

*Study of the Impact of Statewide
Systemic Initiatives
Mathematics and Science Education*

*Wisconsin Center for Education Research
Horizon Research, Inc.*

<http://facstaff.wcer.wisc.edu/normw/>
(Technical Reports)

<http://www.wcer.wisc.edu/ssi/>
(State Profiles)

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Washington, D.C.*

Systemic Reform in Education

- ★ A sustained process over a long period of time
- ★ Engaging a number of people in system improvement
- ★ Changing multiple system components
- ★ Changing interconnections among these components
- ★ Concurrently

NSF Statewide Systemic Initiative (SSI) Program

PROCESS DRIVERS

1. Standards-Based Curricula
2. Coherent Policies
3. Convergent Resources
4. Broad-Based Support

OUTCOME DRIVERS

5. Significantly Higher Student Achievement
6. Improved Achievement of All Students

Goals

- ★ Assess the impact of statewide systemic initiatives (SSI) on student learning
 - ↑ Determine and explain differences between SSI and non-SSI states on mathematics NAEP achievement scores over 1990, 1992, 1996, and 2000 (Grade 8), and 1992, 1996, and 2000 (Grade 4).
 - ↑ Validate and extend findings from NAEP analysis for selected states.
 - ↑ Relate change in mathematics outcomes to degree of implementation of SSI.

Goals (continued)

- ★ Distill the lessons learned from designing, implementing, evaluating, and supporting statewide systemic initiatives (SSI).
 - ↑ Glean knowledge from SSI states about
 - ↑ how systemic reform can be approached and be successful.
 - ↑ Determine how mistakes can be avoided.
 - ↑ Identify what can be generalized from one state to other states and what is state-specific.

Main Research Questions for NAEP Analysis

- ★ 1. Did having a statewide systemic initiative (SSI) improve student mathematics achievement in a state?
- ★ 2. Did having a statewide systemic initiative (SSI) improve the student mathematics achievement scores of traditionally underachieving groups relative to advantaged students?

Main Research Question for NAEP Analysis (continued)

- ★ 3. What statistical model(s) best represent the relationship between mathematics achievement scores over 1990, 1992, 1996, and 2000 in SSI states compared to non-SSI states?

NAEP States by SSI and Non-SSI

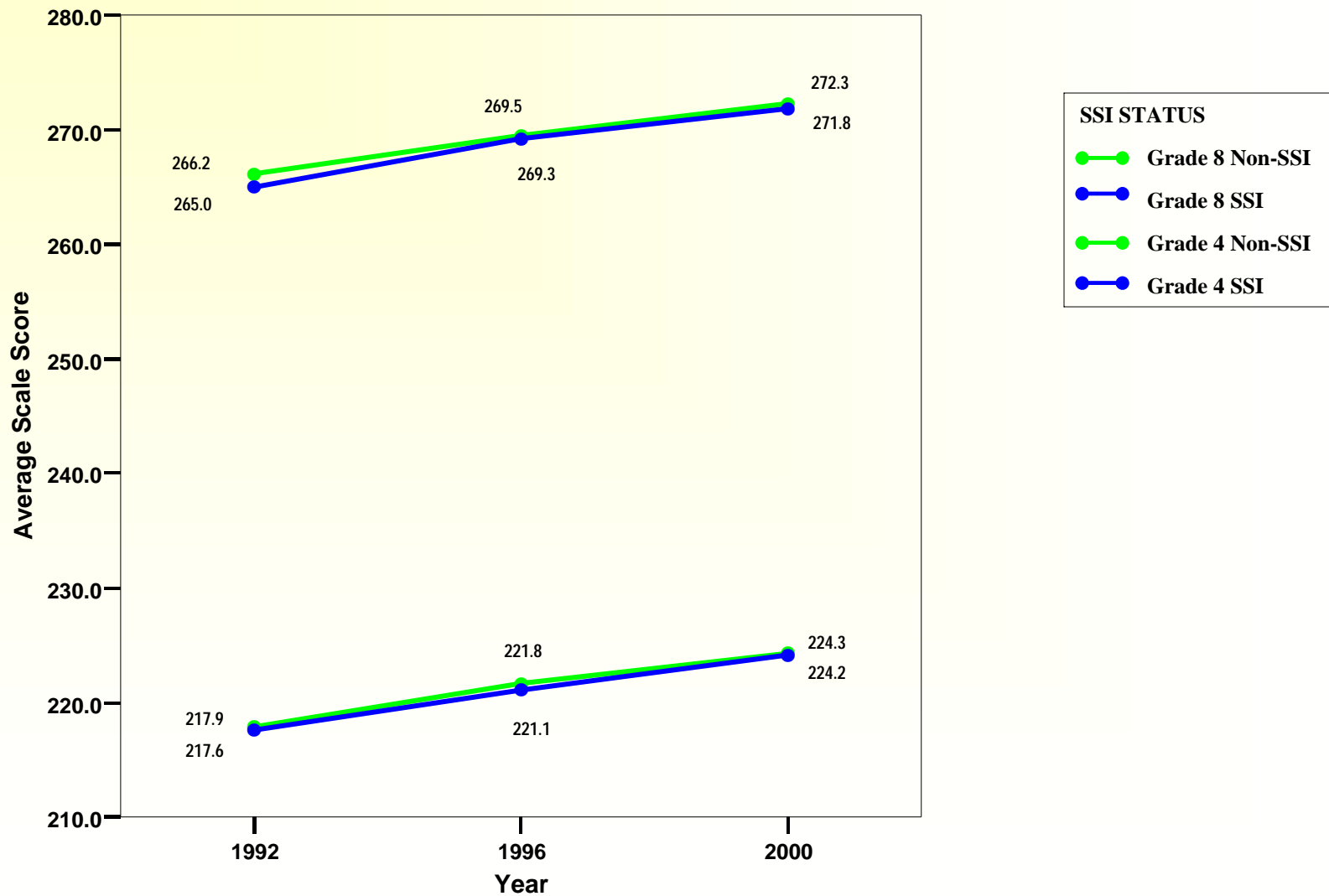
14 SSI and 13 Non-SSI Trend Group

SSI Status	States	Complete Black Sample	Complete Hispanic Sample
Non-SSI	ALABAMA	✓	✓
	ARIZONA	✓	✓
	HAWAII		✓
	INDIANA	✓	✓
	MARYLAND	✓	✓
	MINNESOTA		✓
	MISSISSIPPI	✓	✓
	MISSOURI	✓	✓
	NORTH DAKOTA		
	TENNESSEE	✓	✓
	UTAH		✓
	WEST VIRGINIA	✓	✓
	WYOMING		✓
	TOTAL=13	TOTAL=8	TOTAL=12

