Hearing and Literacy: Trends in Georgia Children

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slide courtesy of Arthur L Kellermann, MD, MPH

Why am I talking about this?

- For the 2009 meeting of the Society for Ear Nose and Throat Advances in Children, I was tasked with an hour presentation: “How so we attend poor children?”
- Since preparing that presentation, concerns about literacy have increased.

Why me?

- Track record of attending the poor: e.g., 10 years Indian Health Service
- Grew up in Mississippi
- At the 2006 SENTAC in Toronto, presented data that non-follow-up from newborn hearing screening is problematic system, not problematic poor mothers
- I have trouble saying “no”.

My priority list of what children need:

- Love
- Sanitation
- Security
- Justice
- Trustworthiness
- Food
- Literacy
- Education
- Money

Be literate by third grade

- “Until third grade, a child learns to read. After third grade, a child reads to learn.”
- “Number of future jail cells needed = number of children failing third grade reading tests. In California, North Carolina, Texas, and Virginia, the failure rate on third grade reading tests is now used to help project the number of jail cells that will be needed when those third graders are adults.”

Annie E Casey Foundation

Objectives

- Review relationship of hearing and literacy
- Review data of hearing impairment in Georgia children, and what is being done
- Review data of literacy in Georgia children, and what is being done

Tautologies

- Hearing is important for language and communicative development, including literacy
- Literacy is necessary for survival, and learning and thriving

Identifying Hearing Impairment in Georgia Children

- Since August 2000, newborns have physiologic auditory screening: A-OAE or A-ABR
- State law requires hearing screening at 25dBHL for all children entering public school for first time (but, no data about number of children who do not pass)

Automated Auditory Brainstem Response

Sounds are presented.

Surface electrodes measure brainstem activity.

Otoacoustic Emissions

Sounds are presented to the ear canal.

A microphone measures the response in the ear canal.

Occurrence of Hearing Loss

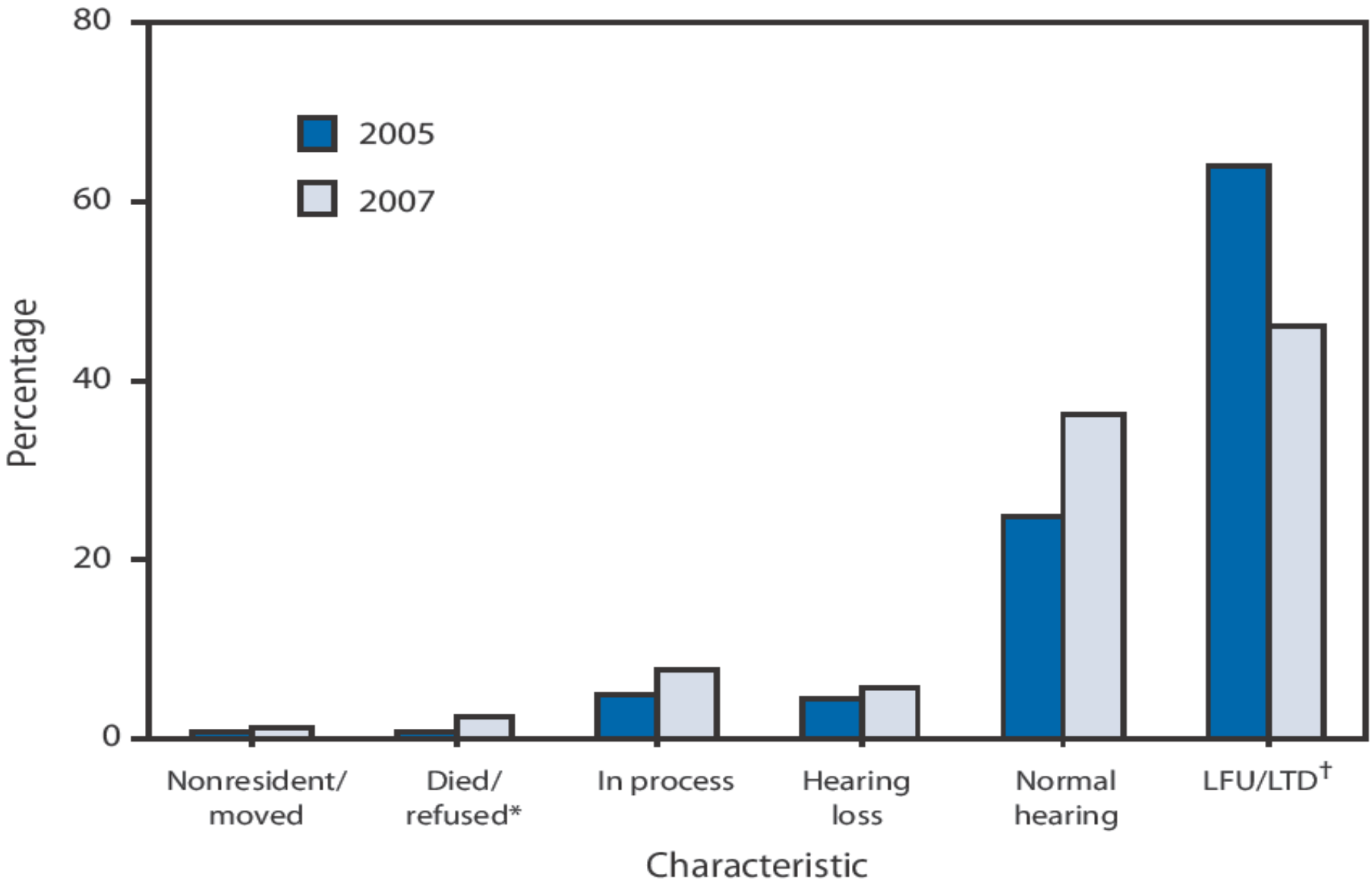
- 3 per 1000 infants are born with a permanent sensorineural hearing loss (~1 Georgia baby/day)
  - –1/1000 from the well baby nursery
  - –10/1000 from the NICU
- Rate increases to approximately 6/1000 by school age

