Psychometric Analysis of the Openness to the Future Scale with the Graded Item Response Model

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Scan for references and supplemental materials.

Introduction

- Openness to the future (OF) has been identified as an important protective factor in the mental health literature.
- The openness to the future scale (OFS; Botella et al., 2018) is a 10-item scale designed to capture and measure this construct.
- Purpose of the present study was to examine the psychometric characteristics of the OFS in a non-European sample.
- We investigate the psychometric properties of the OFS with the IRT framework as it provides more item-level and construct-level information than classical and factor analytic techniques.

Table 1. Items in the Openness to the Future Scale (OFS).

1. When I make plans, I am sure I will be able to carry them out.	6. Sometimes I get scared and feel that I'm losing control when I think about what life may bring. *(item is reverse-coded)*
2. I usually trust things will work out.	7. I calmly accept that good and bad things will happen to me in life.
3. I think I have enough control over the direction my life takes.	8. I know I can overcome the obstacles I encounter in life.
4. I am very excited about future opportunities and challenges.	9. For me: every day is a new day.
5. I have a lot of illusions and future plans.	10. I feel hopeful about what the future may bring.

Note: All items have a 5-point response format that ranges from 1 = strongly disagree to 5 = strongly agree.

Method and Procedures

- $N = 630$ participants from a large university in the Western United States were recruited to participate in the study ($M_{age} = 19.16$, $SD_{age} = 1.63$).
- Sample was racially and ethnically diverse (57% Hispanic, 19% Asian, 14% White, 4% Black, and 6% other).
- Participants were also administered measures related procrastination, time management, and life satisfaction.

Graded Item Response Model

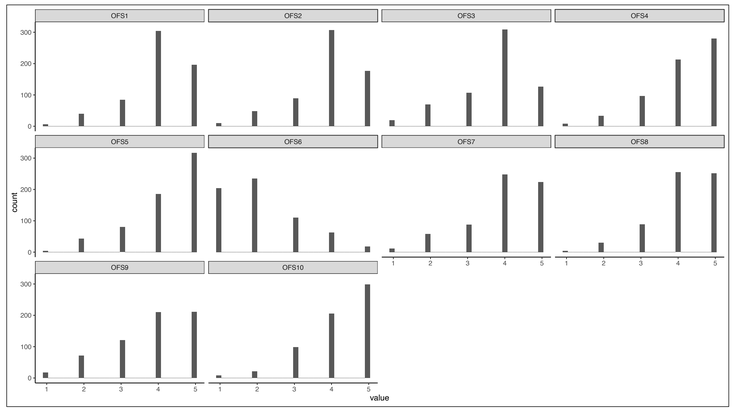
- The graded item response model (GRM; Samejima, 1997) is specifically designed for ordinal manifest variables (e.g., Likert-type items).
- The GRM is defined as:

$$\ln\left(\frac{\psi_{ik}}{1-\psi_{ik}}\right) = \alpha_i(\theta - \beta_{ik})$$

where ψ_{ik} denotes the cumulative probability of a response in category k or lower to the ith item, given latent ability θ, α_i is the item discrimination parameter, and β_{ik} denotes the difficulty parameter corresponding to the kth category.

- Statistical Analyses
  - Model estimated in R with the ltm package (Rizopoulos, 2006).
  - Compared two models via Likelihood Ratio Tests (LRTs):
    - Model 1: Assume $\alpha_i = \alpha$ for all i
    - Model 2: Relaxes Model 1 assumption (i.e., $\alpha_i \neq \alpha$)
  - Model estimation: marginal maximum likelihood with Gauss-Hermite quadrature approximation procedure.

Figure 1. Response Distribution.



Results

Figure 2. Discrimination & Difficulty Parameter Estimates

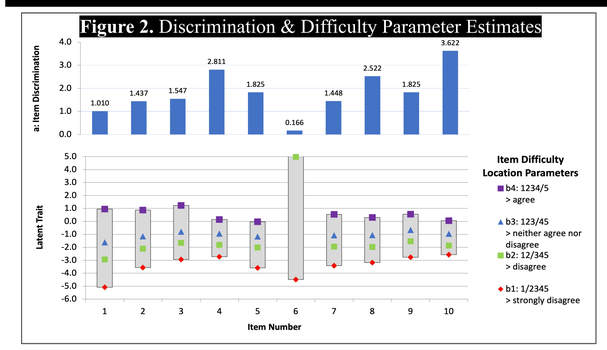


Figure 3. Item Information Curves.

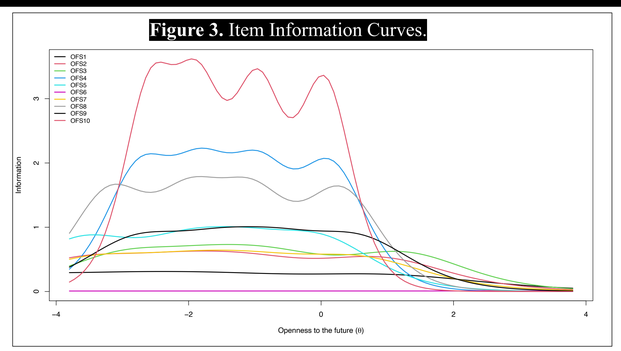


Figure 4. Test Information Curve.

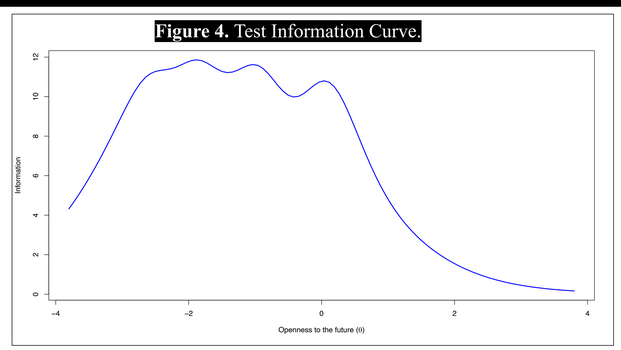
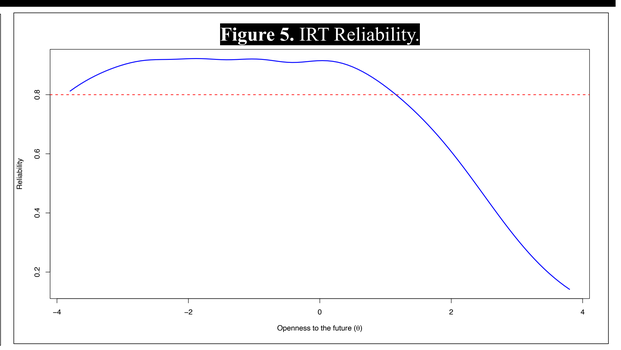


Figure 5. IRT Reliability.



Conclusion

- LRTs, AIC, & BIC indicate that items are not equally related to the target construct.
- Majority of the scale items exhibited high discriminative power & low to moderate difficulty.
- Item 6 was found to have very poor psychometric qualities (see Figs. 2 & 5).
  - Should be investigated further and/or removed from scale.
  - Weak performance of the item could potentially be attributed to its reverse-coded nature.
- Item & test information curve suggests that scale does not provide much information at higher levels of the latent trait; IRT reliability exceeded .80 cutoff for a wide range of the latent trait; internal consistency reliability was adequate: 0.84 (95% CI: 0.819, 0.859).
- OFS appears to be a promising brief instrument that captures positive affect orientation towards the future, and it exhibits adequate psychometric qualities.