Exceptional Longevity: The Case for Resilience and Vitality in Very Late Life

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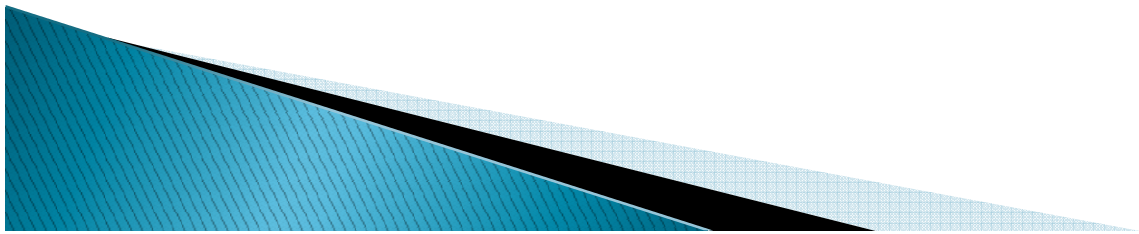
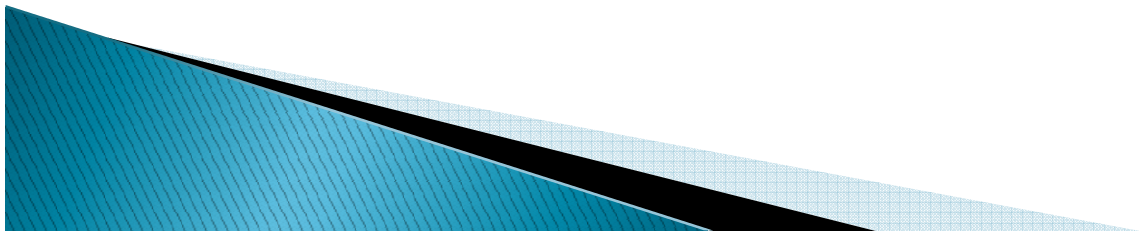
Background

- Negative views of aging tend to dominate
  - This focus hampers efforts to promote health at the individual level (Ory, et al., 2003)
  - Studies can be limited due to cross-sectional, a-contextual, and lack representation of the oldest-old
- Need to consider the spectrum of aging
  - Despite advancing age and known risk factors, many individuals maintain high levels of functioning (e.g., Hagberg, et al., 2001; Poon et al., in press)
  - Variation within "normal" functioning (Hilborn, et al., 2009; Hultsch, et al., 2000) and vitality (e.g., Walter-Ginzburg, et al., 2008)



Spectrum of Cognitive Health

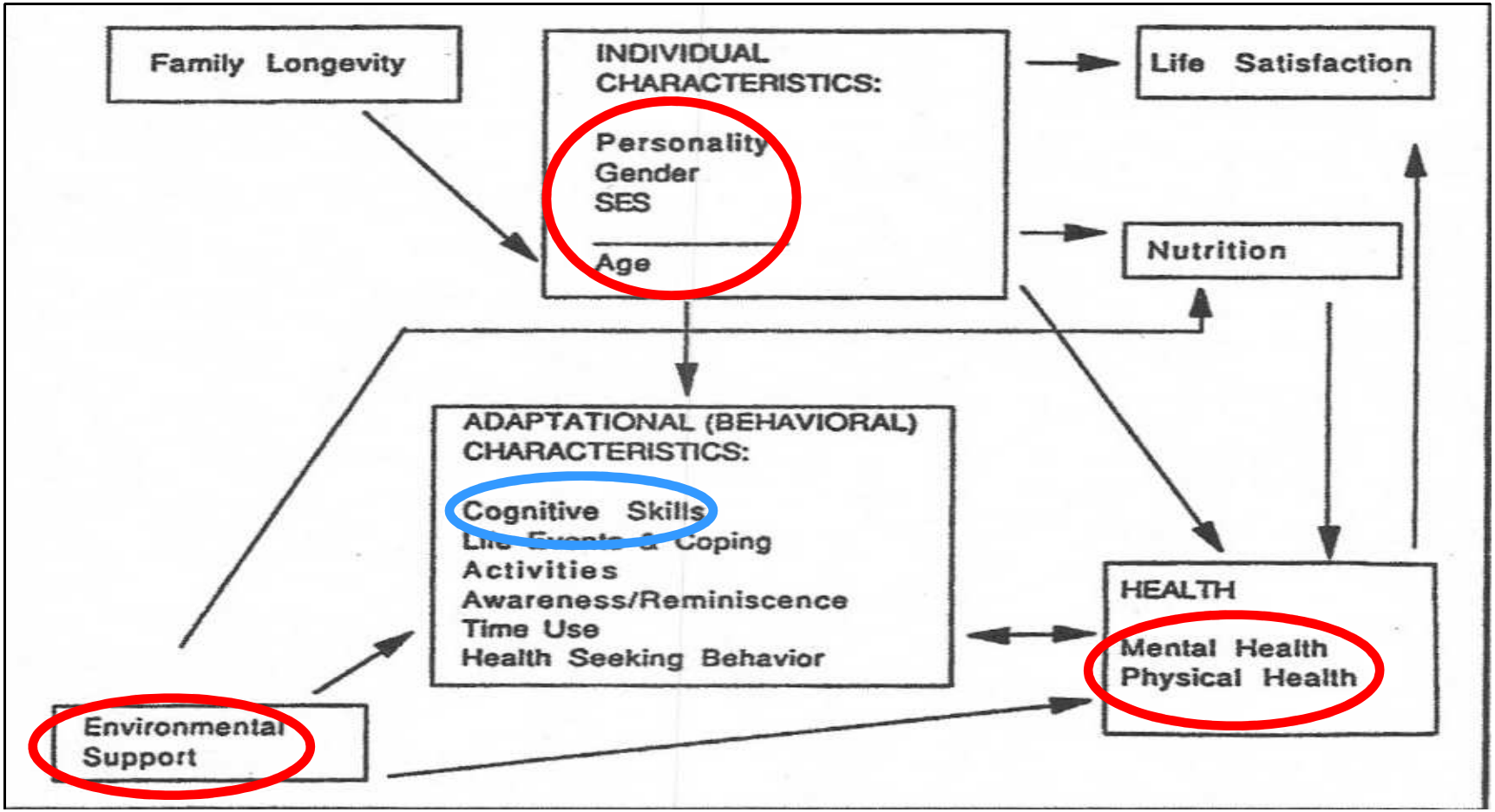
- Vitality
  - “the ability to exploit cognitive resources for active information processing and interaction with the environment in practical everyday activities” (Walter-Ginzburg, et al., 2008)
- Resilience
  - “good outcome in spite of serious threats to adaptation or development” (Masten, 2001)



