Respondent Burden: Lessons Learned from a Mixed-Methods Approach to Assessing Measures of Perceived Burden

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Multi-Method Assessment Overview

- **Reliability (Internal Consistency)**
- **Distinguishability of Item Sub Scales**
- **Dimensionality**
  - Do the items measure the latent construct well?
  - Do they measure more than the latent construct?
- **Linearity**
  - Are the item sub scales linearly related to the latent variable?

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Overview

- Potential sources of measurement error
- Item assessment tools
- Case study
  - Internal consistency
  - Dimensionality
  - Item Sub Scale Performance
    - Distinguishability
    - Linearity Summary
- Conclusions
- Next steps

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Research Questions

- 1) Are responses to the items used in the measure internally consistent?

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Research Questions

- 2) If not, why do they vary?
  - A) Are item relationships higher or lower than we would expect?

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Research Questions

- 3) How are the subscales of my measure performing?
  - A) Do the different response options distinguish between varying levels of latent burden?
  - B) Are the ordinal response options linearly related to each other and latent burden as whole?

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Models & Statistics

- **Confirmatory Factor Analysis**
  - Error Variance (internal consistency)
- **Item Response Theory**
  - Chi Square (internal consistency)
  - LD Chi Square (dimensionality)
  - Trace-lines (distinguishability of sub-scales)
  - Mean Square Error (linearity of sub-scales)

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Assessed 9 Burden Items

- Burden
- Length
- Interest
- Difficulty
- Sensitivity
- Appropriate # of Waves
- Another Survey
- Extend Survey
- Effort

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Background

- Current Expenditure Survey (CEQ)
  - respondents were asked about burden in a post survey (end of 5th interview)
- Burden items were developed using Bradburn's (1978) definition:
  - effort
  - survey length
  - frequency of survey requests

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Research Question 1

- 1) Are responses to the items used in the measure internally consistent?

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Internal Consistency

- Confirmatory Factor Analysis, Error Variance: $1 - r^2$
  - Measures the *% of variation* in the latent construct not explained by the item
- Item Response Theory – Chi Square Statistic
  - Is there a significant proportion of variation in the latent construct not explained by this item?

