Reliability, Validity, and Clinical Utility of the Vocational Fit Assessment

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Materials available at andrewpersch.com
Speakers

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Our **long-term goal** is to improve postsecondary employment outcomes for individuals with IDD through the adaptation, development, and deployment of systematic assessment and intervention strategies.
Background

• About 3% (9 million people) of the American population lives with an intellectual disability (ID)\(^1\)

• Birth – 21, IDEA

<table>
<thead>
<tr>
<th>Postsecondary Outcomes</th>
<th>Intellectual Disabilities</th>
<th>All Disabilities</th>
<th>General Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>29%</td>
<td>60%</td>
<td>67%</td>
</tr>
<tr>
<td>Employment</td>
<td>39%</td>
<td>60%</td>
<td>66%</td>
</tr>
</tbody>
</table>

• Total lifetime costs (healthcare, support services, lost productivity) ≥ $1 million per individual with ID\(^3\)

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1 Administration on Intellectual and Developmental Disabilities, 2012  
3 Centers for Disease Control and Prevention, 2006
Importance of Employment

- Work is a fundamental human occupation
- Strongly linked to identity\(^1\), SES\(^2\), QoL\(^3\), and health\(^4\)
- Provides sociocognitive structure to view the world\(^5\)
- Federal contractors must employ 7%\(^6\)
- Most employment services fail to meet the needs of those in transition\(^7\)

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1 Corcoran, 2004
2 Butterworth et al., 2012
3 Eggleton et al., 1999
4 Petrovski & Gleeson, 1997
5 Daston, Riehle, & Rutkowski, 2012
6 Final Rule on Section 503 of the Rehabilitation Act of 1973
7 Wehman, 2006; Wehman & Scott, 2013
Developing Research Questions

- How do people with ID find & keep a job?

1. Job Matching
2. Job Placement
3. Assessment
4. Discovery
5. Decision Making
6. Negotiating Work
7. Training
8. Integrated Env.
Research Program

Current Practices in Job Matching

Vocational Fit Assessment
In the absence of adequate job matching resources, we strongly recommend that transition teams employ best practices including:

a) proactive interdisciplinary and interagency teaming, collaboration, and community outreach
b) data-based decision making
c) defining acceptable, person-centered outcomes
d) working to increase the consistency of transition planning practices.

“Job matching is the collaborative, data-based decision-making process used by transition teams to determine the best fit between an individual’s abilities and preferences and the job’s environmental and occupational demands.”
Vocational Fit Assessment (VFA)

- Purposes of the VFA:
  a) assess individual abilities
  b) assess job demands
  c) identify pros and cons of each potential job match
  d) identify areas of need, suitable for intervention

- 4+ yr. - iterative, instrument development process
  - 70% of individuals with disabilities = 153 jobs
    - 153 jobs = 2,970 work tasks (i.e., items)
      - 18 months, item optimization
        - Resulted in 126 item assessment

- Items reflect the work of people with disabilities
Psychometric Evaluation

Study 2:
- Determine the factor structure of the VFA
- Obtain estimates of subscale reliability

Study 3:
- Evaluate the reliability and validity of VFA items and subscales using modern psychometric techniques

“The Catch”
- Parametric statistical and psychometric techniques are incompatible with ordinal data arising from polytomous scales of measurement
3 Oranges + 22 Apples + 5 Watermelons

3 + 22 + 5 = 30

30 fruits / 3 groups = average of 10 fruits per group
Low Ability + Some Ability + High Ability

0 + 1 + 2 = 3

3 / 3 = 1 = Some Ability
Study #2 Design

- Prospective cross-sectional study using 2 electronically administered surveys, VFA-W & VFA-J
  - Participant demographics
  - Descriptive questions about workers or jobs
  - 126 tailored items

- Professional key stakeholders recruited to use the VFA to assess workers and jobs

- Eligible participants were:
  - Adults (age 18 or older)
  - Currently employed in a transition setting
  - > 1 year of experience in disabilities
Theoretical Categorization

Phase

Latent Parallel Analysis

- VFA common item stems grouped into hypothesized subscales based on content domain

Ordinal Exploratory Factor Analysis

- Dimensionality of hypothesized VFA-W subscales evaluated using latent parallel analysis
- Parameters set for number of factors retained and rotation method
- Factor pattern evaluated
- Items failing to load onto single factor solution dropped