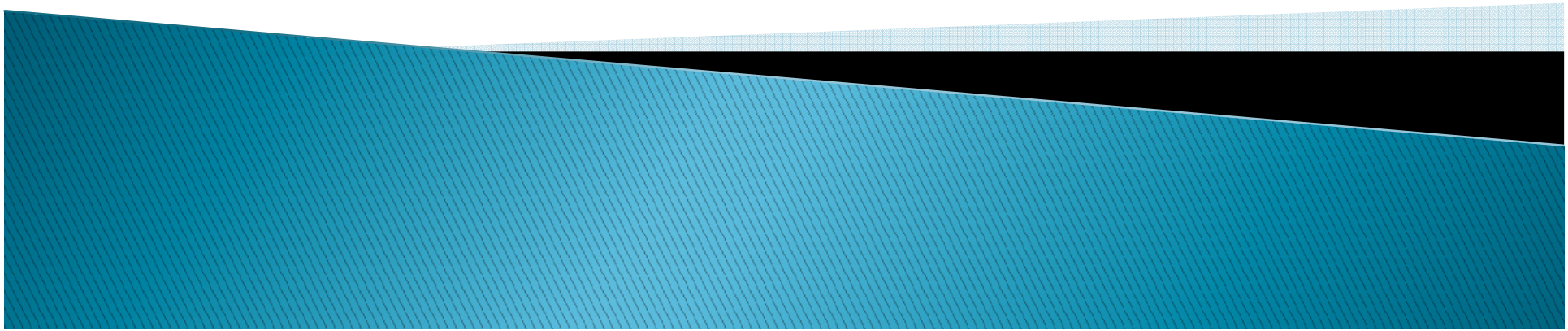
Research Rationale

- Need to identify individuals who demonstrate resilience and vitality in advanced age
  - Differential contributors and potential patterns
    - Exceptional longevity personality pattern; Martin, et al., 2006
- Examined potential factors contributing to cognitive vitality and health
  - Georgia Adaptation Model
- Converging evidence from two centenarian studies
  - Age group comparisons
  - Group and individual-level

Model of Adaptation (Poon et al., 1992)



Georgia Centenarian Study



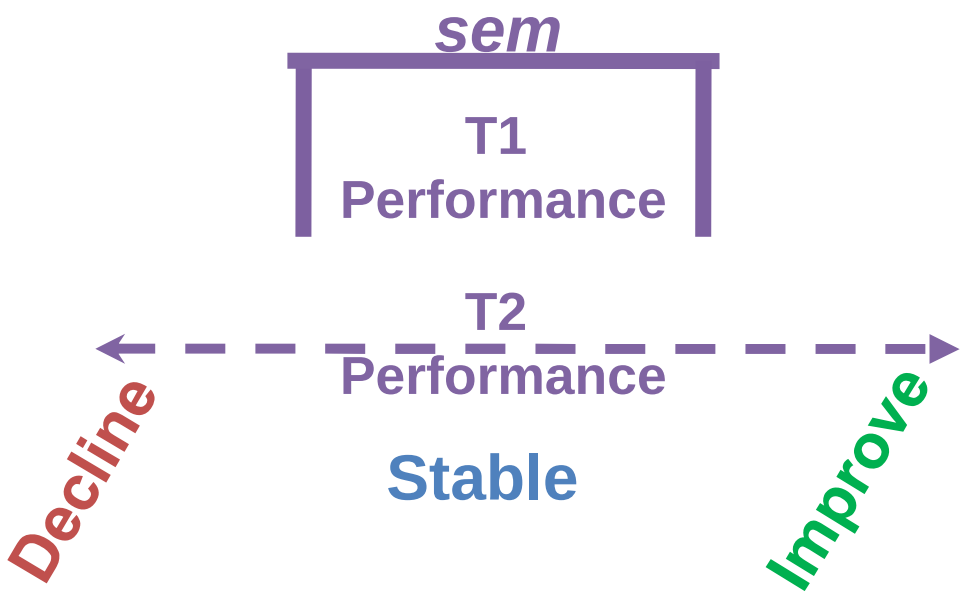
Sample Characteristics: Phases 1 & 2

		Age M (SD) Range	Sex (% F)	Ethnicity	Education (with High School)
Phase 1: Baseline Group (N = 321)	60	64.88 (2.85) R = 60–69	58%	• 67% White • 33% Black	17.6%
	80	82.63 (2.35) R = 79–89	68%	• 77.4% White • 22.6% Black	8.6%
	100	100.74 (1.55) R = 99–110	75%	• 72.3% White • 27.7% Black	9.5%