slide from Krista Biernath & John Eichwald, CDC EHDI

3 lines of evidence that hearing in Georgia children is being addressed

1) CDC assemblage of newborn screening data, 2000-2012. More than 99% screened
2) National Health and Nutrition Examination Survey (NHANES) 1988-1994 versus 2005-2006
3) Survey about children disabled by hearing loss, 2008-2011

FIGURE. Status of infants who did not pass initial hearing screening — United States, 2005–2007



* Infant died or parents refused the screening.
† Lost to follow-up/lost to documentation.

CDC MMWR, March 5, 2010

Territories of the Unites States

District of Columbia

American Samoa

Federated States of Micronesia

Guam

Marshall Islands

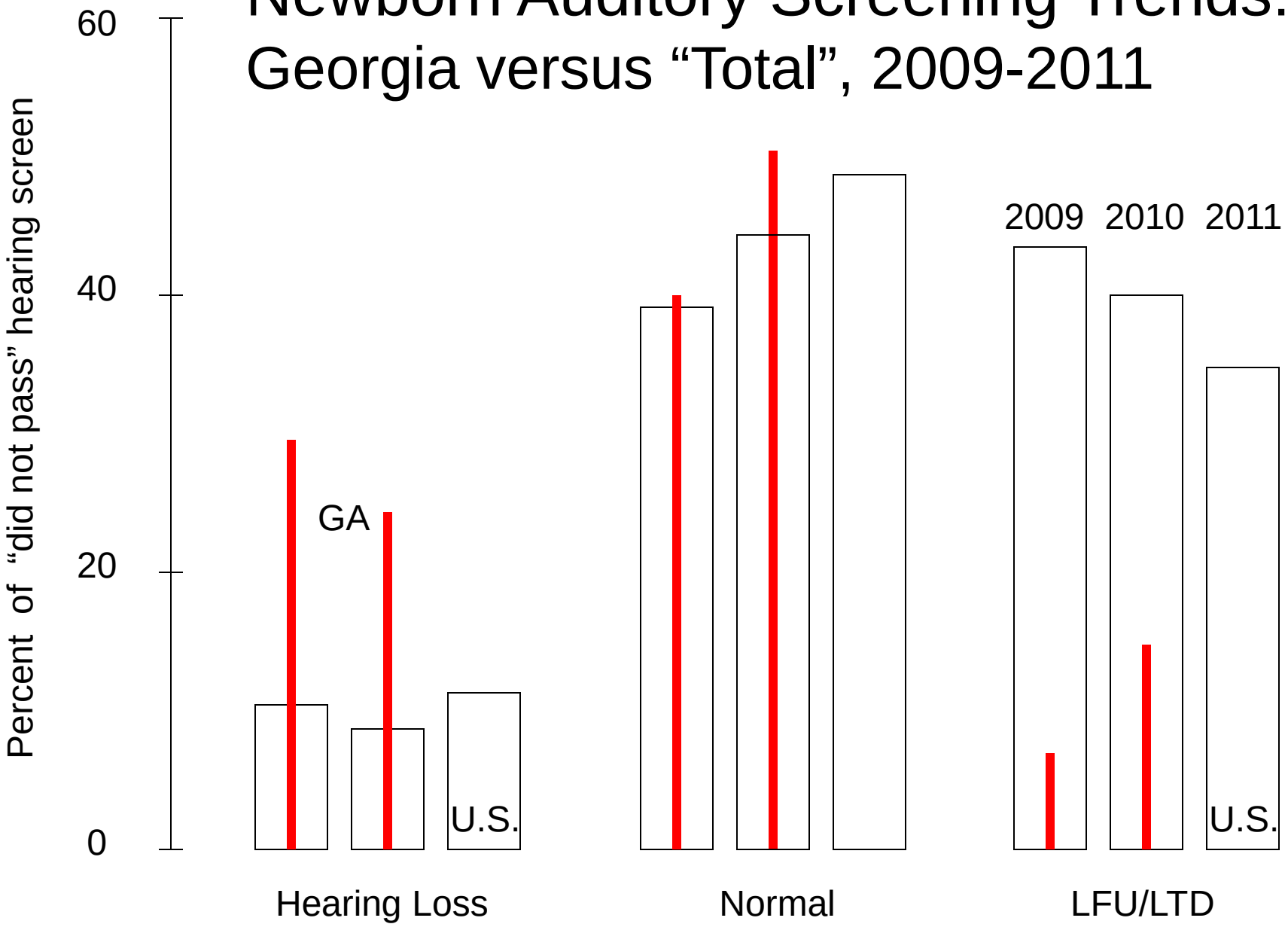
Northern Mariana Islands

Puerto Rico

Republic of Palau

Virgin Islands

Newborn Auditory Screening Trends: Georgia versus "Total", 2009-2011



Lost to Follow-Up / Lost To Documentation

CDC assemblage of 2009 data

Summary of Diagnosis and Loss to Follow-up / Loss to Documentation in 2009

November 2011

Data Source: 2009 CDC EHDI Hearing Screening & Follow-up Survey (HSFS) (www.cdc.gov/ncbddd/hearingloss/ehdi-data2009.html)
LFU / LTD: Loss to Follow-up / Loss to Documentation

State / Territory (n = 48)	Total Screened	Total Not Pass	Percent Not Pass	Inpatient (IP) / Outpatient (OP): Not Pass IP / did not Receive OP Screen	Normal Hearing	Percent w. Normal Hearing	Hearing Loss	Percent w. Hearing Loss	Prevalence per 1,0000 screened	No Diagnosis: LFU/LTD				
