American Indian = 11.0, Hispanic = 68.0, Multiracial = 29.0

Total of White through Hispanic = 2897

White % = $2705/2897 = 0.9337$

To determine the white proportion of the multiracial:

$29 * 0.9337 = 27.078$

Then add that to white: $2705 + 27 = 2732$

The following questions are prepared for disproportionate representation analysts.

(SCRIPT) Hi, my name is *(first & last name)* and I am a research assistant at Wayne State University in Detroit. I work on the project that measures Part B disproportionate representation for the State of Michigan. The Michigan Department of Education has asked my colleagues and I to contact several other states to see whether they are having some of the same problems Michigan is having in measuring disproportionate representation. I'm hoping to talk with someone there about how *(state)* measures disproportionate representation. Are you the person I should speak with?

Confirm that we are speaking to someone who is willing to talk to us. If not, get name and contact info of person we should speak with.

(SCRIPT) I have a few questions about how *(state)* measures disproportionate representation. This discussion will be completely anonymous; we will not reveal the names of people we talk to, and we will only mention states by name if they give us permission to do so. Shall we begin?

Confirm that state currently uses (measure/combination) described in the most recent SPP/APR.

(SCRIPT) Has *(state)* experienced statistical or practical problems in using *(measure/combination)* for any of its districts? Can you give me an example?

(SCRIPT) Let me give you an example of a problem we've found here in Michigan. In certain districts where a minority population is substantially different from that group's overall state population, the Weighted Risk Ratio for white students is greatly exaggerated. For example, in one district there are about 300 white students, 200 American Indian students, and roughly 5 students in *all other* minority groups combined. In this district the WRR for white students is roughly 35. However, if we switch the American Indian population with the Black population – which is the largest minority group statewide – the WRR for white students declines dramatically to 1.61. This is because the WRR is pegged to each racial group's statewide composition, and while Black students are the largest minority group statewide, that is not the case in this particular district where American Indian students are the largest minority group. To your knowledge, has *(state)* observed similar problems with exceptionally high WRRs in districts where a district's largest minority group is *not* the state's largest minority group?

(SCRIPT) How have you addressed this problem? **OR** Are there any other problems you've noticed in calculating the WRR that seem to depend on a district's population characteristics?

(SCRIPT) For several reasons, Michigan uses two populations when determining disproportionate representation: (1) the operating population, which includes all students who actually attend school in the district, and (2) the resident population, which includes all students who live in the district's boundaries, including those who attend schools in other districts or public school academies. Michigan decided to consider both populations because a student may be identified for special education by either the operating or resident district. Michigan has decided to use the lower of the two disproportionate representation ratios in reporting. Does (*state*) distinguish between operational and residential enrollment?

If yes, how does (*state*) combine the data?

If asked for reasons: (SCRIPT) There are two reasons why Michigan makes this distinction. First, Michigan has schools of choice, meaning that students living in one district may attend school in another district. Second, special education services for students with a particular disability may be delivered by a multi-district consortium or by an intermediate school district.

Does (*state*) account for bi- or multi-racial students when measuring disproportionate representation? How?

As our research progresses, we may choose to run simulations using LEA-level data from several other states. Are there any circumstances under which your LEA-level data would be available to us for such a purpose? (*If yes, indicate that we will get back to them regarding this at a later time.*)

May we use your state's name in our report to the Michigan Department of Education?

I have one final question: is there someone in addition to you I should speak with about (*state's*) disproportionate representation calculations? If so, may I have their name and contact information?

That's all the questions I have for you today. Thank you very much for taking the time to talk with me.