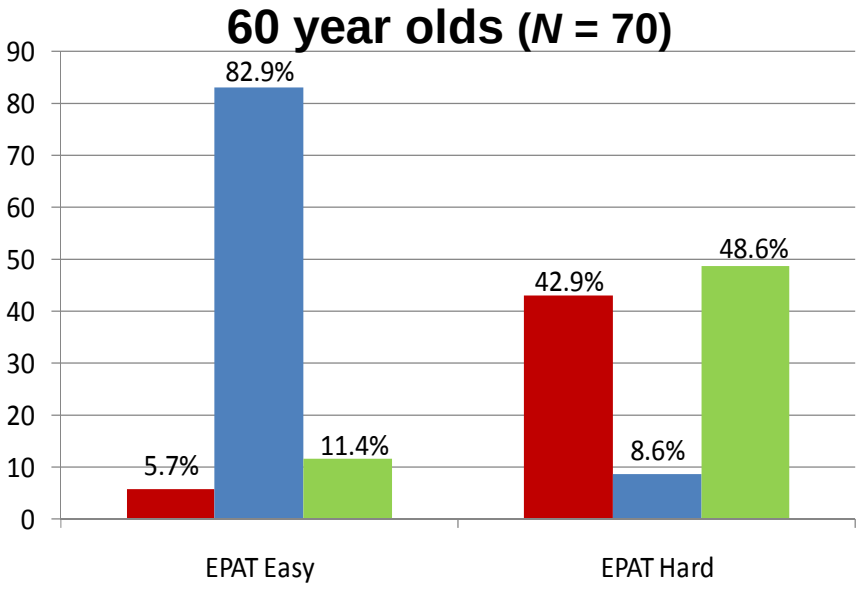
Participants scoring 17+ on the MMSE completed an extensive interview, including psychosocial indicators

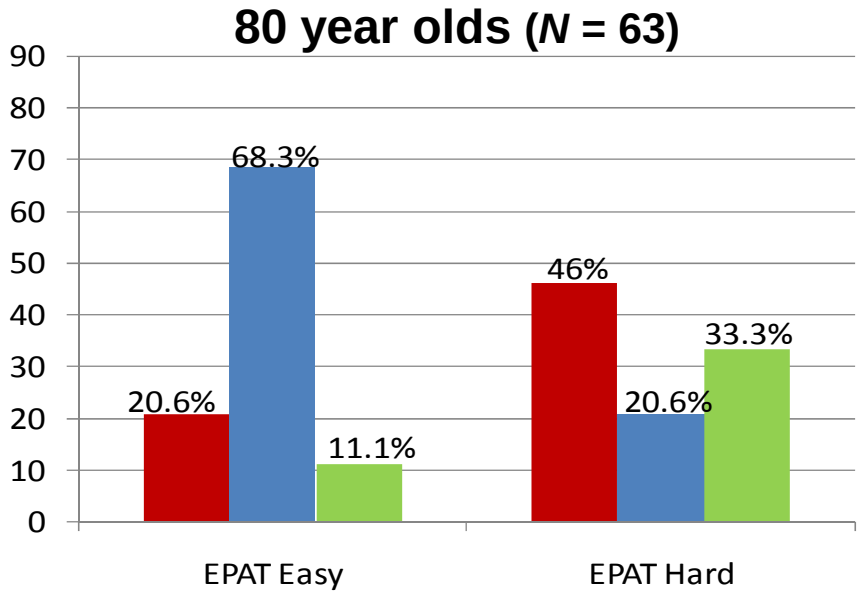
Method

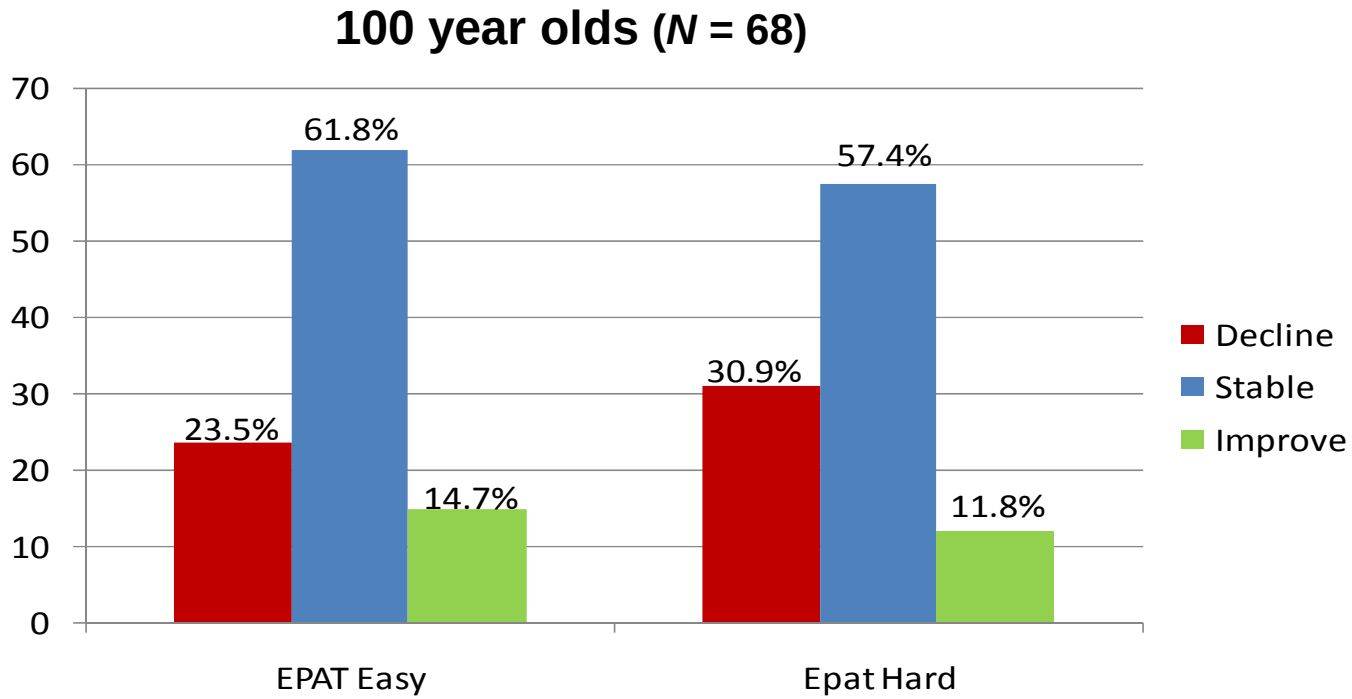
- Memory Functioning
  - EPAT (Trahan, et al., 1989)
    - 2 versions: Easy and Hard
    - Using individuals' own standard error of measurement (sem), we categorized performance between T1 and T2