SSI Status	States	Complete Black Sample	Complete Hispanic Sample
SSI	ARKANSAS	✓	
	CALIFORNIA	✓	✓
	CONNECTICUT	✓	✓
	GEORGIA	✓	✓
	KENTUCKY	✓	
	LOUISIANA	✓	✓
	MAINE		
	MASSACHUSETTS	✓	✓
	MICHIGAN	✓	✓
	NEBRASKA	✓	✓
	NEW MEXICO		✓
	NEW YORK	✓	✓
	SOUTH CAROLINA	✓	✓
	TEXAS	✓	✓
TOTAL=14	TOTAL=12	TOTAL=11	

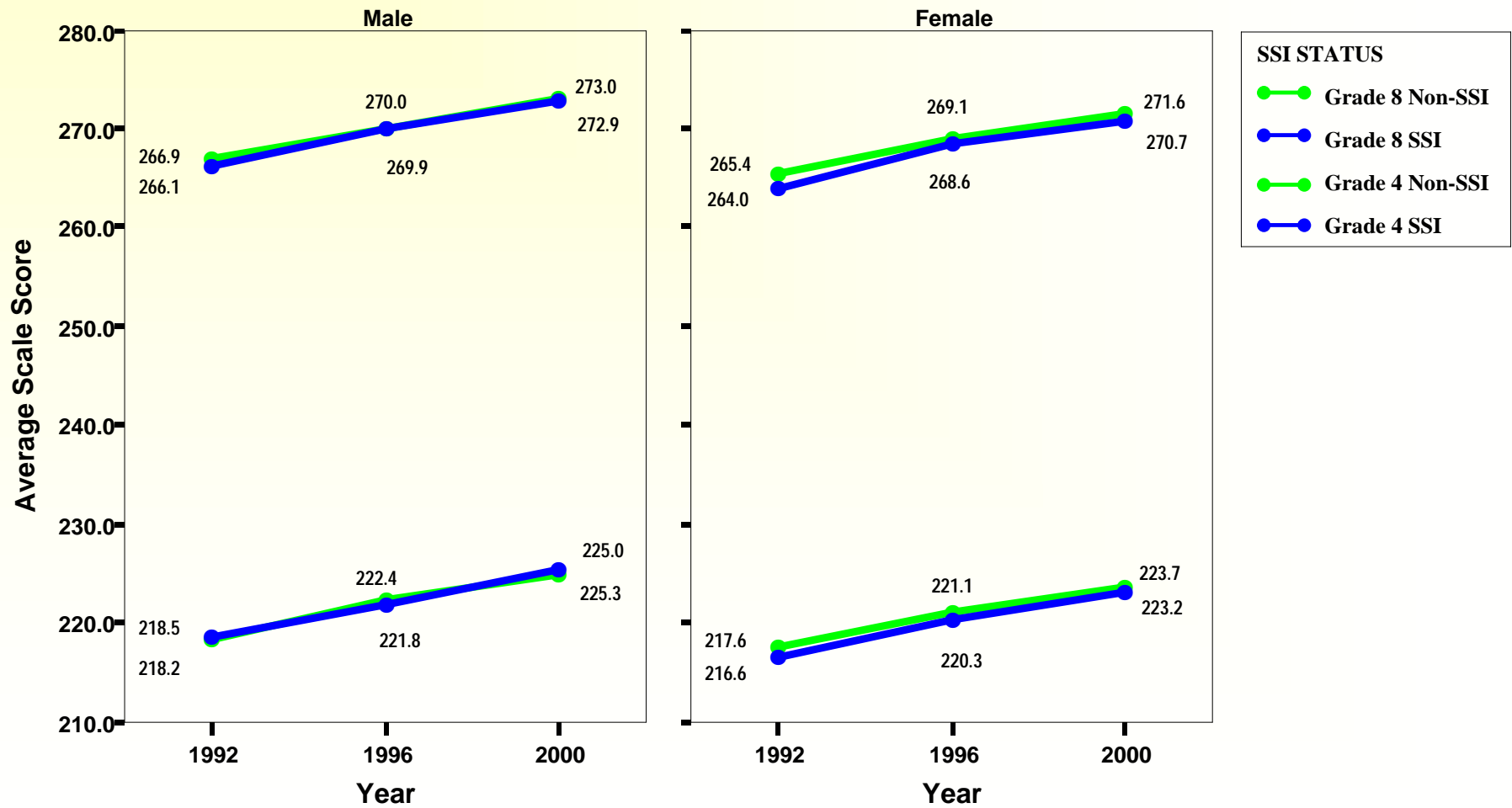
NAEP Achievement by SSI Status

14 SSI and 13 Non-SSI Trend Group