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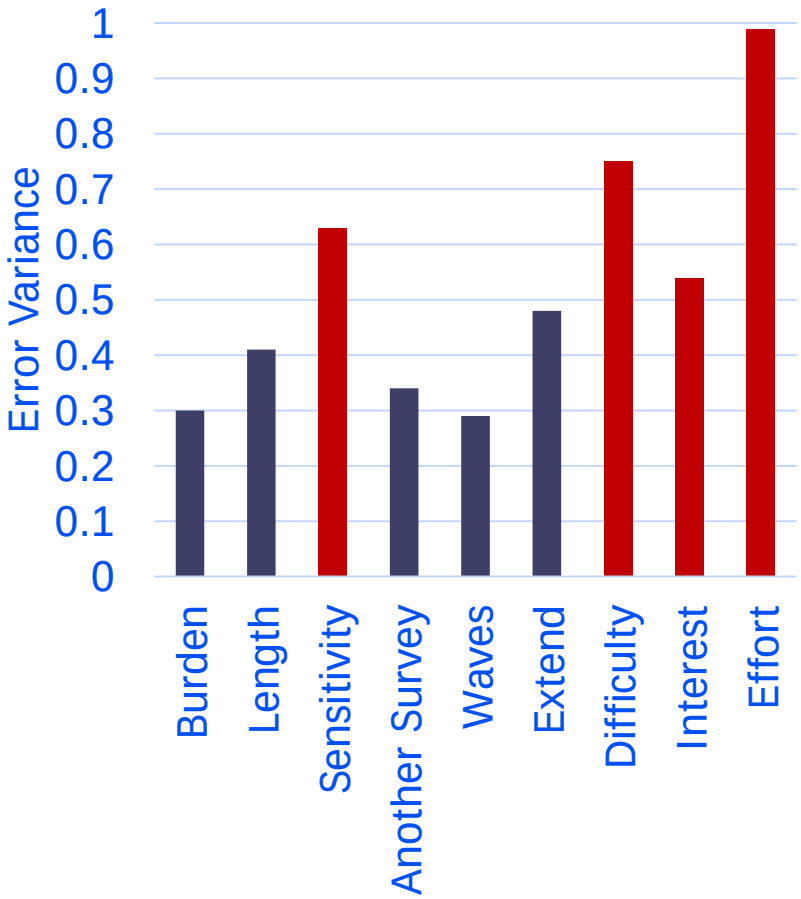
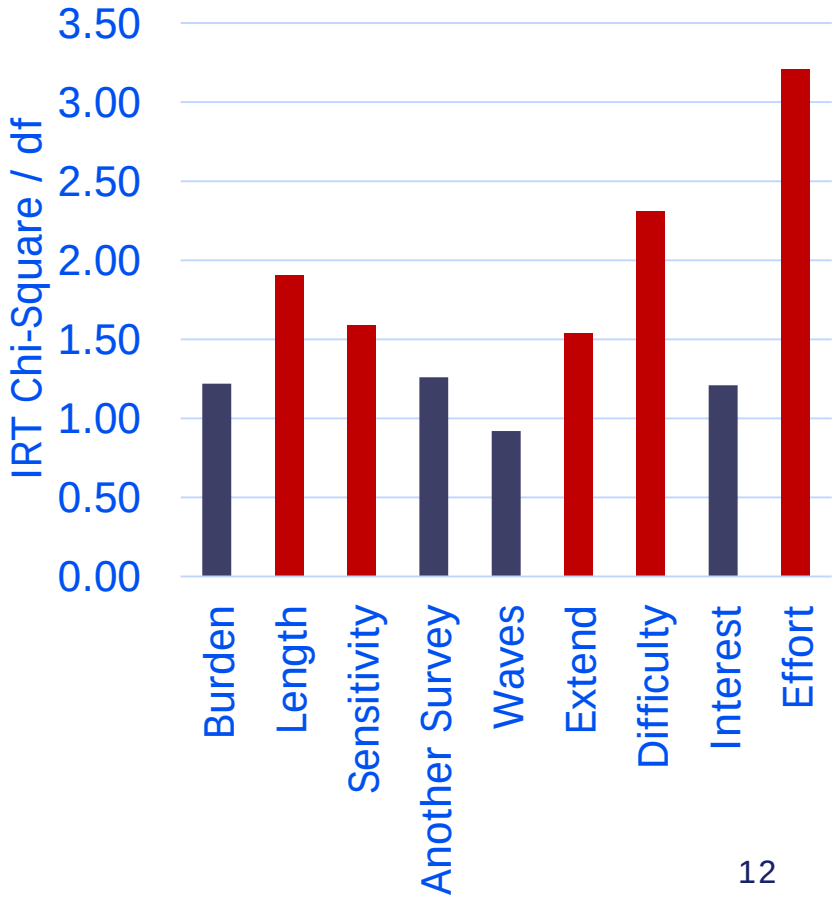
Internal Consistency

CFA – Error Variance



IRT – Chi Square



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Item Response Theory - Chi Square

- X^2 also considers
  - how difficult an item is to agree w/
    - Some items maybe carry more weight…
  - Item response patterns vs total score
  - local independence of the item
    - Is it as correlated as we would expect w/ the other items?
    - Is it more correlated w/ the other items than we would expect after controlling for the latent variable burden?

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Research Question 2

- 2) If item responses are not internally consistent, why might they vary?
  - A) Are item relationships higher or lower than we would expect?
  - B) Are there interaction effects aka differential item functioning?

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Local Independence

- Dimensionality
  - LD $\chi^2 \leq -10$
    - not as correlated as we would expect w/ another item
  - LD $\chi^2 \geq 10$
    - more correlated than we would expect w/ another item after controlling for the latent burden
    - measures more than just latent burden

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IRT LD χ^2 Statistics by Burden Items

Item	Burden	Another	Extend	Length	Interest	Sensitivity	Wave	Difficulty
Burden								
Another	-7.7							
Extend	-10.1	-15.0						
Length	-8.6	7.6	5.0					
Interest	-17.5	-5.4	-7.0	-0.9				
Sensitivity	14.9	7.8	-9.5	-4.2	-17.2			
Wave	-3.4	-0.7	-0.0	0.2	0.1	-8.6		
Difficulty	26.6	12.3	-11.9	1.4	-13.8	18.3	-8.8	
Effort	20.0	7.6	-12.9	1.9	-28.7	8.1	-0.1	13.1