Memory Performance Change







Analyses

- Separate multiple regression analyses were conducted to examine predictors across the 3 age groups
  - **DV = 3-level Change Category**
    - EPAT Easy, EPAT Hard

- **IVs**
  - **Individual Characteristics**
    - Sex, Ethnicity, Education
  - **Personality**
    - Extraversion, Anxiety
  - **Environmental Support**
    - Number of Visits, Talk on Phone
  - **Physical Health**
    - Overall Health, Physical ADLs
  - **Mental Health**
    - Depression

Significant Predictors of Change in EPAT Hard

	60	80	100
Individual Characteristics	•Ethnicity (Black) $R^2 = .21$		•Ethnicity (Black) •Education $R^2 = .12$
Environmental Support			•Number of Visits $R^2 = .36$
Physical Health			•PADL $R^2 = .36$
Mental Health			•Depression $R^2 = .36$

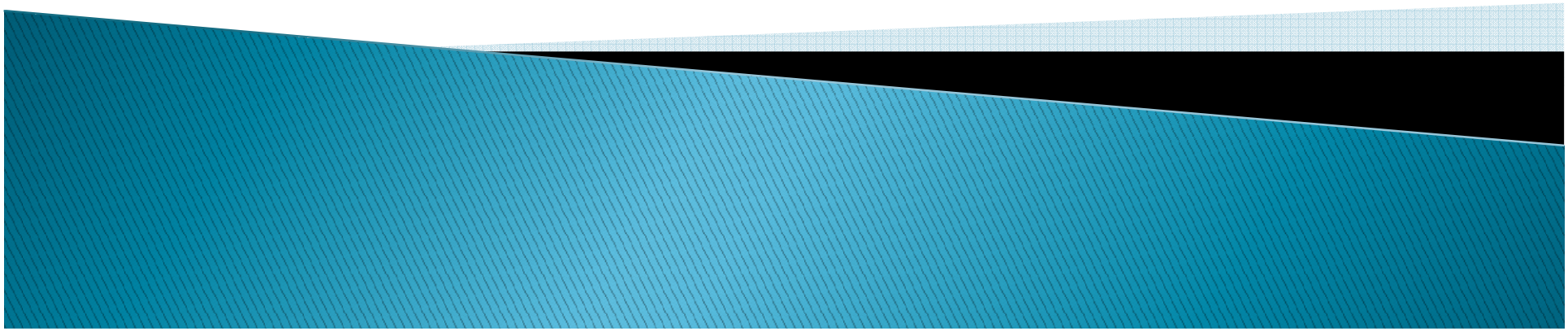
Note: There were not any significant predictors of change in EPAT Easy

Crosstabs Easy x Hard: Change Status

		60 years (n=70) EPAT Hard			80 years (n=63) EPAT Hard			100 years (n=68) EPAT Hard		
		D	S	I	D	S	I	D	S	I
EPAT	D	4.3%	0%	1.4%	15.7%	0%	3.2%	14.7%	5.9%	2.9%
Easy	S	34.3%	8.6%	40%	25.4%	19%	23.9%	8.8%	51.5%	1.5%
	I	4.3%	0%	7.1%	3.2%	1.6%	6.3%	7.4%	0%	7.4%
			55.7%			50.8%			60.4%	

Green=optimal/resilient/stable
Red = at-risk
Orange = age-related decline and potential risk

Iowa Centenarian Study



Method

- Baseline Sample
  - Iowa Centenarians (N = 124)
  - Community and institutional dwelling

- Variability Testing (N = 19)
  - 4 testing points across 12-month period
  - Participants scoring 6+ on the SPMSQ in the baseline participated the variability testing

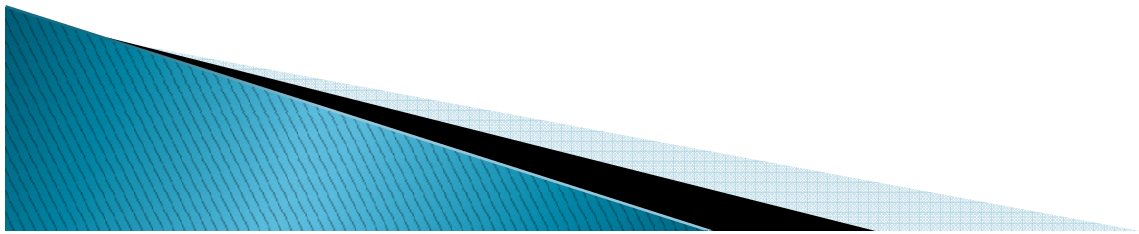
Sample Characteristics

	N	Age M (SD) Range	Sex (% F)	Education M (SD) Range	Independent Living
Baseline Group	124	101.68 (2.25) R=100-112	86%	12.14 (3.38) R=1-24	19.4%
Centenarians participating in all time points	19	100.19 (1.80) R=100-104	63%	11.63 (2.64) R=8-16	52.6%

Measures

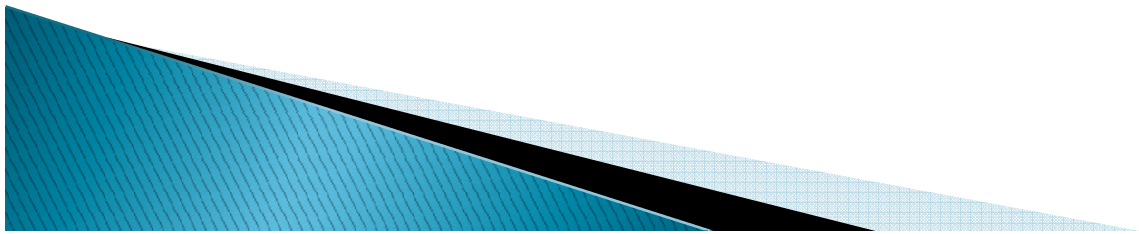
- Cognitive Status
  - SPMSQ (Short Portable Mental Status Questionnaire; Pfeiffer, 1974)
  - 10 items, 4 errors considered indicative of impairment
  - DV = Total errors