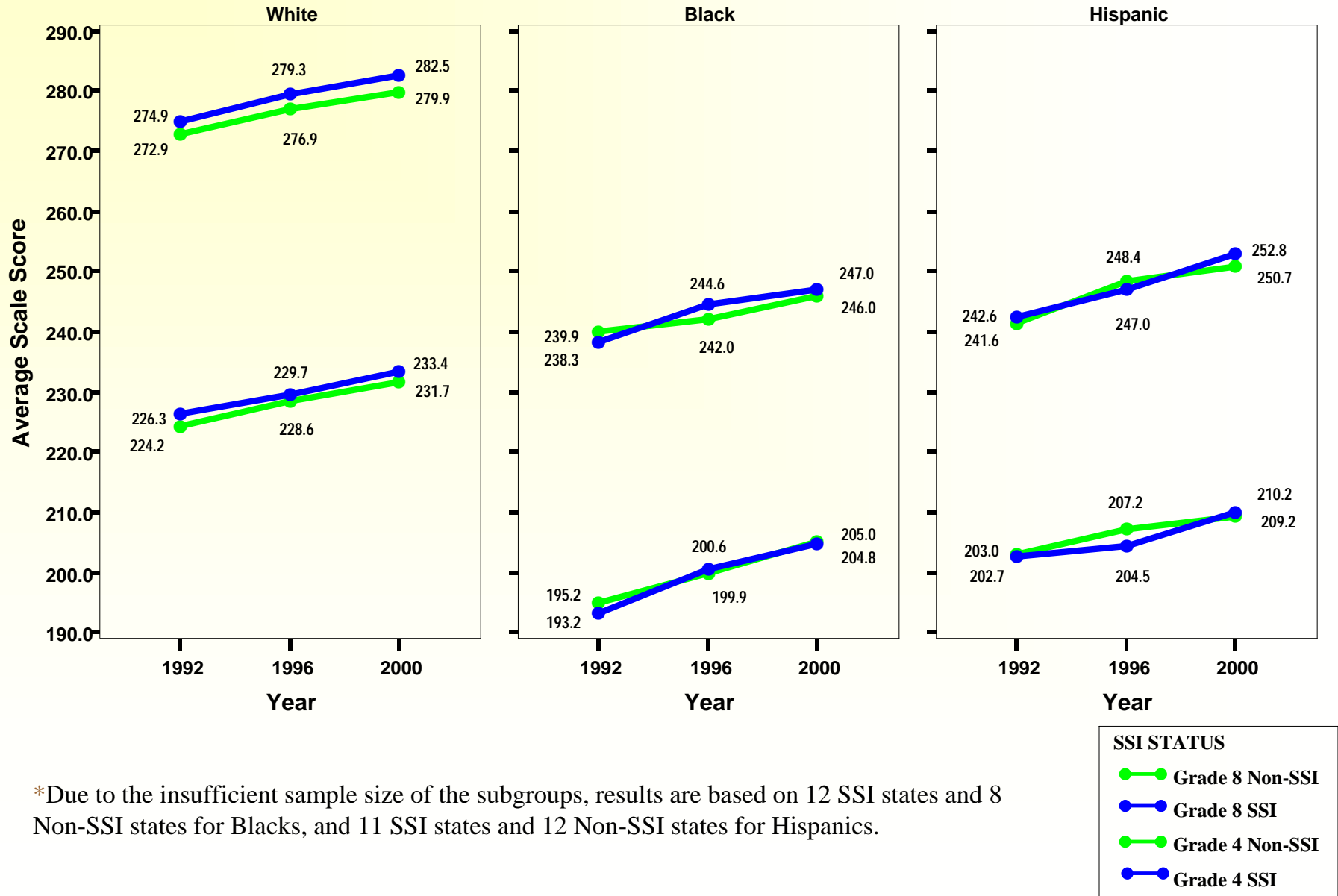
NAEP Achievement by Gender

14 SSI and 13 Non-SSI Trend Group



NAEP Achievement by Race

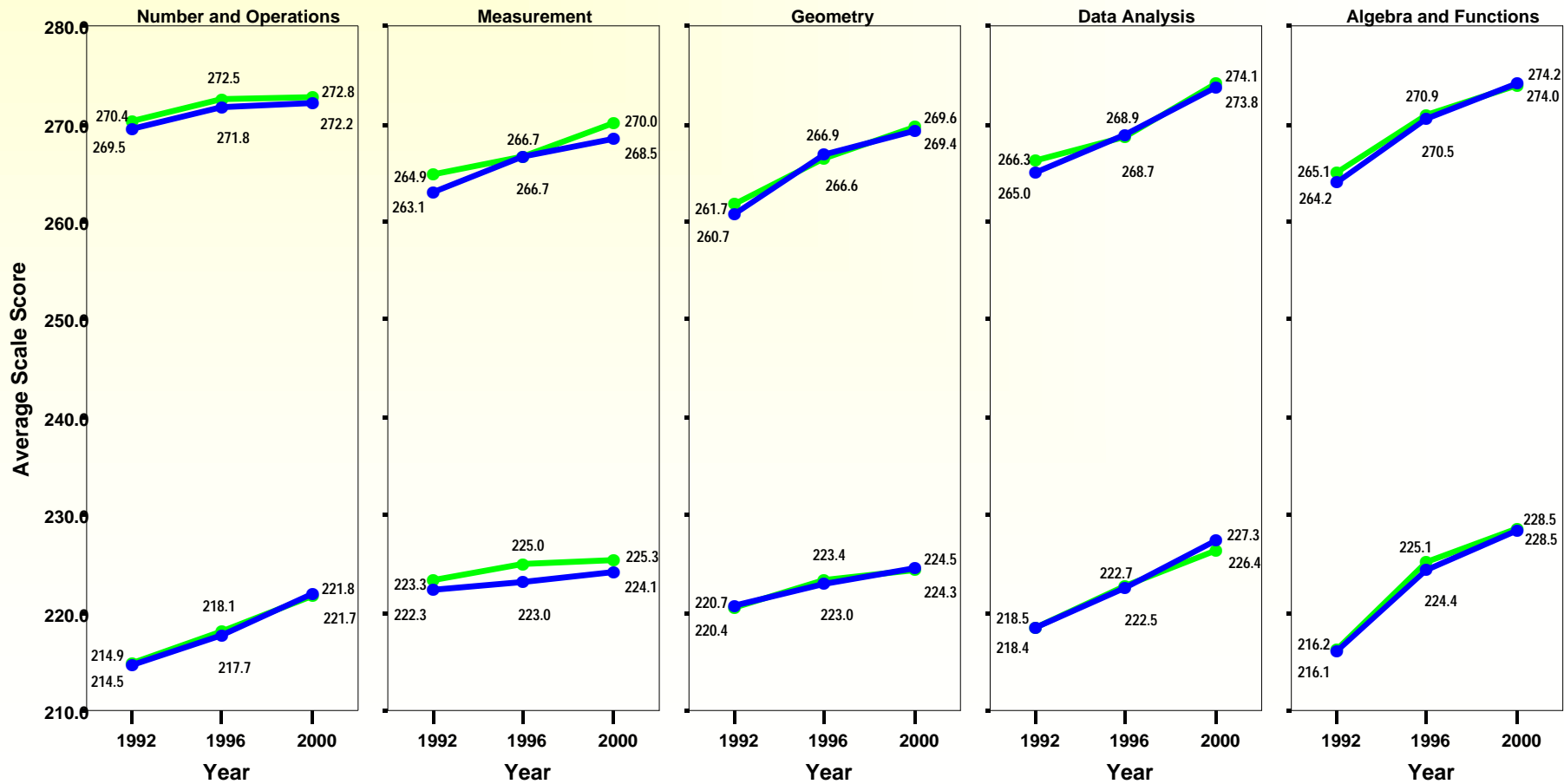
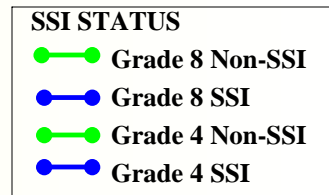
14 SSI and 13 Non-SSI Trend Group*



*Due to the insufficient sample size of the subgroups, results are based on 12 SSI states and 8 Non-SSI states for Blacks, and 11 SSI states and 12 Non-SSI states for Hispanics.