										Parents / Family Contacted but Unresponsive	*Unable to Contact*	*Unknown*	**# LFU/LTD** *(Parents/Family Contacted but Unresponsive + Unable to Contact + Unknown)*	**Percent LFU/LTD** *(#LFU/LTD ÷ # Total Not Pass * 100)*
Alaska	10,575	226	2.1	156	11	4.9	19	8.4	1.8	88	4	87	179	79.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia	123,021	573	0.5	0	242	42.2	181	31.6	1.5	26	10	2	38	6.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wyoming	7,077	46	0.6	0	12	26.1	19	41.3	2.7	11	0	0	11	23.9
Totals	3,614,918	56,794	1.6	13,020	22,124	39.0	5,073	8.9	1.4	7,476	4,537	13,622	25,635	45.1

CDC assemblage of 2010 data

Summary of Diagnosis and Loss to Follow-up / Loss to Documentation in 2010

December 2012

Data Source: 2010 CDC EHDI Hearing Screening & Follow-up Survey (HSFS) (www.cdc.gov/ncbddd/hearingloss/ehdi-data.html)
LFU / LTD: Loss to Follow-up / Loss to Documentation

State / Territory (n = 52)	Total Screened	Total Not Pass	Percent Not Pass	Inpatient (IP) / Outpatient (OP): Not Pass IP / did not Receive OP Screen	No Hearing Loss	Percent w. Normal Hearing	Hearing Loss	Percent w. Hearing Loss	Prevalence per 1,0000 screened	No Diagnosis: LFU/LTD				
										Parents / Family Contacted but Unresponsive	*Unable to Contact*	*Unknown*	**# LFU/LTD** *(Parents/Family Contacted but Unresponsive + Unable to Contact + Unknown)*	**Percent LFU/LTD** *(#LFU/LTD ÷ # Total Not Pass * 100)*
Georgia	131,171	907	0.7	534	452	49.8	220	24.3	1.7	16	4	124	144	15.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Totals	3,806,062	59,719	1.7	8,935	26,324	44.1	5,046	8.4	1.4	7,251	4,269	11,964	23,474	39.3