- Verbal Fluency
  - COWAT (Controlled Oral Word Association test; Benton & Hamsher, 1976)
  - 60-second trials, generate words beginning with “S” &“T”
  - DV = Total combined score



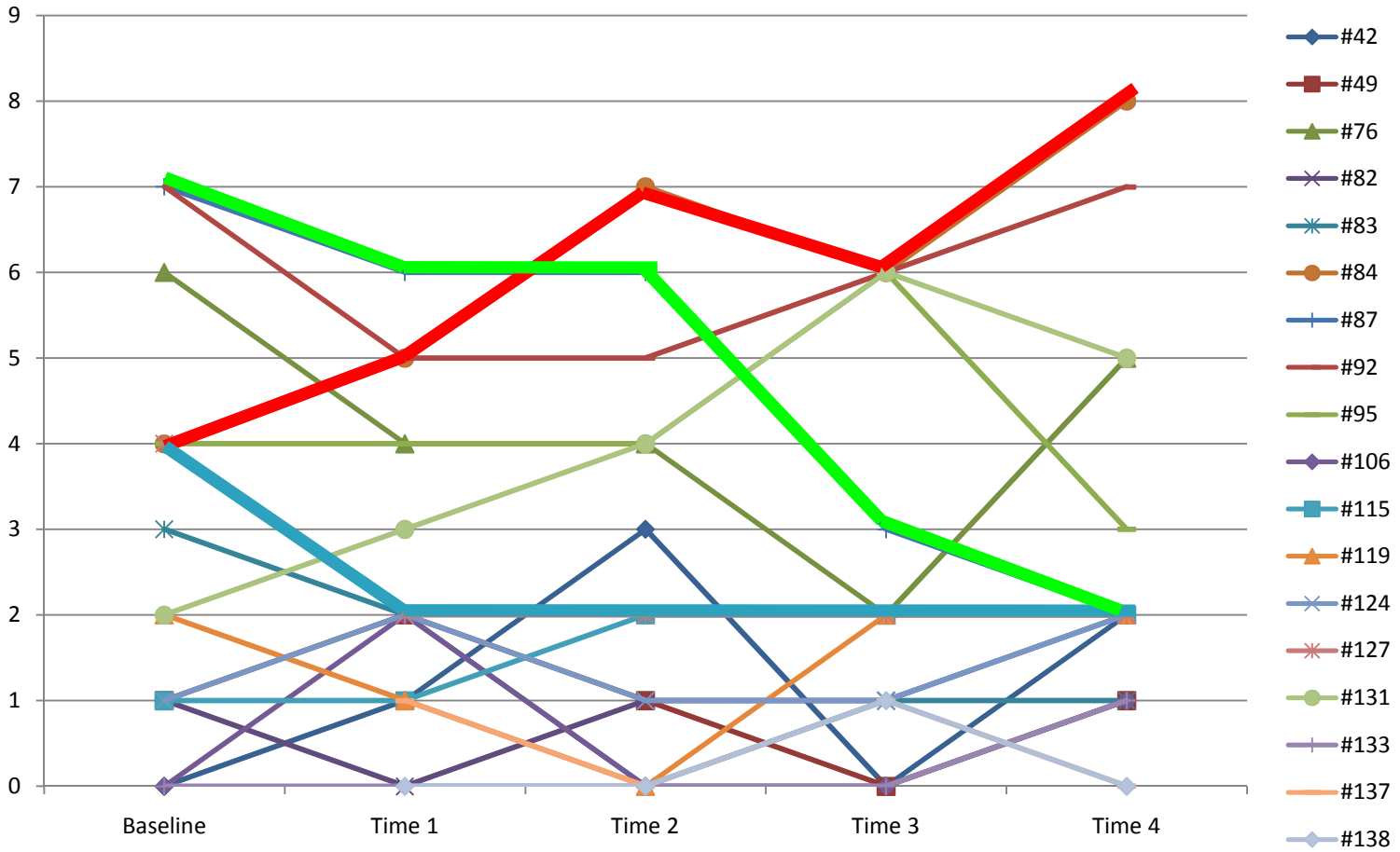
Analyses

- Two repeated measures analysis of variance tests were conducted to assess changes in SPMSQ and verbal fluency performance over time