NAEP Achievement by Content Areas

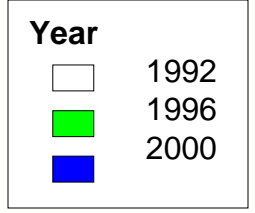
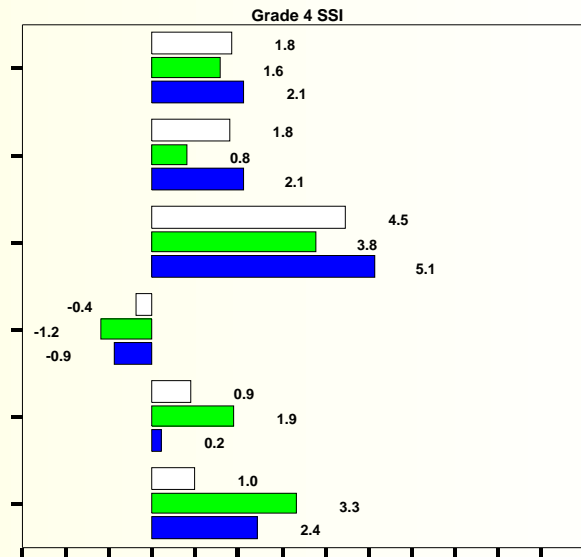
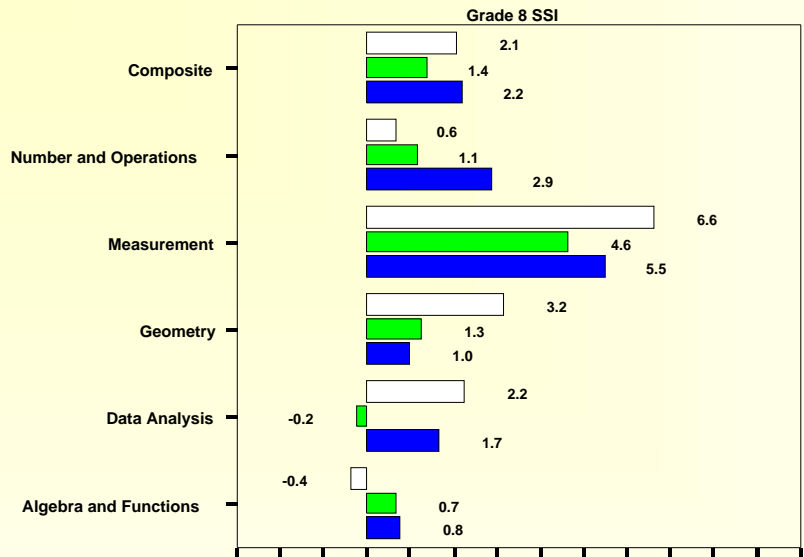
14 SSI and 13 Non-SSI Trend Group



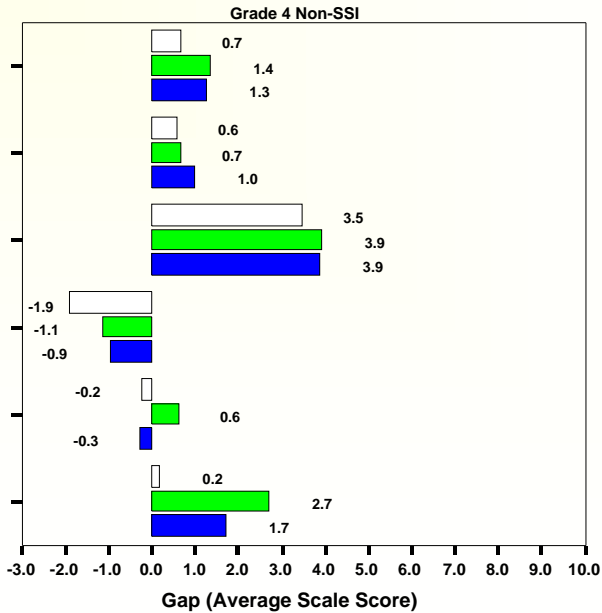
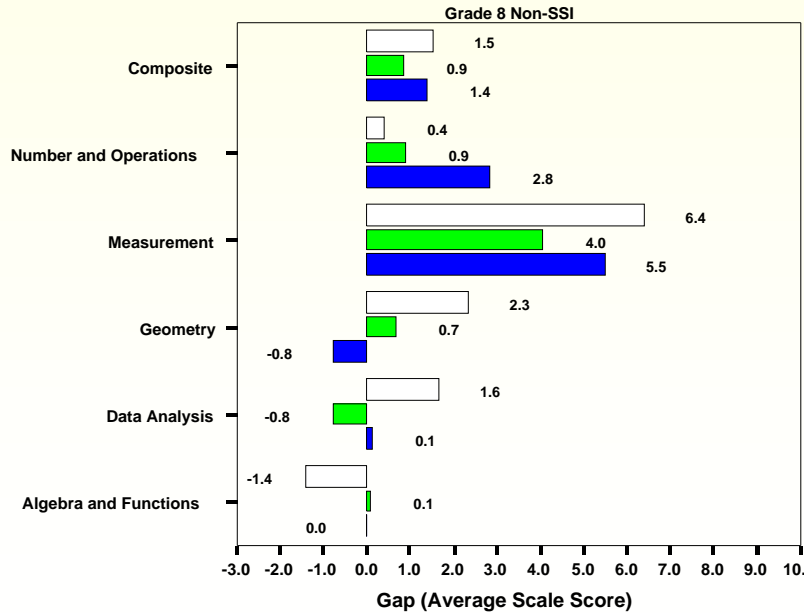
Male Minus Female by NAEP Content Area