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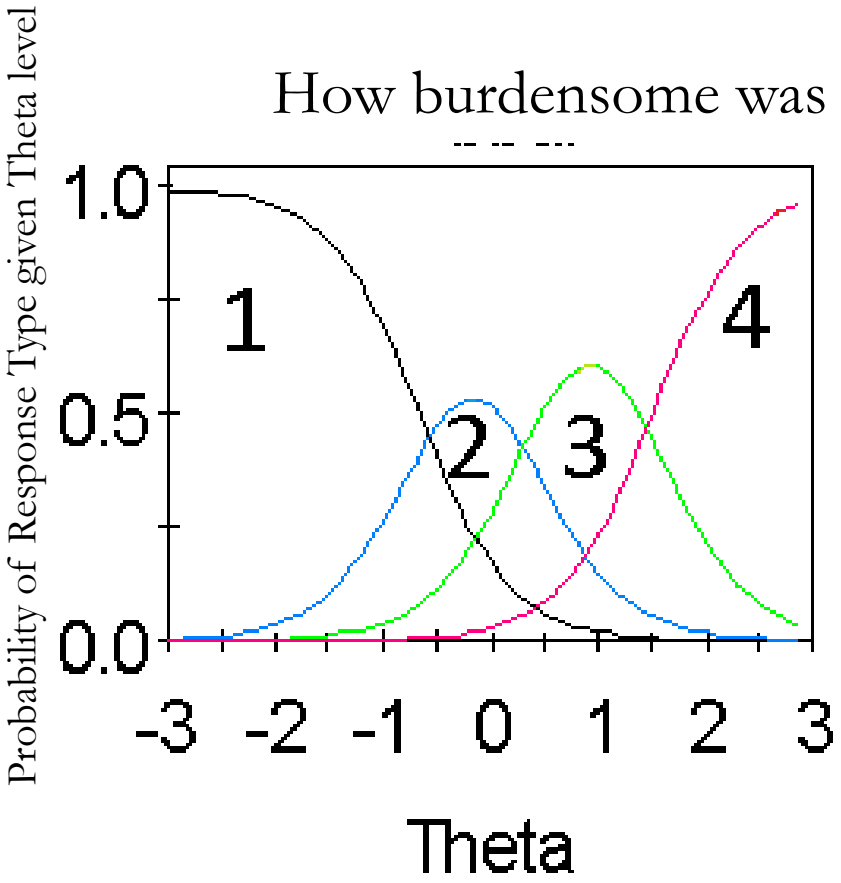
Research Question 3

- 3) How are the subscales of my measure performing?
  - A) Do the different response options distinguish between varying levels of latent burden?

