New Methods for Reducing Adverse Impact and Preserving Validity

Joel P. Wiesen, Ph.D.

Herman Aguinis, Ph.D.

Contact: jw@APRpsych.com

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Overview

- Developed completely new selection methods based on existing tests
- Compared new with traditional selection methods in a large Monte Carlo study

Test Battery Studied

- General Mental Ability (GMA, m/c test)
- Conscientiousness (CONSC)
- Physical Performance Test (PPT)
- Structured Interview (SI)

What is New?

- Tests are typical
- Novelty involves ways to use the test data
- Not all tests contribute to the grade of each applicant
- Choose tests based on the strengths or weaknesses of the applicant

New Selection Methods

- Greatest Strength Method (GSM)
- Two Greatest Strengths Method (GSM2)
- Drop the Lowest Score (DROP)
- Composite without GMA (COMP2)

Comparison Methods

- GMA alone
- Composite of all tests (COMP)
- Random (RAND)

Evaluation Areas

- Validity
- Adverse Impact (AI)
- Standardized Mean Group Difference (d)
- Mean Job Performance (MJP)

Quick Look at Findings

- Preserve much validity
- Reduce AI
- Some caveats

New Methods Explained

- Determine z-score for each test
- Calculate method grades based on z-scores

Greatest Strength Method (GSM)

- Determine test with greatest z-score
- Grade = that z-score
- Fail any candidate with a low score on any test
- Rank candidates based on grade

Two Greatest Strengths Method (GSM2)

- Determine the 2 tests with greatest z-scores
- Grade = composite of those 2 z-scores
- Fail any candidate with a low score on any test
- Rank candidates based on grade

Drop the Lowest Score Method (DROP)

- Determine test with lowest z-score
- Grade = composite of remaining 3 z-scores
- Fail any candidate with a low score on any test
- Rank candidates based on grade

Compensatory Omitting GMA (COMP2)

- Omit GMA (i.e., m/c test)
- Grade = composite of other 3 z-scores
- Rank candidates based on grade

Comparison Methods Explained

- Determine z-score grade for each test
- Calculate method scores based on grades

GMA Test Alone

- Grade = z-score for GMA (i.e., m/c test)
- Rank candidates based on grade

COMP

- Grade = composite of all 4 z-scores
- Rank candidates based on grade

RAND

- Grade ignores all test -scores
- Rank candidates randomly

Simulation Study Methodology

- Specify intercorrelations
- Generate data with these intercorrelations
- Create gender and EEO groups
- Create mean score differences
- Compute grades using 7 different methods
- Make selections under the various methods
- Evaluate validity, AI, etc.

Intercorrelation Inputs

	SI	PPT	CONSC	Job Performance
GMA	.31	0	.03	.51
SI		0	0	.48
PPT			0	.35
CONSC				.22

Create Mean Score Differences

	GMA	ORAL	PPT	CONSC	Job Perf.
Women (Case 1)	0	0	-1.25	0	0
Women (Case 2)	0	0	-1.25	0	-.4375
Ethnic Group	-.72	-.31	0	.07	-.27

Some Variables Considered

- Selection ratio (SR)
  - Lower SRs typically yield worse AI
- Proportion of ethnic minority applicants (EEO)
- Applicant group size

Selection Ratio (SR)

- .01
- .05
- .15
- .20
- .30
- .50
- .90

Proportion of Ethnic Minority Applicants (EEO)

- .05
- .10
- .20
- .30
- .40
- .50

Applicant Group Size

- 500
- 1,000
- 2,000
- 10,000
- 750,000

Number of Replications

- Replicate until consider 750,000 cases
  - 1,500 replications for N of 500
  - 750 replications for N of 1,000
  - 375 replications for N of 2,000
  - 75 replications for N of 10,000
  - 1 replication for N of 750,000

Design Summary

- 7 levels of SR
- 6 levels of EEO
- 7 methods of using data
- 2 genders
  - Case 1: No gender difference in MJP
  - Case 2: Gender difference in MJP
- 2 EEO groups
- 5 levels of sample size

Results

- Results varied somewhat by level
- Will show results first for
  - Total sample of 750,000
  - SR = .2
  - EEO = .2

Validity

Method	Validity	AI EEO	AI Gender	MJP Case 1	MJP Case 2
GMA	**0.51**				
GSM	0.52				
GSM2	0.62				
DROP	0.61				
COMP2	0.57				
COMP	0.69				
RAND	0.00				