14 SSI and 13 Non-SSI Trend Group

Composite and Five Subtopics



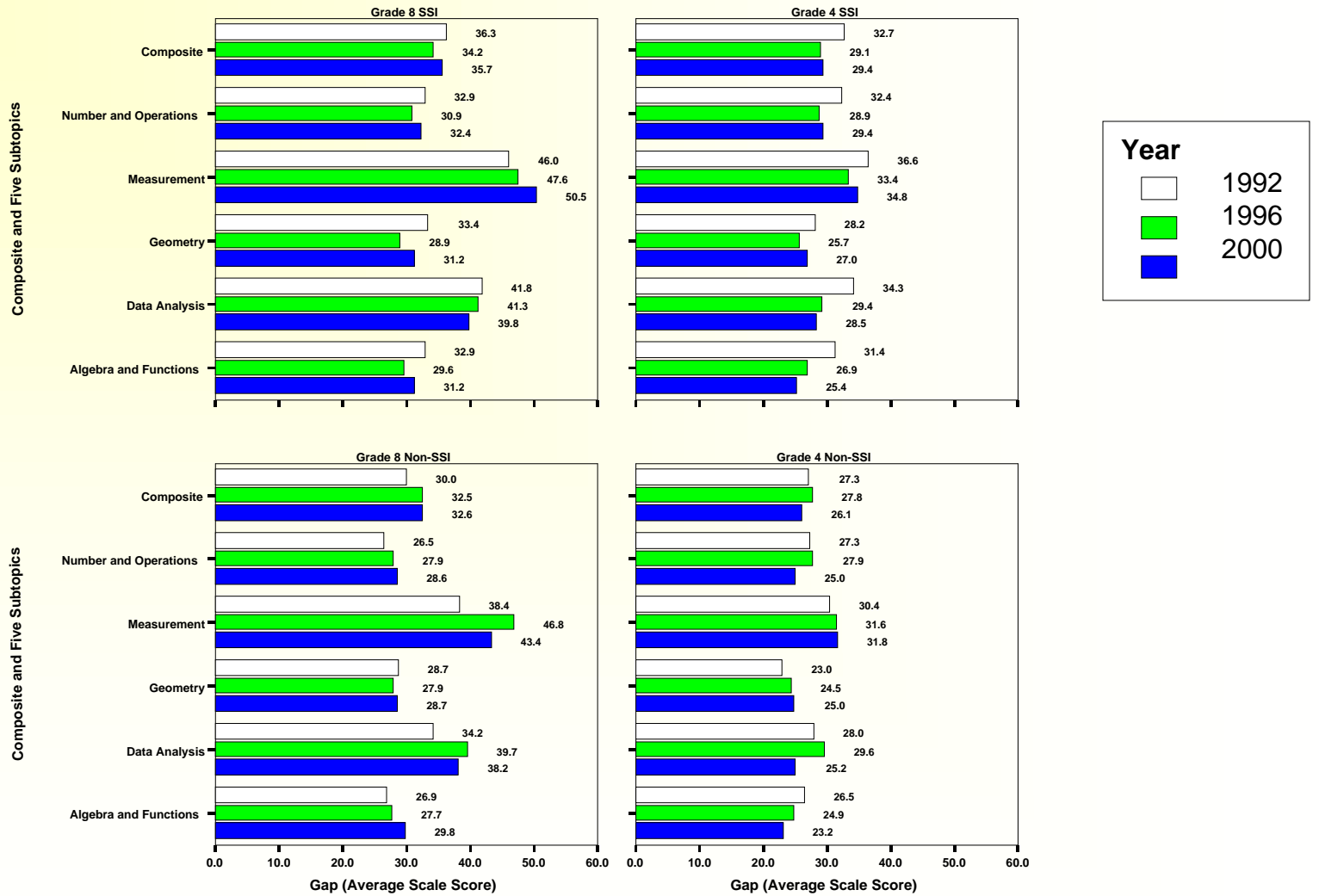
Composite and Five Subtopics



Gap (Average Scale Score)

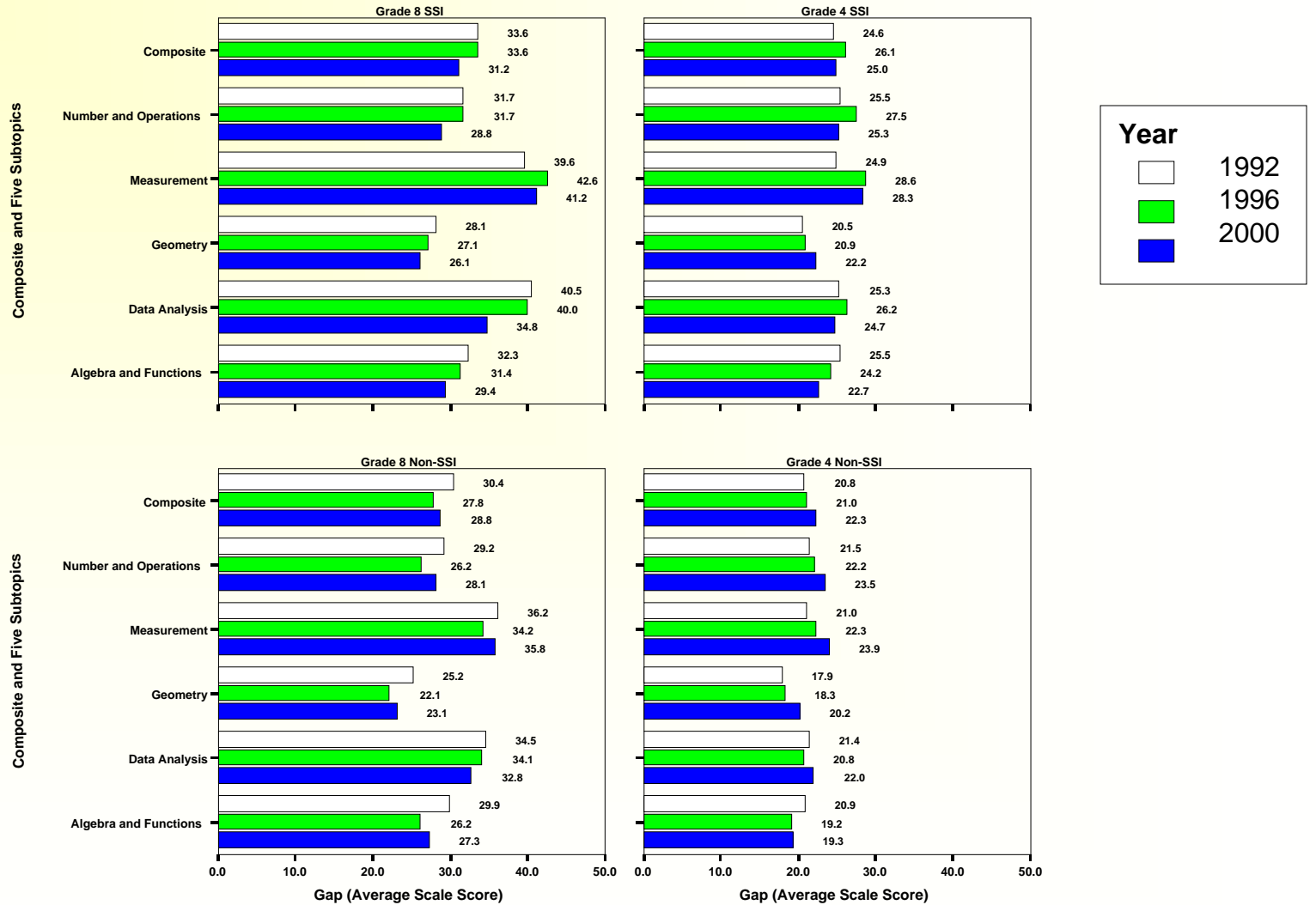
Gap (Average Scale Score)