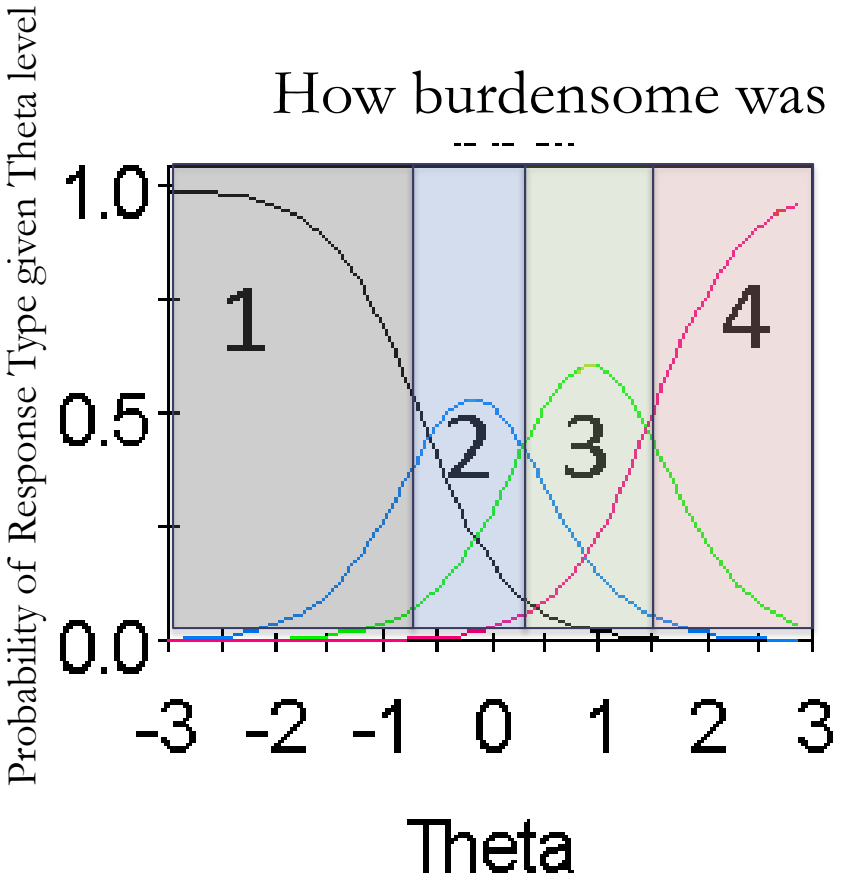
Tracelines
Good Item Fit Example



1 Not at all burdensome
2 A little burdensome
3 Somewhat burdensome
4 Very burdensome

Theta = Standardized Scale of the Latent Variable Burden

Tracelines
Good Item Fit Example



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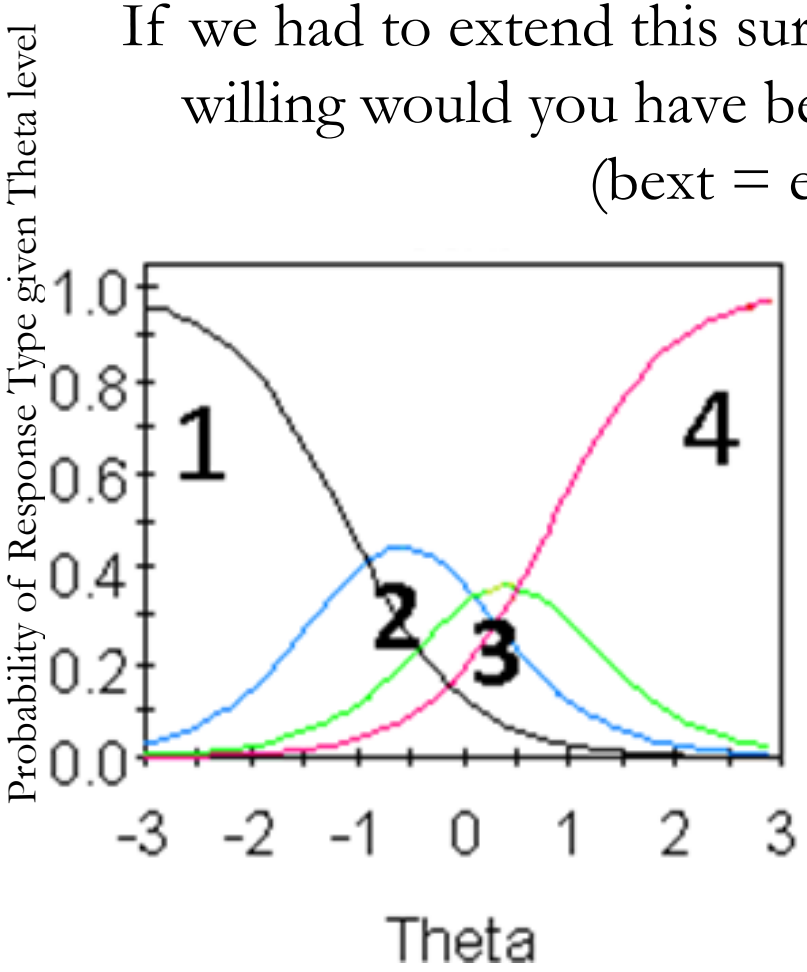
Poor Item Fit Example

If we had to extend this survey for another 15 minutes, how willing would you have been to continue this interview? (bext = extend survey)