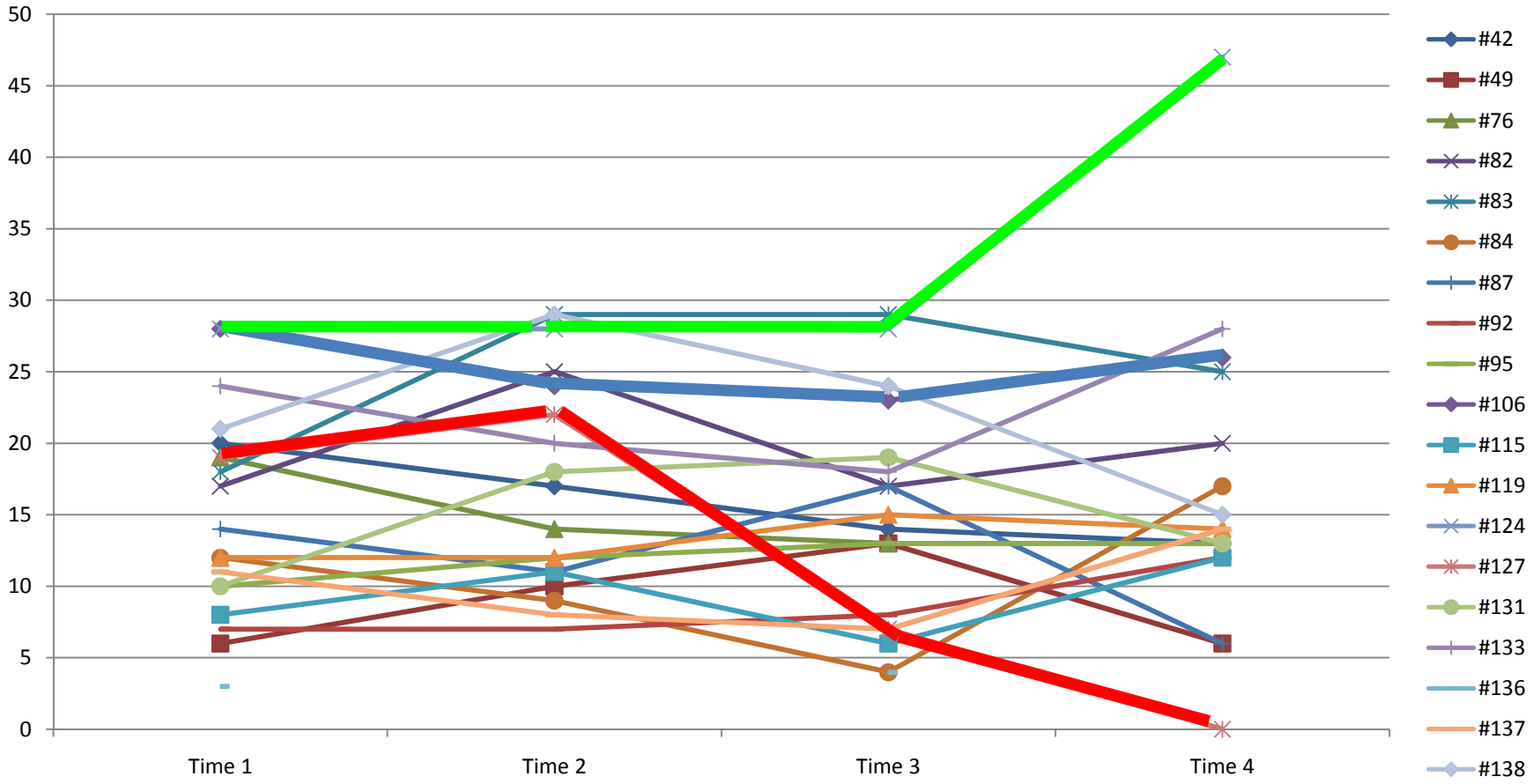
SPMSQ Performance (Errors)

	Baseline	Time 1	Time 2	Time 3	Time 4
Mean Errors	2.63	2.47	2.47	2.53	2.84
SD	2.45	1.98	2.48	2.55	2.52



Verbal Fluency Performance

	Time 1	Time 2	Time 3	Time 4
N	28	22	20	18
Mean	13.93	16.14	14.65	16.33
SD	6.99	7.47	7.45	10.39

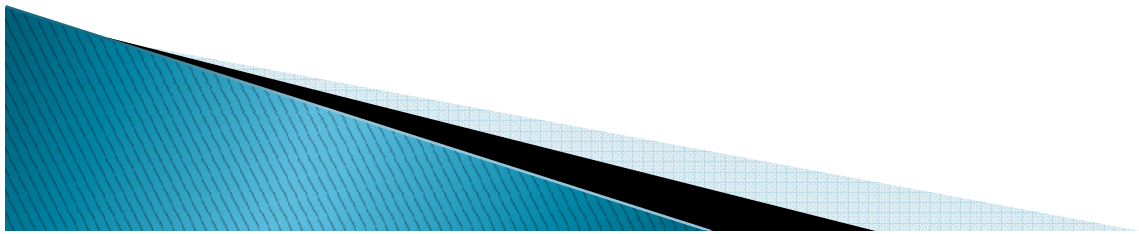


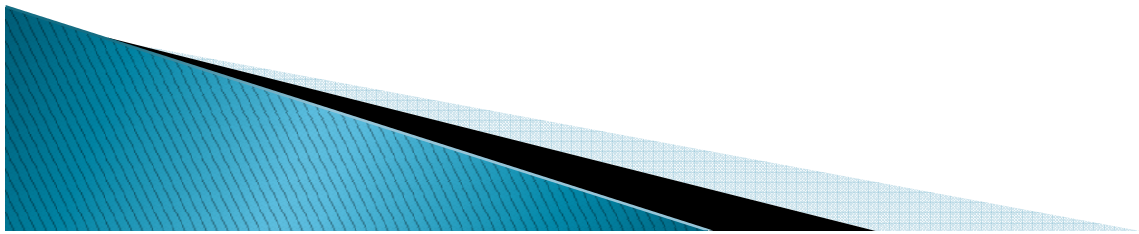
Conclusions and Future Directions

- At the group and individual levels, centenarians demonstrated stability in cognitive performance
  - *Georgia Centenarian Study: Phases 1 and 2*
    - 60 and 80 year-olds were more likely to demonstrate change in memory compared to 100-year-olds
    - Predictors of change varied across age groups
      - Phase 3 (not shown here) predictors of MMSE status group x age; different predictors
  - *Iowa Centenarian Study*
    - Stability across multiple time points for mental status and reasoning ability measure
- Caveats
  - Attrition and selectivity among 100-year-olds
  - Regression to the mean among younger groups

Conclusions and Future Directions

- Converging evidence supporting a need to consider the spectrum of functioning in late life
  - Examine within-person variability/fluctuation
- Address synergistic effects and capitalize on ways to promote continued health and well-being in advanced age (Kramer & Willis, 2002; Park, et al., 2007; Studenski, et al., 2006)
  - Social engagement and cognitive health
  - Affect ←→ Cognition