*White Minus Black by NAEP Content Area 14 SSI and 13 Non-SSI Trend Group**



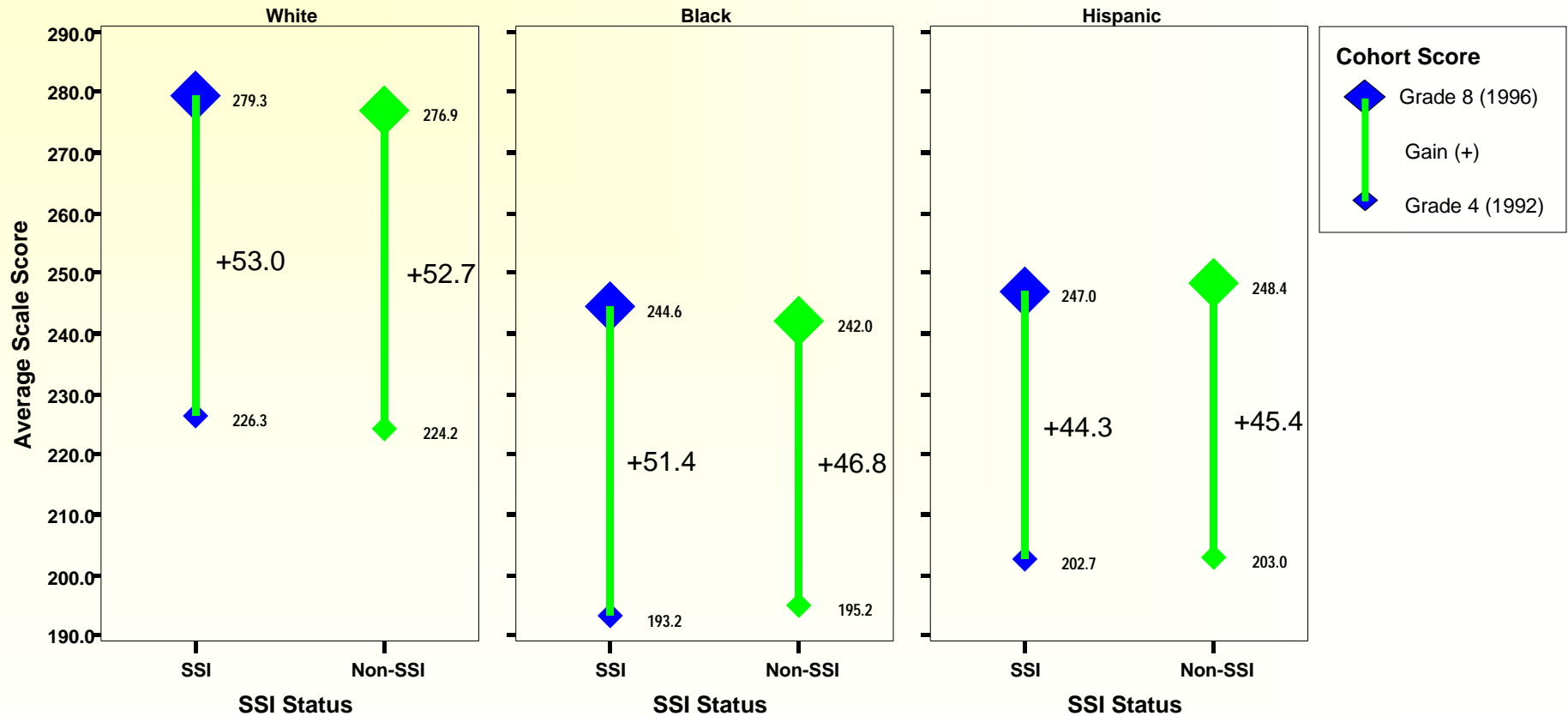
*Due to the insufficient sample size of these subgroups, results are based on 12 SSI states and 8 Non-SSI states.

White Minus Hispanic by NAEP Content Area 14 SSI and 13 Non-SSI Trend Group*



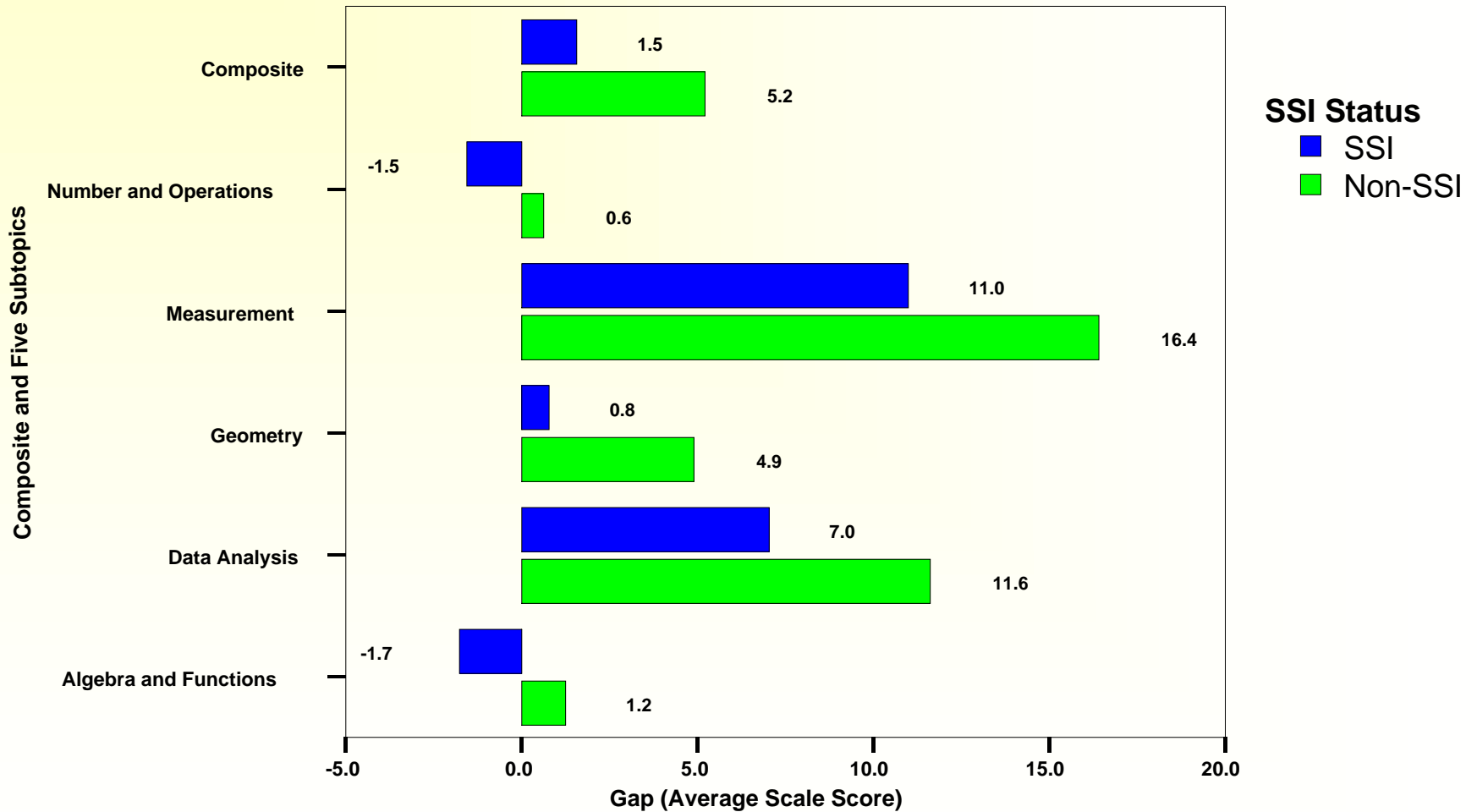
*Due to the insufficient sample size of these subgroups, results are based on 11 SSI states and 12 Non-SSI states.

