Is Depression Appropriately Measured in Geriatric Outpatient Clinics?
Rasch Analysis of the Geriatric Depression Scale (GDS-15)

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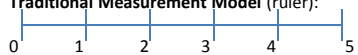Centre universitaire de santé McGill
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Introduction

• Key factors for geriatric depression screening tools:
(1) Time efficient
(2) Psychometrically valid (ie. Does the total score reflect accurate severity of depression?)
• Limitations in the traditional measurement model are addressed in the Rasch model analysis

Traditional Measurement Model (ruler):

0   1   2   3   4   5

Assumes that each question can be weighted equally

Rasch Model Analysis:

0   1   2   3 4   5

Reveal that some items are weighted more than others
→ Sum scores (total) **NOT** a good measure of depression

Objectives

(1) Assess psychometric properties of GDS-15
(2) Determine whether GDS-15 is influenced by cognitive ability and test language

Methods

• *Sample*: 178 patients (M=81, SD=6.3) in Montréal, QC
• *Test Language*: English, French and Italian
• *Cognitive ability*: Mini-Mental State Examination (MMSE) (cognitive impairment <26*) *varies by education and age
• Data compared to Rasch model (RUMM2030 software) where the probability of endorsing a specific GDS question depended on the person's level of depression and the severity of the depression question
• Does data fit Rasch Model?
YES → Valid Test
NO → Invalid Test → Identify potential changes to improve validity

Results

### Summary Statistics from Rasch Analysis

	All GDS Entries (n=214)*	Removal of Misfit Items
Fit Rasch Model?	NO	YES
Item-trait Interaction (x^2 test)	84.1, p<0.001	30.1, p=0.11
Reliability (Person Separation Index)	0.70	0.61
Test-of-fit Power	Good	Reasonable
Misfit Items (Fit Residual)	1) Life is empty (-3.1) 2) Good spirits (-2.5) 3) Prefer stay home (2.9) 4) Memory problems (3.7)	None

*Removal of multiple entries per person (n=178) yielded similar results

Demographics Table

|		n	% of sample
Sex	Male	69	32%
	Female	145	68%
Age (years)	79 under	79	37%
	80 older	135	63%
Education (years)	11 less	102	48%
	12 up	71	33%
	Missing	41	19%
Site (hospital)	Royal Victoria	139	65%
	Montreal General	75	35%
Language	English	130	61%
	French	64	30%
	Italian	20	9%
Mini-Mental State Examination (MMSE)	26 up	91	42%
	25 less	119	56%
	Missing	4	2%

Item Hierarchy Map

Person-Item Threshold Distribution
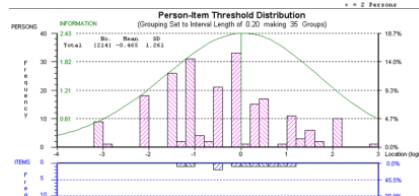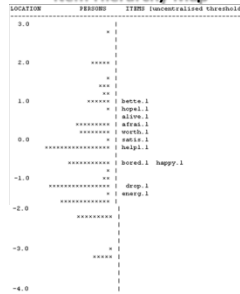
Results (continued)

Differential Item Functioning (DIF) Graphs

1) Cognitive Ability (MMSE)   2) Test Language
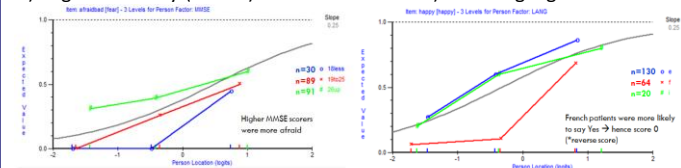
Item 6 – afraid that something bad is going to happen to you
18less = 18 and less | 19to25 | 26up= 26 and up

Item 7 – feeling happy
e = English | f = French | i = Italian

1) Cognitively healthy patients are more likely to endorse fear about the future
2) Francophone patients are more likely to endorse feeling happy "être heureux" than other language speakers

Discussion

• Our findings share some commonalities with previous studies[1,2,3] in terms of misfit items (see slide #2 for Brazil, U.S. and Chinese sample)
• However, controversy as to whether the GDS-15 fits a Rasch Model may be due to different sample characteristics, culture and item wording (translation)
• Examining DIF such as test language and ability might explain these mixed results

Conclusion

Removal of misfit items (life is empty, good spirits, prefer stay home, memory problems) may contribute to a more psychometrically valid tool to measure geriatric depression. Revisiting wording of the question (something bad happen) and French translation (feeling happy) may further improve validity of tool.

References:
1. Chachamovich, E., Fleck, M. P. & Power, M. (2010). Is Geriatric Depression Scale-15 a suitable instrument for measuring depression in Brazil? Results of a Rasch analysis. *Psychology, Health & Medicine*, 15(5), 596-606.
2. Chiang, K., Green, K. & Cox, E. (2009). Rasch analysis of the Geriatric Depression Scale-short form. *Gerontologist*, 49(2), 262-275.
3. Tang, W. et al. (2005). The Geriatric Depression Scale should be shortened: Results of Rasch analysis. *Int. J. Ger. Psych.*, 20(8), 783-789.