CDC assemblage of 2011 data

Summary of Diagnosis and Loss to Follow-up / Loss to Documentation in 2011

August 2013

Data Source: 2011 CDC EHDI Hearing Screening & Follow-up Survey (HSFS) (www.cdc.gov/ncbddd/hearingloss/ehdi-data.html)
LFU / LTD: Loss to Follow-up / Loss to Documentation

State / Territory (n = 50)	Total Screened	Total Not Pass	Percent Not Pass	Inpatient (IP) / Outpatient (OP): Not Pass IP / did not Receive OP Screen	No Hearing Loss	Percent w. No Hearing Loss	Hearing Loss	Percent w. Hearing Loss	Prevalence per 1,0000 screened	No Diagnosis: LFU/LTD					
										Total No Diagnosis	*Parents / Family Contacted but Unresponsive*	*Unable to Contact*	*Unknown*	# LFU/LTD (Parents/Family Contacted but Unresponsive + Unable to Contact + Unknown)	Percent LFU/LTD (#LFU/LTD ÷ # Total Not Pass * 100)
Alaska	10,960	150	1.4	61	34	22.7	18	12.0	1.6	98	26	4	37	67	44.7
Wyoming	6,608	43	0.7	10	16	37.2	16	37.2	2.4	11	6	0	0	6	14.0
Totals	3,416,209	59,161	1.7	7,842	28,575	48.3	5,088	8.6	1.5	25,498	5,996	5,154	9,707	20,857	35.3

National Health and Nutrition Examination Survey (NHANES) 1988-1994 versus 2005-2006

- Nationally representative cross-sectional data
- Normal: <= 15dBHL for 0.5-1-2-3-4-6-8kHz
- Mild (or worse hearing loss) if >=25dBHL
- Any hearing loss worsened:
  14.9% (95%CI 13.0-16.9) to 19.5% (95%CI 15.2-23.8)
- Unilateral high frequency loss worsened:
  12.8% (95%CI 11.1-14.4) to 16.4% (95%CI 13.2-19.7)
- Noise-induced hearing loss suspected

Shargorodsky et al., JAMA, 2010

Children Disabled by Hearing Loss, Family Reported

GEORGIA

age	2008	2009	2010	2011
≤ 4 years	0.8	0.6	0.5	0.7%
5-15	0.7	0.6	0.7	0.7%
16-20	0.6	0.5	0.5	0.7%

UNITED STATES

age	2008	2009	2010	2011
≤ 4 years	0.5	0.5	0.5	0.6%
5-15	0.7	0.6	0.6	0.6%
16-20	0.7	0.7	0.6	0.7%

The 90% "margin of error" for each statistic is +/- 3.9%

Employment and Disability Institute, Cornell University
National Institute on Disability and Rehabilitation Research
Funded by U.S. Department of Education
<www.disabilitystatistics.org> accessed 01 November 2013

Relationship of hearing & reading

- Historically, d/Deaf and hard of hearing students read at late 3rd to early 4th grade level
- Surveyed a convenience sample 7 states' educators in charge of d/Deaf & hard of hearing students

Easterbrooks & Beal-Alvarez, 2012

Easterbrooks & Beal-Alvarez (2012) had problems with their study

- Data from only 7 of 50 states
- No clear definition of degrees of hearing loss
- Assessment measures differed from state to state
- Definitions of reading proficiency differed from state to state

Table 1

States' Definitions of "Meets Proficiency"

State	*Grades*	*Definition of "meets proficiency"*
1	1–8	Meets reading standards for grade level.
2	3–8	Students consistently demonstrate mastery of the grade-level subject matter and skills.
3	3–8, 11	Satisfactory academic performance, solid understanding, and adequate display of the skills required in the state standards.
4	3–11	n/a
5	3–8, 11, 12	Sufficient understanding and application of the standards.
6	3–8, 10	Competency in knowledge and skills.
7	1–5, 3–11	Competency in and application of knowledge.