*NAEP Achievement Cohort Growth Grade 4 to 8 by Race 1992-1996 14 SSI and 13 Non-SSI Trend Group**



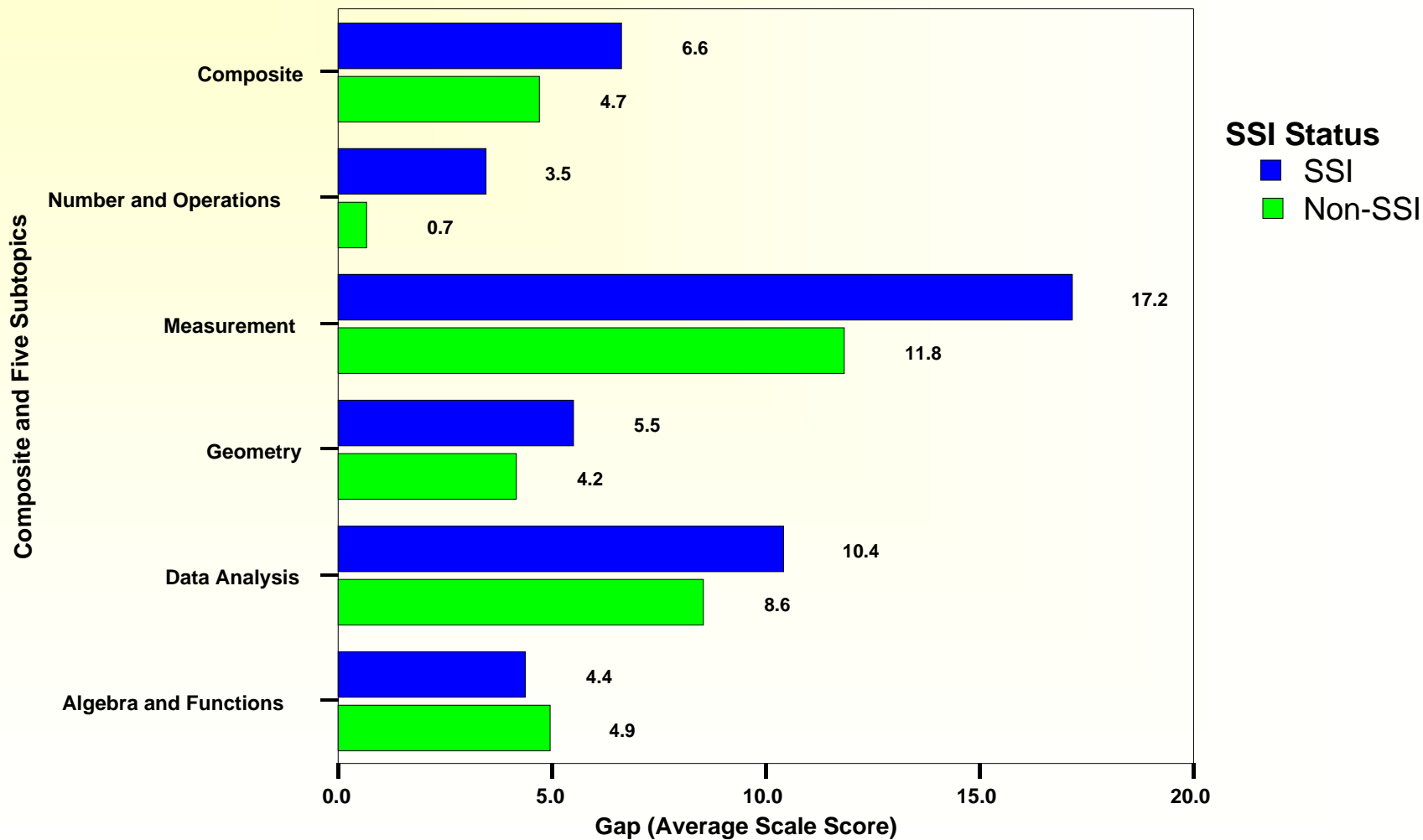
*Due to the insufficient sample size of the subgroups, results are based on 12 SSI states and 8 Non-SSI states for Blacks, and 11 SSI states and 12 Non-SSI states for Hispanics.

*1992-1996 Cohort Growth Differences by NAEP Content Areas
White minus Black
14 SSI and 13 Non-SSI Trend Group**



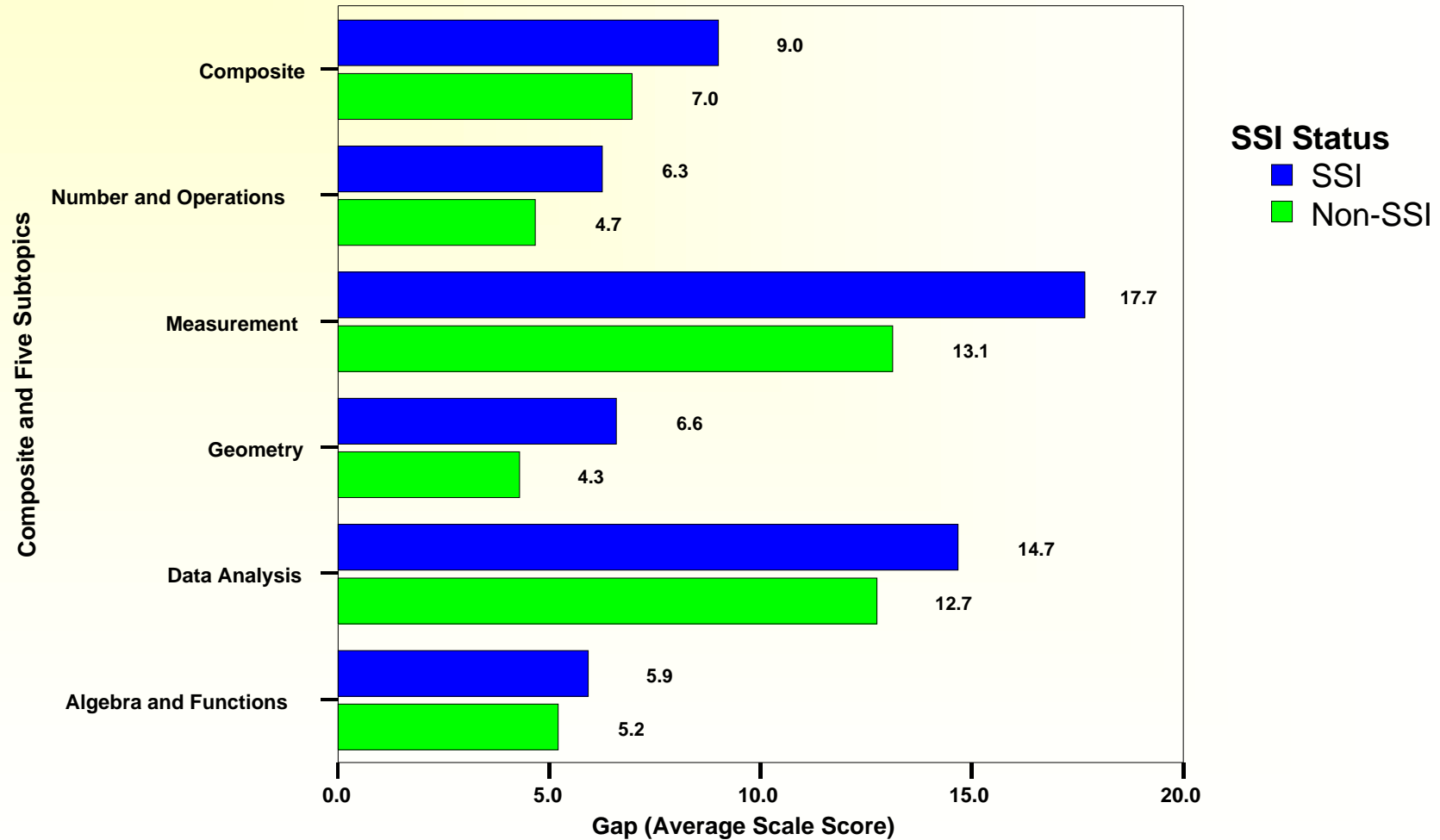
* Due to the insufficient sample size of these subgroups, results are based on 12 SSI states and 8 non-SSI states.