Iterative Revision and Reconciliation of VFA-W and VFA-J Subscales

Reliability Determination

- Unidimensional subscales evaluated using ordinal alpha
Study #2 Analysis Plan

1. Theoretical Categorization

2. Latent Parallel Analysis (LPA)

- Used to inform factor retention decisions
- Appropriate when ordinal data arise from normally distributed continuous latent variables
- Accuracy superior to K1 and scree plot

1. Polychoric correlation matrix created
2. Monte Carlo simulations used to create 250 matched, random datasets
3. LPA program computed, extracted, and compared eigenvalues for real and random datasets
4. Real factor eigenvalues > random values were retained

126 VFA Common Item Stems

McDondald, 1999
Hayton, Allen, & Scarpello, 2004
O'Connor, 2000
Gugiu, Coryn, & Applegate, 2010
Gugiu, Coryn, Clark, & Kuehn, 2009
Stout, 1987
Timmerman & Lorenzo-Seva, 2011
Garrido, Abad, & Ponsoda, 2013
Study #2 Analysis Plan

3. Ordinal Exploratory Factor Analysis (OEFA)
   • Polychoric correlation\(^1\)-\(^2\) matrix = OEFA input\(^3\)-\(^4\)
   • LPA results used to define number of factors to retain\(^5\) and method of rotation\(^6\)
   • Promax method\(^7\) of oblique rotation used when LPA indicated >1 factor
   • Items that failed to load onto a single-factor solution were removed from the analysis and were returned to developmental item bank\(^8\)

4. Iterative Revision of VFA-W & VFA-J Subscales in Parallel
   • LPA & OEFA discontinued once a consistent unidimensional structure identified for each subscale.

5. Reliability Determination Using Ordinal \(\alpha\)\(^9\)-\(^11\)
   • Estimate of internal consistency \(\approx\) Cronbach’s alpha

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1. Drasgow, 2004
2. Joreskog, 1994
3. Bartholomew & Knott, 1999
5. Hayton et al., 2004
6. Costello & Osborne, 2005
7. Hendrickson & White, 1964
8. Tabachnick & Fidell, 2000
10. Gugiu et al., 2012
VFA-W Participant Demographics \((n=166)\)
- White (88%), females (81.9%), working age (99.4%)
- Teachers (38.8%), job coaches (23.7%), job developers (10.6%)
- Employed in high schools (40.7%), in postsecondary education institutions (21.7%), and with community rehabilitation providers (10.1%).
- Average of 8.21 \((\sigma = 7.63)\) years of experience

VFA-J Participant Demographics \((n=105)\)
- White (90.6%), females (84.4%), working age (99%) 
- Teachers (39.3%), job coaches (23.6%), job developers (10.7%)
- Employed in high schools (42.5%), in postsecondary education institutions (19.5%), and with community rehabilitation providers (13.3%).
- Average of 8.56 \((\sigma = 7.66)\) years of experience
Study #2 Findings

126 VFA Common Item Stems

126 items → 10 subscales, 86 items
## Study #2 Findings

<table>
<thead>
<tr>
<th>Category</th>
<th>VFA-W</th>
<th>Ordinal $\alpha$</th>
<th>VFA-J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Abilities ($k=7$)</td>
<td>0.893</td>
<td></td>
<td>0.749</td>
</tr>
<tr>
<td>Communication Skills ($k=6$)</td>
<td>0.899</td>
<td></td>
<td>0.808</td>
</tr>
<tr>
<td>Computer Skills ($k=16$)</td>
<td>0.989</td>
<td></td>
<td>0.990</td>
</tr>
<tr>
<td>Higher Task-Related Abilities ($k=8$)</td>
<td>0.915</td>
<td></td>
<td>0.828</td>
</tr>
<tr>
<td>Interpersonal Skills ($k=6$)</td>
<td>0.870</td>
<td></td>
<td>0.817</td>
</tr>
<tr>
<td>Lower Task-Related Abilities ($k=8$)</td>
<td>0.946</td>
<td></td>
<td>0.842</td>
</tr>
<tr>
<td>Physical Abilities ($k=10$)</td>
<td>0.919</td>
<td></td>
<td>0.838</td>
</tr>
<tr>
<td>Safety ($k=7$)</td>
<td>0.870</td>
<td></td>
<td>0.860</td>
</tr>
<tr>
<td>Self-Determination ($k=11$)</td>
<td>0.954</td>
<td></td>
<td>0.922</td>
</tr>
<tr>
<td>Work Structure ($k=7$)</td>
<td>0.864</td>
<td></td>
<td>0.691</td>
</tr>
</tbody>
</table>
Study #2 Discussion

- LPA and OEFA of 10 unidimensional subscales lends initial evidence of VFA construct validity.