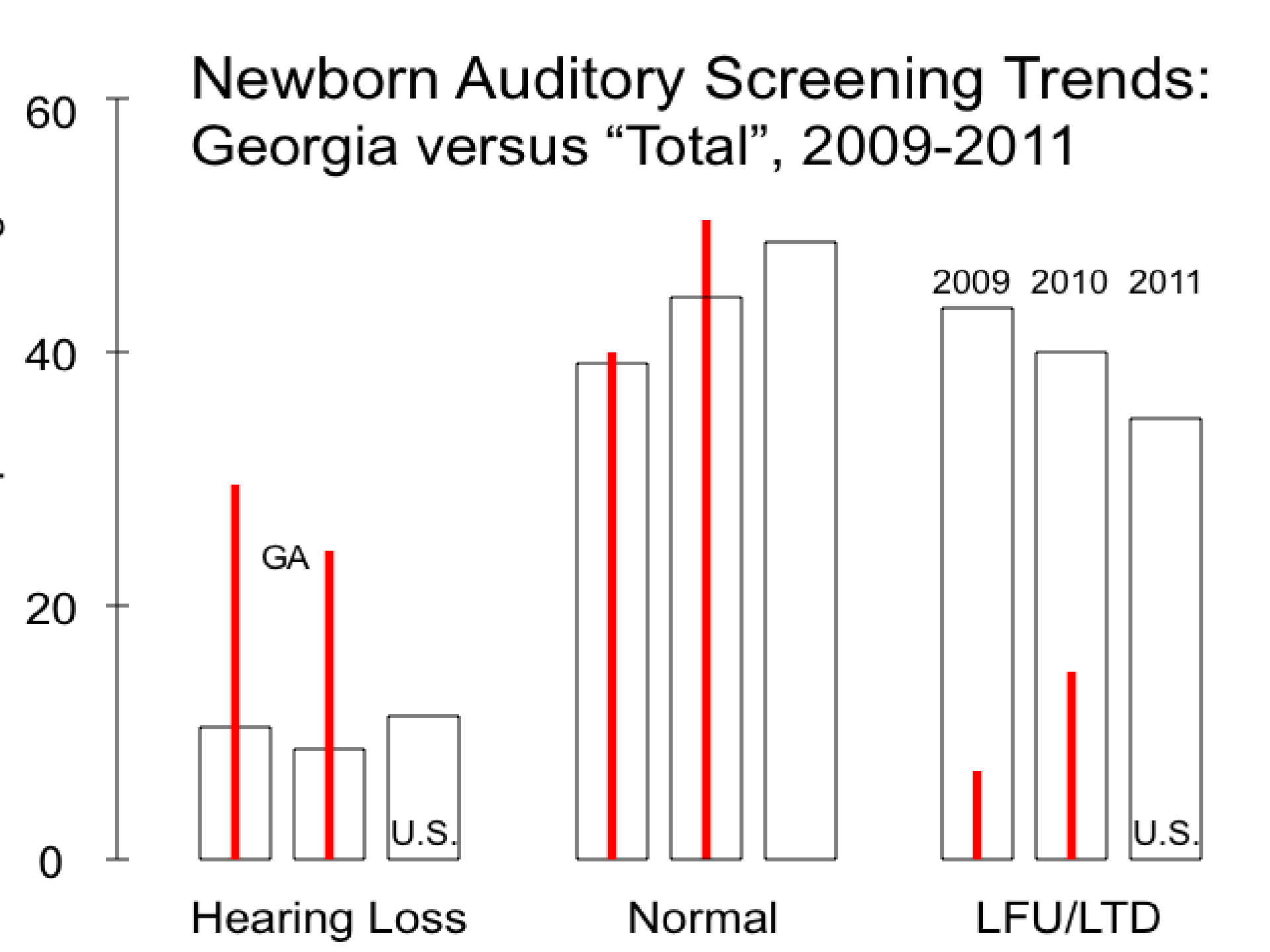
from Easterbrooks & Beal-Alvarez, 2012

Easterbrooks & Beal-Alvarez (2012) nevertheless tentatively concluded:

- No better study of reading in d/Deaf and hard of hearing students is available
- Most of the 7 states reported somewhat better reading than predicted by “glass ceiling”
- A common core of standards may allow for more rigorous study

Literacy in Georgia children: Why? What to do?

Comer Yates


Newborn Auditory Screening Trends:
Georgia versus "Total", 2009-2011
60
40
20
0
GA
U.S.
2009
2010
2011
U.S.
Hearing Loss
Normal
LFU/LTD