1 Very willing
2 Somewhat willing
3 Somewhat unwilling
is not associated w/ unique levels of burden
4 Very unwilling

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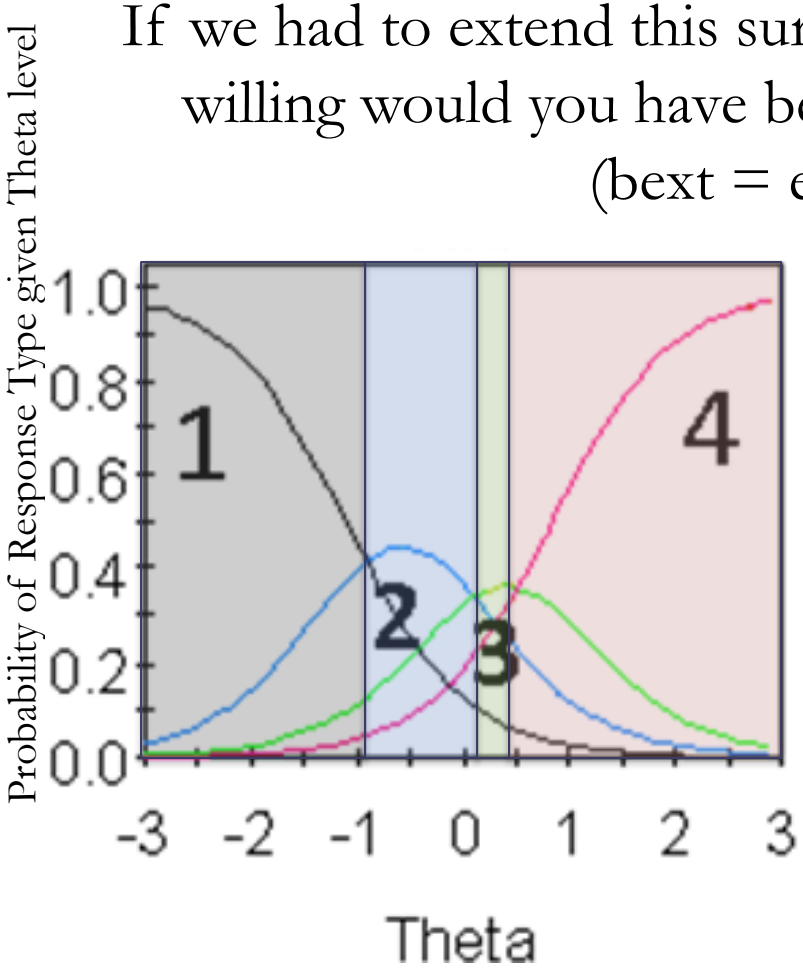

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  - A) Do the different response options distinguish between varying levels of latent burden?
  - B) Are the ordinal response options linearly related to each other and latent burden as whole?

IRT - Linearity

- Linearity (Mean Square Error: *t*)
  - Like CFA and the IRT Chi-Square statistic, the IRT *t* statistic also looks at the consistency of item responses, but is more sensitive to violations of linearity
  - If items responses violate the assumptions of linearity (they do not have a linear relationship w/ the latent variable), they will have significant misfit

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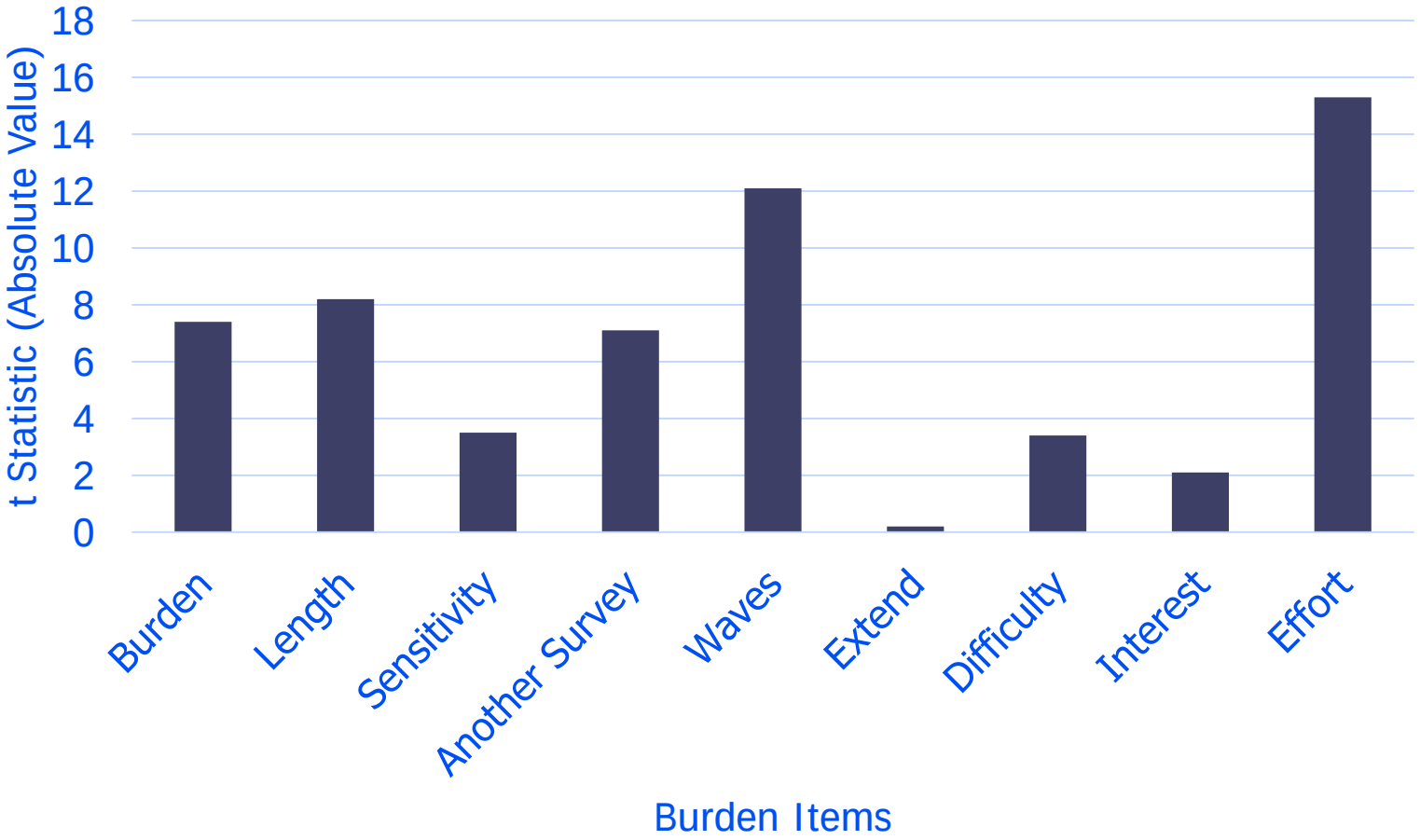
t Statistics by Burden Items