- Internal consistency (ordinal $\alpha$) of 10 unidimensional subscales supported.

- 5 ‘high performing” subscales including computer skills, self-determination, lower task-related abilities, physical abilities, and higher task-related abilities.

- Limitations include small samples, analyses of VFA-W and VFA-J in tandem, and limited generalizability.
Study #3 Design

Evaluate the reliability and validity of VFA items and subscales using modern psychometric techniques

1. Retrospective Rasch Analysis

2. Prospective Generalizability Theory (GT) G-Study
   - Professional key stakeholders recruited to use the VFA to assess workers and jobs
   - Eligible participants were:
     - Adults (age 18 or older)
     - Currently employed in a transition setting
     - > 1 year of experience in disabilities
Study #3 Findings

- Cognitive Abilities ($k=7$)
- Communication Skills ($k=5$)
- Computer Skills ($k=16$)
- Higher Task-Related Abilities ($k=8$)
- Interpersonal Skills ($k=6$)
- Lower Task-Related Abilities ($k=8$)
- Physical Abilities ($k=10$)
- Safety ($k=7$)
- Self-Determination ($k=11$)
- Work Structure ($k=7$)

- 14 (8.1%) VFA-W & VFA-J items identified as misfitting
- Only 1 (0.6%) item significantly effected precision of Rasch measurement and required removal
- J96 (ability to answer questions about items available for public use or purchase) and parallel item Q96 removed from Communication Skills subscale
- Subscale reliabilities ≥ 0.62 for VFA-W and ≥ 0.58 for VFA-J
- 85 item, “full scale,” GT estimates of reliability were = 0.41 for VFA-W and = 0.78 for VFA-J
Study #3 Discussion

• The complementary use of GT\textsuperscript{1} to extend Rasch analysis\textsuperscript{2-4} enabled rigorous examination of item, subscale, and full scale performance.

• Professionals who use the VFA to inform job matching decisions may be able to improve the postsecondary employment outcomes of individuals with disabilities.

• Limitations include small samples and limited ability to generalize.

\textsuperscript{1} Brennan, 2001
\textsuperscript{2} Bond & Fox, 2007
\textsuperscript{3} Wright & Stone, 1979
\textsuperscript{4} Wright & Masters, 1982
Additionally...

Content Validity
• Expert \((n=18)\) with average of \(16.4 (\sigma=11)\) years of experience judged contextual relevance of VFA items:
  • 71% completely appropriate
  • 18.9% mostly appropriate
  • 6.9% somewhat appropriate
  • 3.2% not appropriate
Algorithm Findings

Professionals challenged to integrate data on individual abilities and job demands.

Pilot #1
- 246 successes/ 335 trials = 73.4% success rate
- 81 of 89 algorithm failures occurred when job demands were high and the worker had some ability

Pilot #2
- 185 successes/ 185 trials = 100% success rate

Pilot #3
- 291 success/ 360 trials = 80.8% success rate

Basic logic of matching algorithm strongly supported
Clinical Utility

- Professionals \((n=30)\) familiar with the VFA considered potential acceptability, practicability, appropriateness, and relevance.

- The vast majority of professionals thought that the VFA would be a relevant, appropriate, and effective tool for job matching.

- Similarly, most thought that the VFA would be of practical use and acceptable to other key stakeholders.
Clinical Utility

- Project SEARCH teachers (n=8) used the VFA to inform job matching decisions for a total of 44 students during the 2014-2015 academic year.

- Results confirm the perceived value and practical utility of the VFA and lend preliminary evidence in support of SJM utility.

- Most teachers (∼90%) found JMRs easy to use, accurate, and informative.

- Similarly, most teachers (∼90%) felt that JMR components such as the Vocational Fingerprint, Vocational Fit Charts, and task details provided useful data.

- All teachers (100%) responded that they trusted the VFA comparative algorithm.
Benefits

- Systematically *informs* best match of individual & job
- Integrates the worker *AND* the job
- Emphasizes *strengths* and *abilities*, not *limitations*
- Identifies areas for *intervention*
- *Ease* of administration
Future Directions

• Efficacy & Effectiveness Trials
• CER Trials

• Other populations
  • Veterans
  • TBI
  • Mental health disorders

• Other PEO problems
  • Neuromotor impairment
  • Environmental accessibility
Thank You!!

Questions?

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