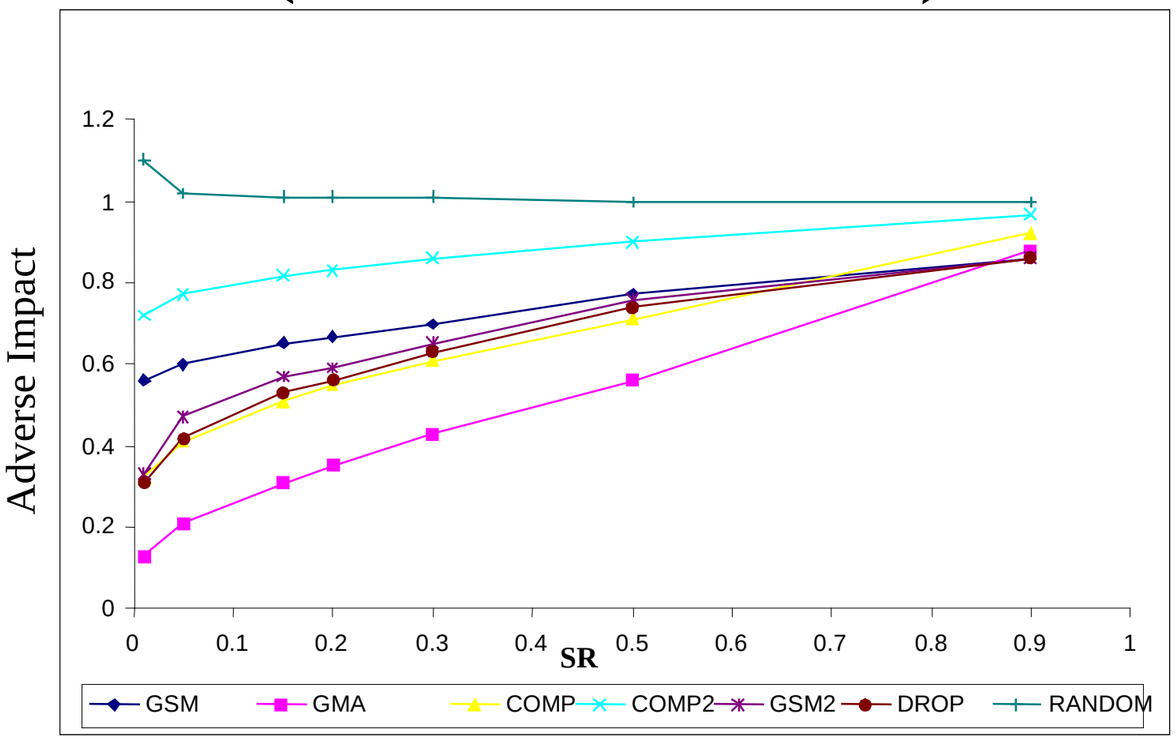
Adverse Impact (AI)

Method	Validity	AI EEO	AI Gender	MJP Case 1	MJP Case 2
GMA	**0.51**	**0.31**	**1.00**		
GSM	0.52	0.63	0.66		
GSM2	0.62	0.56	0.61		
DROP	0.61	0.53	0.55		
COMP2	0.57	0.83	0.35		
COMP	0.69	0.53	0.44		
RAND	0.00	1.00	1.00		