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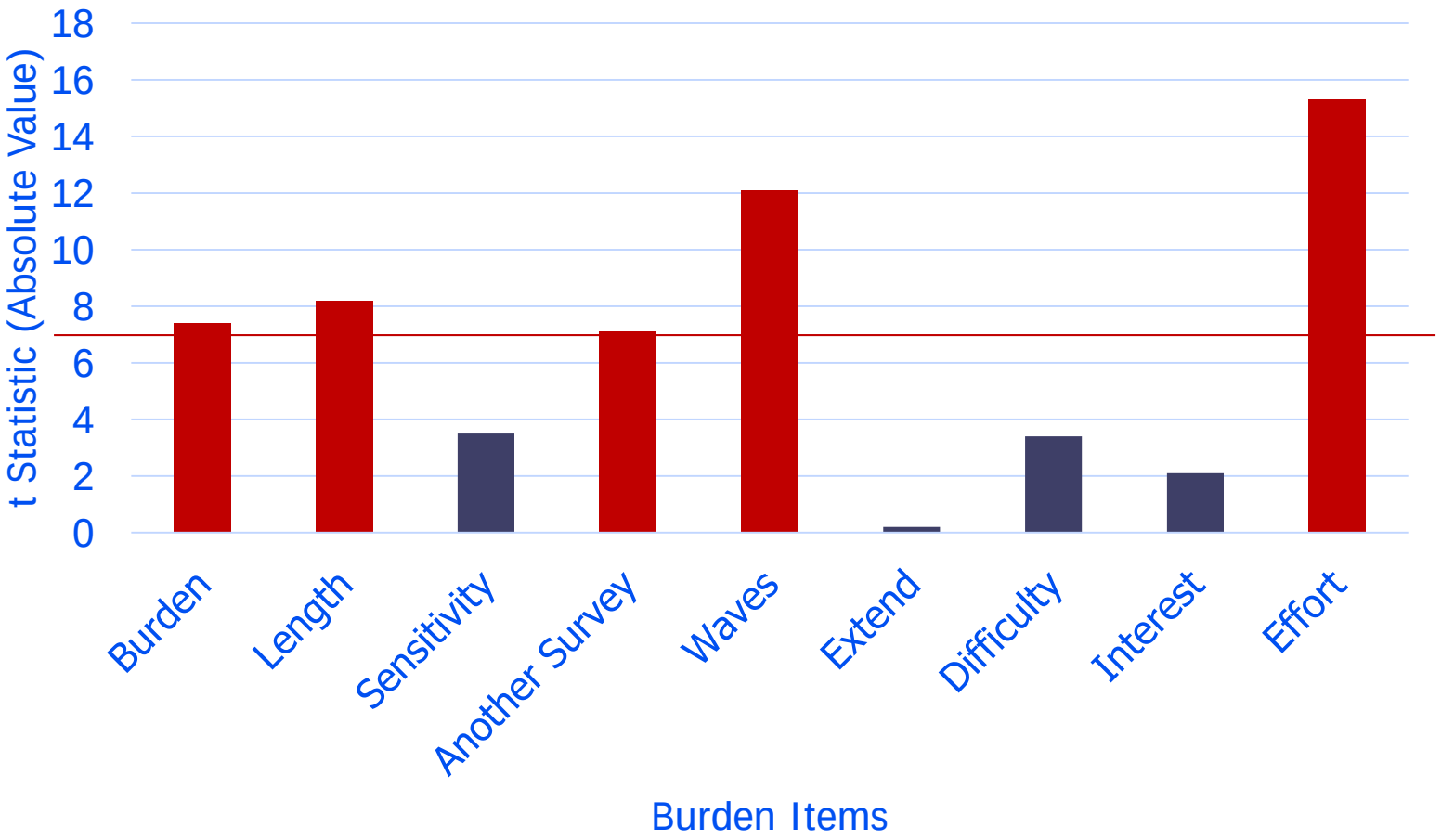
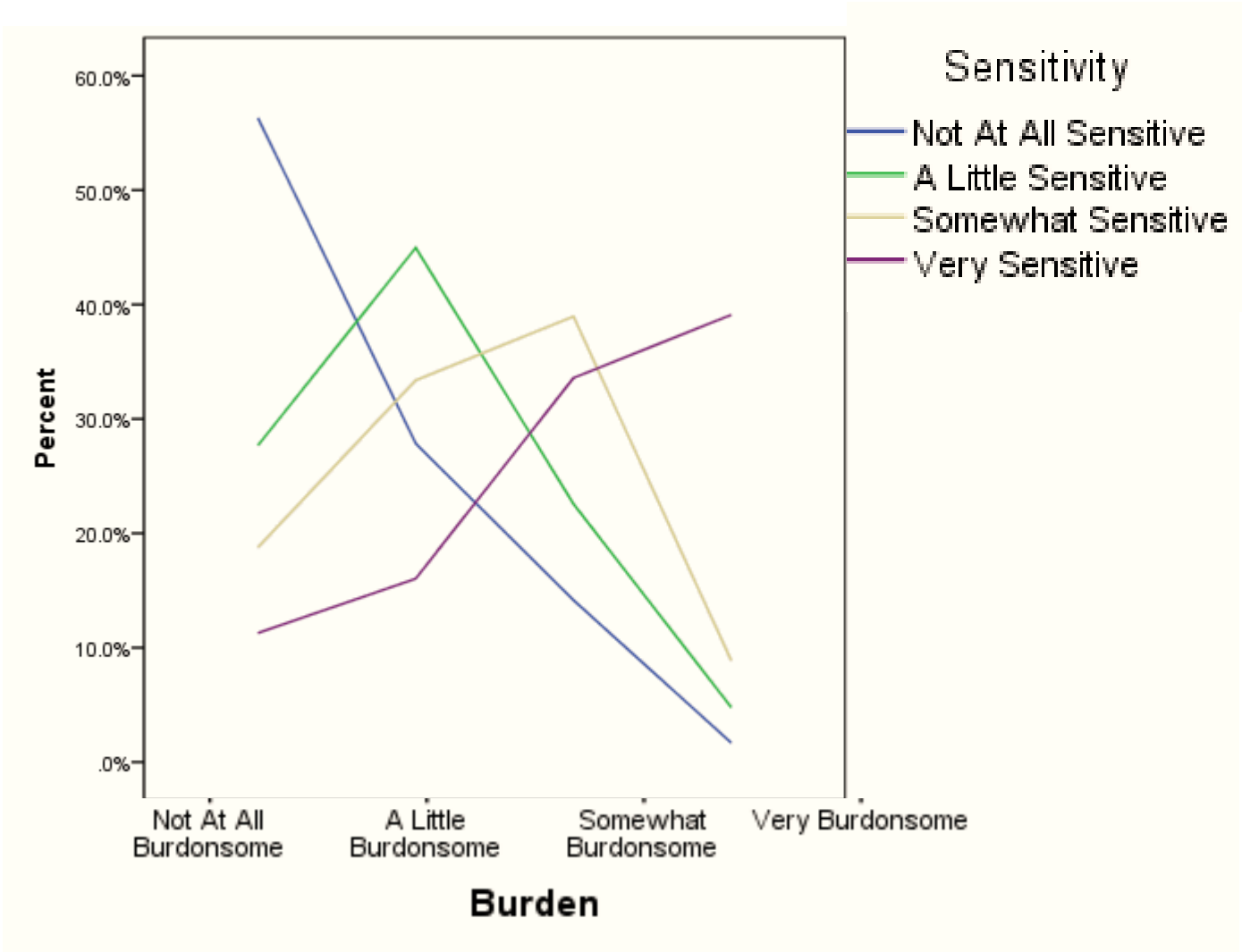
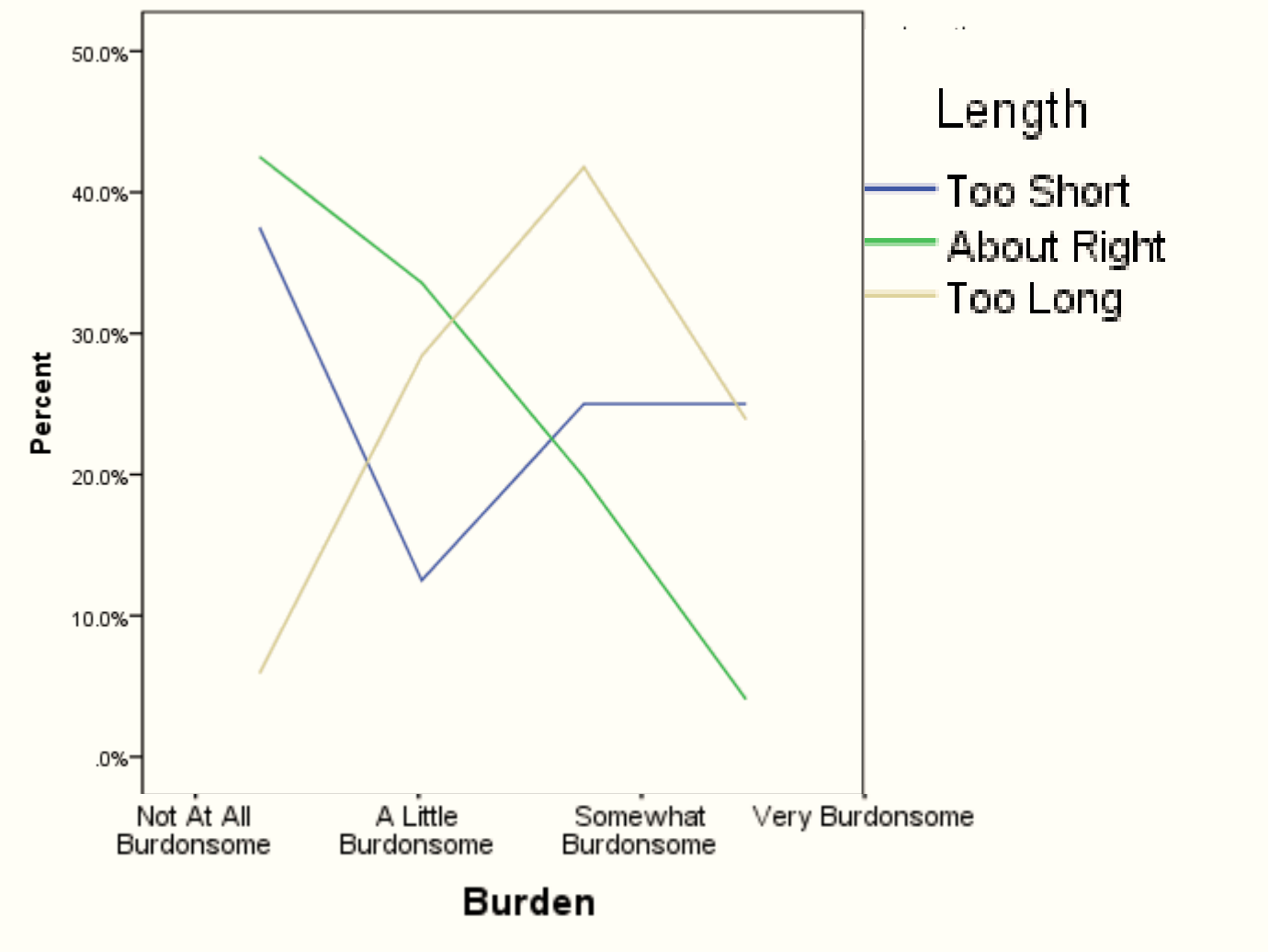


Significant Misfit

Item Response Curves by Reported Burden Good Fitting Item



Item Response Curves by Reported Burden Poor Fitting Item



Conclusions

- While psychometric assessment tools provide insight about how our items perform - There is no single cohesive tool – it takes multiple methods
- All methods provide different details (even w/in IRT) – item may perform well in one aspect, but not another
- The various methods can be used to better understand and potentially improve our items

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Our Next Steps

- Exploring how to best improve item sub-scales to improve utility and linearity across all response options

- Examining our definition of burden and whether we should include more items to measure a multidimensional construct or reduce items to assess a single dimensional construct

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Contact Information

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