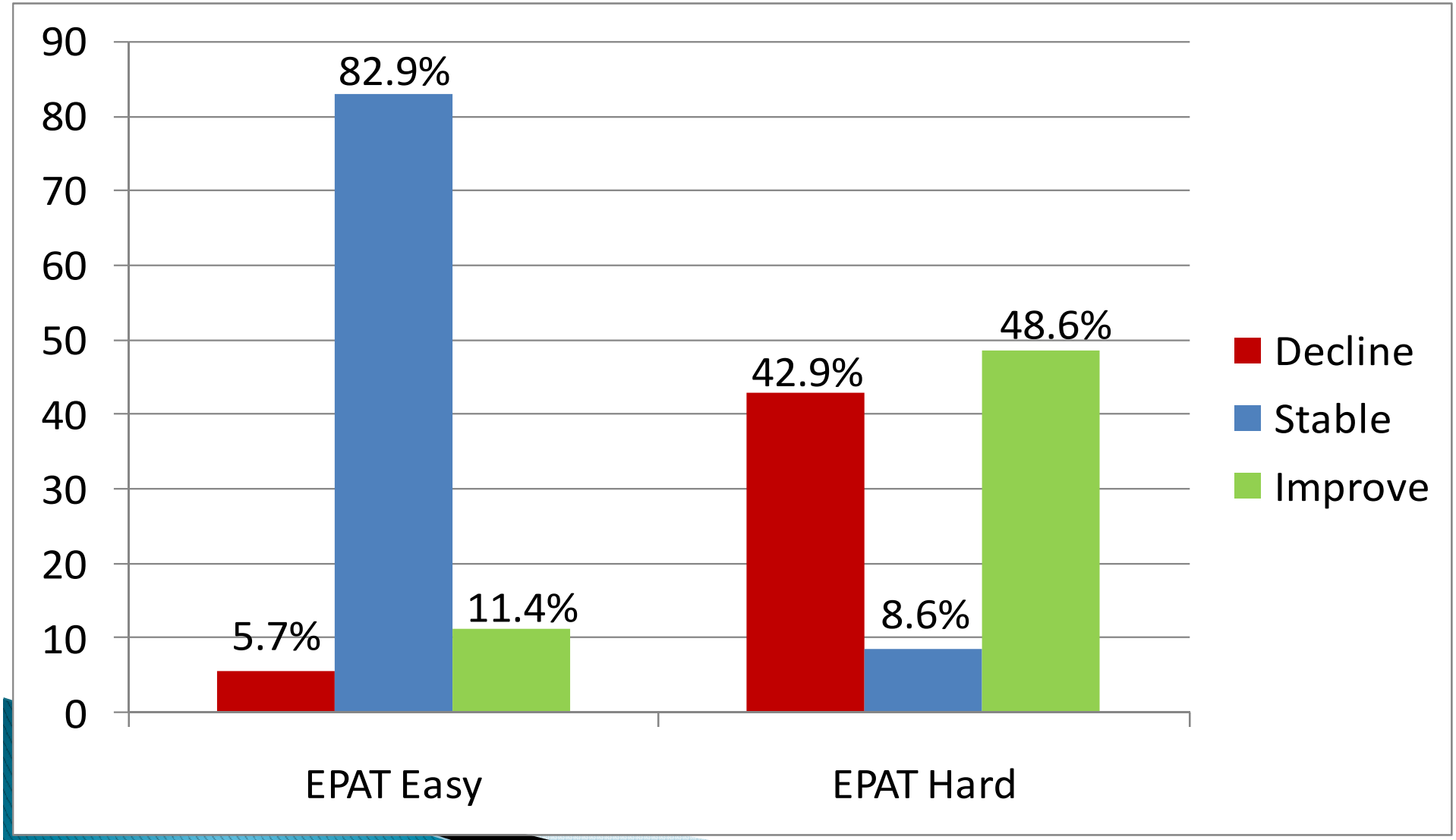


Defining Cognitive Health

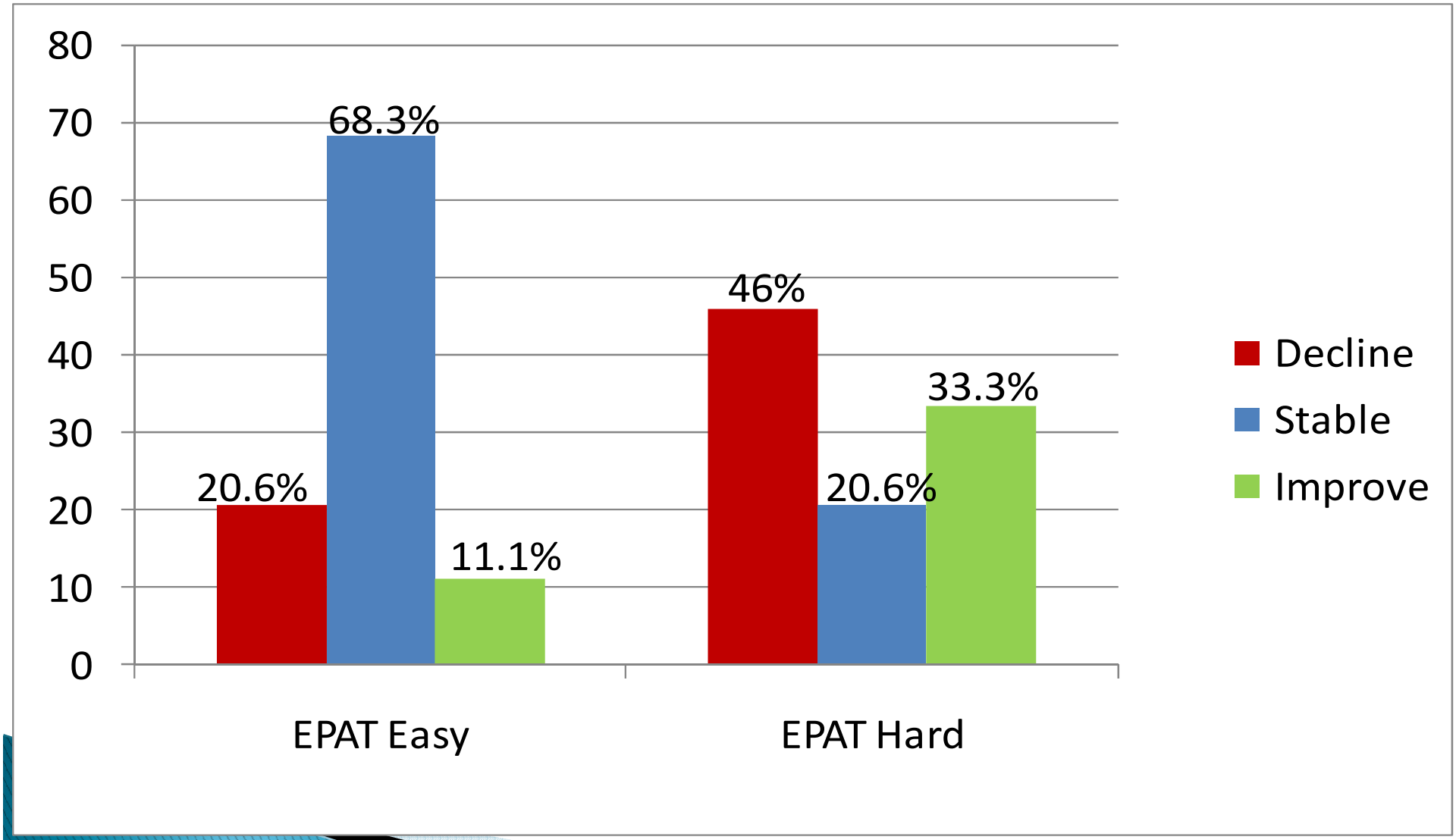
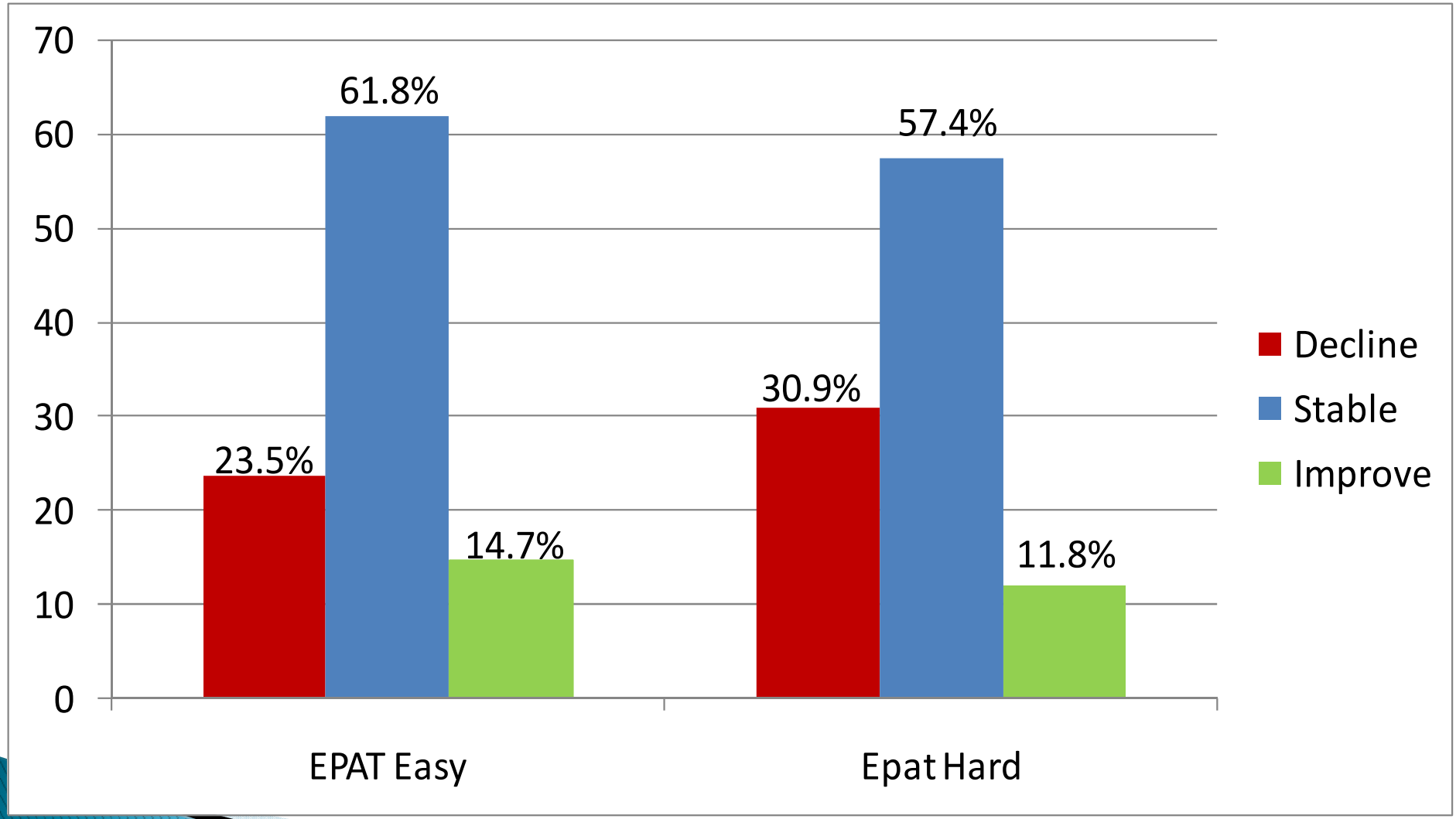
- "…not just the absence of disease, but rather as the development and preservation of the multidimensional cognitive structure that allows the older adult to maintain social connectedness, an ongoing sense of purpose, and the abilities to function independently, to permit functional recovery from illness or injury, and to cope with residual functional deficits (pg. 13; Hendrie, et al., 2006)"

The NIH Cognitive and Emotional Health Project: Report of the Critical Evaluation Study Committee

Memory Performance Change
60 year olds (N=70)



Memory Performance Change
80 year olds (N=63)



Memory Performance Change
100 year olds (N=68)