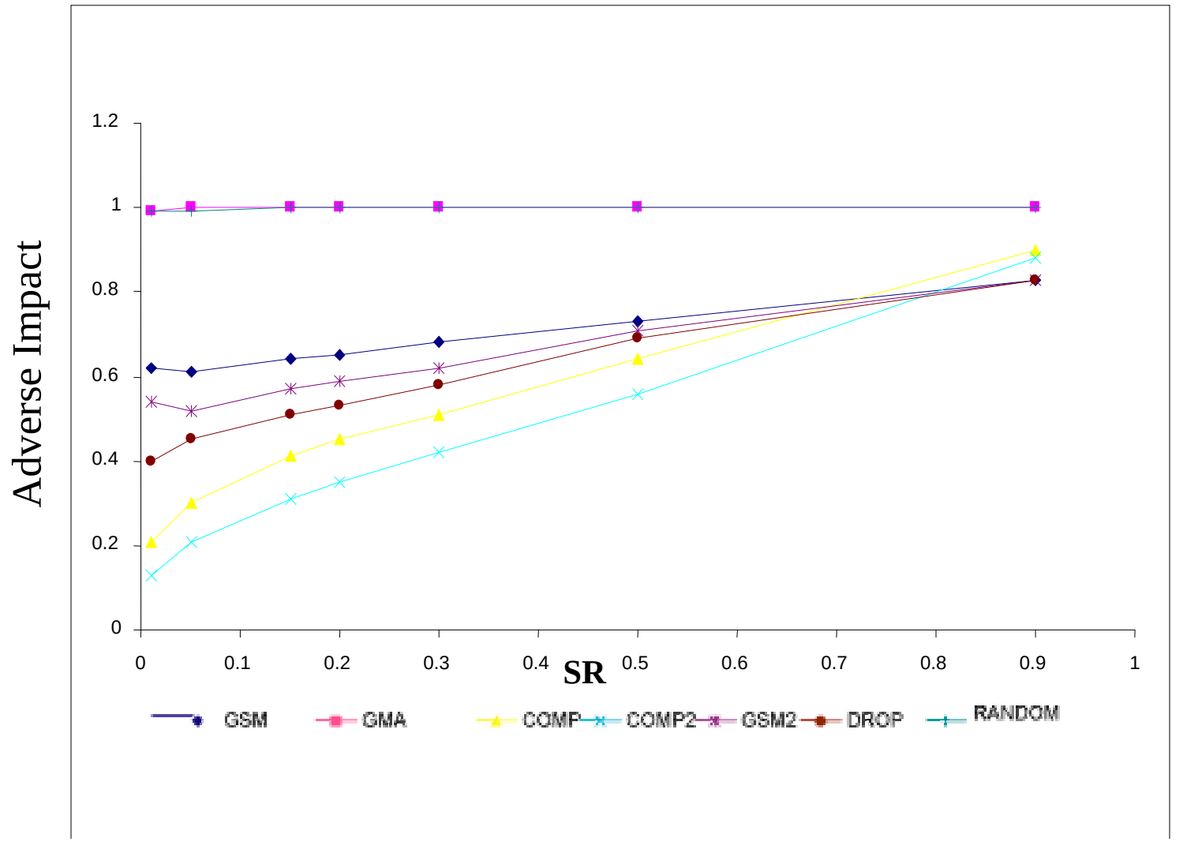
Mean Job Performance (MJP)

Method	Validity	AI EEO	AI Gender	MJP Case 1	MJP Case 2
GMA	**0.51**	**0.31**	**1.00**	**0.67**	**0.45**
GSM	0.52	0.63	0.66	0.74	0.57
GSM2	0.62	0.56	0.61	0.85	0.68
DROP	0.61	0.53	0.55	0.90	0.74
COMP2	0.57	0.83	0.35	0.75	0.63
COMP	0.69	0.53	0.44	0.93	0.79
RAND	0.00	1.00	1.00	-0.06	-0.27

AI for EEO, by Method and SR (EEO50, N750,000)



AI for Gender, by Method and SR (EEO50, N750,000)



Summary of Validity Results

- Validity highest for COMP
- Validity for novel methods also high
- Validity for novel methods greater than GMA m/c test alone

Summary of AI Results

- Traditional approaches have relatively severe AI for EEO or gender or both
  - GMA has AI for EEO
  - COMP has AI for EEO and gender
- Novel approaches reduce AI for BOTH EEO and gender
  - Especially GSM

Caveats

- High variability in AI
  - Often AI = zero, especially with
    - Small N
    - Low SR
    - Low EEO
- Mathematical model approach

Conclusions

- Novel, simple ways to use test scores
  - GSM, GSM2 and DROP have promise
  - Will result in occupational diversity in terms of skills
- Reduce adverse impact
- Maintain much validity
- One approach, not “the solution”

Note on Occupational Diversity

- More diverse mix of strengths/weaknesses in employees
- Each employee may contribute based on strengths
- May facilitate teamwork

Final Thoughts

- This is a simplified summary of the results of a large Monte Carlo study. Full paper is in preparation.
- Call for collaboration in real life applications

A more complete summary of this research will be available at:
http://appliedpersonnelresearch.com/pubs.html