*1996-2000 Cohort Growth Differences by NAEP Content Areas
White minus Black
14 SSI and 13 Non-SSI Trend Group**



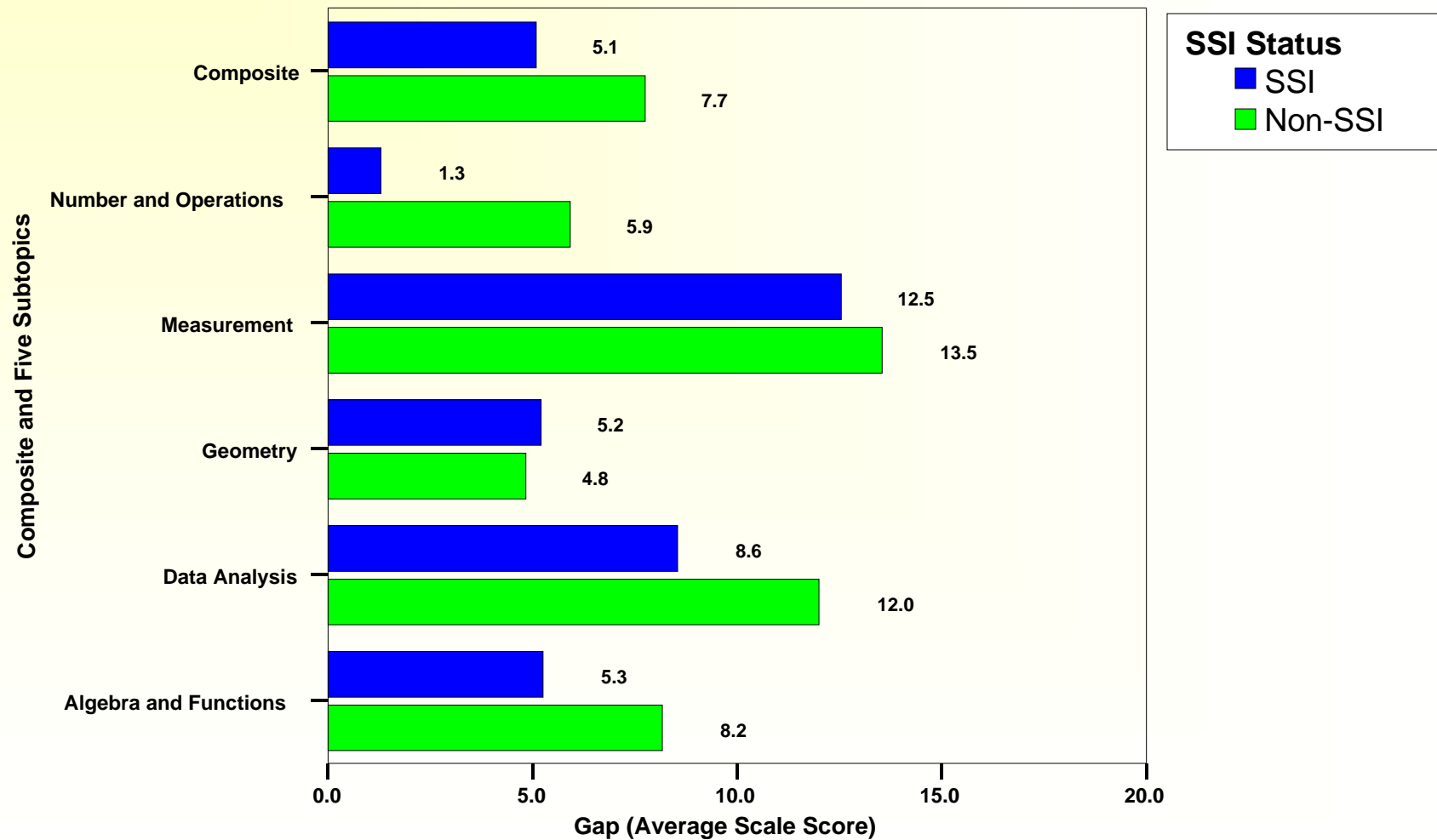
* Due to the insufficient sample size of these subgroups, results are based on 12 SSI states and 8 Non-SSI states.

*1992-1996 Cohort Growth Differences by NAEP Content Areas
White Minus Hispanic
14 SSI and 13 Non-SSI Trend Group**



* Due to the insufficient sample size of these subgroups, results are based on 11 SSI states and 12 Non-SSI states.

*1996-2000 Cohort Growth Differences by NAEP Content Areas
 White minus Hispanic
 14 SSI and 13 Non-SSI Trend group**



* Due to the insufficient sample size of these subgroups, results are based on 11 SSI states and 12 Non-SSI states.

*Main research question for
DIF Analysis:*

Was the construct being
measured in SSI and Non-
SSI samples the same?

Total Number of Items by Year

	Grade 4	Repeated Items	Grade 8	Repeated Items
1990			137	
1992	156	97	183	114
1996	144	97	162	114
2000	145	119	160	133

NAEP Item Categories

TOPICS:

- ★ **Number & Operations**
- ★ **Measurement**
- ★ **Geometry**
- ★ **Data Analysis, Statistics,
& Probability**
- ★ **Algebra & Functions**

PROCESSES:

- ★ **Conceptual Understanding**
- ★ **Procedural Knowledge**
- ★ **Problem Solving**
- ★ **Problem Solving Extended**

*Number of DIF Items by Year and Program
14 SSI and 13 Non-SSI Trend Group*

Grade 4		
	1996	2000
SSI	12	21
Non-SSI	11	14

*Number of DIF Items by Year and Program
14 SSI and 13 Non-SSI Trend Group*

Grade 8		
	1996	2000
SSI	18	21
Non-SSI	15	18

Frequency of DIF Items by Topic and Process—Grade 4 SSI States 2000 (14)

	Conceptual Understanding	Procedural Knowledge	Problem Solving	Total by Topic
Number & Operations	1	1	1	3
Measurement	2	1		3
Geometry	1		2	3
Data Analysis, Statistics & Probability	1	3	2	6
Algebra & Functions	1	1	4	6
Total by Process	6	6	9	21

Frequency of DIF Items by Topic and Process—Grade 4 Non-SSI States 2000 (13)

	Conceptual Understanding	Procedural Knowledge	Problem Solving	Total by Topic
Number & Operations	3	2		5
Measurement		1	2	3
Geometry	1			1
Data Analysis, Statistics & Probability				
Algebra & Functions	3	1	1	5
Total by Process	7	4	3	14