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William Belzak

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SUMMARY

My research is focused on psychological and educational measurement. I have worked on developing statistical methods for evaluating bias in measurement, as well as evaluating the effectiveness of test security for high-stakes remote assessments. More generally, I am interested in applying the principles of psychometrics (validity, reliability, fairness) to a variety of disciplines, including remote proctor decision making and ratings of online advertisement quality.

EXPERIENCE

2021- Duolingo, Inc.

Senior Psychometrician (2022-)

Psychometrician II (2021-2022)

EDUCATION

2017-2021 University of North Carolina at Chapel Hill

Ph.D. Quantitative Psychology,
National Defense Science and Engineering Graduate Fellow

M.A. Quantitative Psychology

2015-2017 College of William and Mary

M.A. Experimental Psychology

2009-2013 North Carolina State University

B.A. Economics,
summa cum laude

PEER-REVIEWED PUBLICATIONS

Belzak, W. C. M., & Lockwood, J.R. (under review). Estimating Test-Retest Reliability in the Presence of Self-Selection Bias and Learning/Practice Effects. *Applied Psychological Measurement*

Belzak, W. C. M., & Bauer, D. J. (2024). Using Regularization to Identify Measurement Bias Across Multiple Background Characteristics: A Penalized Expectation–Maximization Algorithm. *Journal of Educational and Behavioral Statistics*. https://doi.org/10.3102/10769986231226439

Belzak, W. C. M., Lockwood, J. R., & Attali, Y. (2024). Measuring Variability in Proctor Decision Making on High-Stakes Assessments: Improving Test Security in the Digital Age. *Educational Measurement: Issues and Practice. 43*, 52-65. https://doi.org/10.1111/emip.12591

Belzak, W. C. M. (2023). The regDIF R package: Evaluating complex sources of measurement bias using regularized differential item functioning. *Structural Equation Modeling: A Multidisciplinary Journal*, *30*(6), 974-984. https://doi.org/10.1080/10705511.2023.2170235

Belzak, W. C. M. (2023). The Multidimensionality of Measurement Bias in High-Stakes Testing: Using Machine Learning to Evaluate Complex Sources of Differential Item Functioning. *Educational Measurement: Issues and Practice*, *42*(1), 24-33. https://doi.org/10.1111/emip.12486

Rancourt, D., Choquette, E. M., Ahlich, E., Lang, B. M., Verzijl, C. L., Palermero, M., & **Belzak, W. C. M.** (2022). Invariance of the Eating Disorder Inventory - Drive for Thinness Subscale Across University and Community Samples. *Psychological Assessment, 34*(4), 341-352. https://doi.org/10.1037/pas0001095

Chen, S. M., Bauer, D. J., **Belzak, W. C. M.**, & Brandt, H. (2022). Advantages of spike and slab priors for detecting differential item functioning relative to other Bayesian regularizing priors and frequentist lasso. *Structural Equation Modeling: A Multidisciplinary Journal, 29*(1), 122-139. https://doi.org/10.1080/10705511.2021.1948335

Stevens, A. K., Janssen, T., **Belzak, W. C. M.**, Padovano, H. T., & Jackson, K. M. (2022). Comprehensive Measurement Invariance of Alcohol Outcome Expectancies among Adolescents using Regularized Moderated Nonlinear Factor Analysis. *Addictive Behaviors*, *124*, 107088. https://doi.org/10.1016/j.addbeh.2021.107088

Belzak, W. C. M. & Bauer, D. J. (2020). Improving the Assessment of Measurement Invariance: Using Regularization to Select Anchor Items and Identify Differential Item Functioning. *Psychological Methods, 25*(6), 673-690. https://doi.org/10.1037/met0000253

Belzak, W. C. M. (2020). Testing Differential Item Functioning in Small Samples. *Multivariate Behavioral Research*, *55*(5), 722-747. https://doi.org/10.1080/00273171.2019.1671162

Bauer, D. J., **Belzak, W. C. M.**, Cole, V. T. (2020). Simplifying the Assessment of Measurement Invariance over Multiple Background Variables: Using Regularized Moderated Nonlinear Factor Analysis to Detect Differential Item Functioning. *Structural Equation Modeling: A Multidisciplinary Journal*, *27*(1), 43-55. https://doi.org/10.1080/10705511.2019.1642754

Belzak, W. C. M., & Bauer, D. J. (2019). Interaction Effects May Actually Be Nonlinear Effects in Disguise: A Review of the Problem and Potential Solutions. *Addictive Behaviors*, *94*, 99-108. https://doi.org/10.1016/j.addbeh.2018.09.018

Thrash, T. M., Maruskin, L. A., Moldovan, E. G., Oleynick, V. C., & **Belzak, W. C. M.** (2017). Writer–Reader Contagion of Inspiration and Related States: Conditional Process Analyses Within a Cross-Classified Writer × Reader Framework. *Journal of Personality and Social Psychology*, *113*(3), 466-491. https://doi.org/10.1037/pspp0000094

CHAPTERS AND PROCEEDINGS

Belzak, W. C. M., Naismith, B., & Burstein, J. (2023). Ensuring fairness of human-and AI-generated test items. In *International Conference on Artificial Intelligence in Education* (pp. 701-707). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-36336-8_108

Thrash, T. M., **Belzak, W. C. M.**, Wadsworth, L. M., & Sim, Y. Y. (2019). Indirect Effect Models. In V. Zeigler-Hill and T. Shackelford (Eds.) *Encyclopedia of Personality and Individual Differences*. Springer, Cham. https://doi.org/10.1007/978-3-319-24612-3_1314

Belzak, W. C. M., Sim, Y. Y., Thrash, T. M., & Wadsworth, L. M. (2017). Beyond hedonic and eudaimonic well-being: Inspiration and the self-transcendence tradition. In M. D. Robinson & M. Eid (Eds.), *The happy mind: Cognitive contributions to well-being* (pp. 117–138). Springer International Publishing/Springer Nature. https://doi.org/10.1007/978-3-319-58763-9_7

SOFTWARE

Belzak, W. C. M. (2021). regDIF: Regularized Differential Item Functioning (R package version 1.1.1). https://CRAN.R-project.org/package=regDIF

SELECTED TALKS

Belzak, W. C. M. (2024). *Evaluating measurement bias in highly diverse populations of test takers* [invited talk]. "AI for Education: Bridging Innovation and Responsibility" workshop at the Association for the Advancement of Artificial Intelligence Conference, Vancouver, BC.

Belzak, W. C. M. (2023). *The Proctor Calibration Tool: Improving Proctor Decision-Making Through Automated Measurement and Feedback* [conference talk]. Conference on Test Security, Phoenix, AZ.

Belzak, W. C. M. (2022). *Assessing Remote Proctors of High-Stakes Tests* [conference talk]. International Meeting of the Psychometric Society, Bologna, Italy.

Belzak, W. C. M. (2021). *The Intersectionality of Measurement Bias* [invited talk]. Quantitative Forum in the L.L. Thurstone Psychometric Laboratory, University of North Carolina, Chapel Hill, NC.

AWARDS

2019-2022	National Defense Science and Engineering Graduate Fellowship (NDSEG), United States Department of Defense
2020	Lyle V. Jones Award for Academic Excellence and Community Engagement, L.L. Thurstone Psychometric Laboratory, University of North Carolina at Chapel Hill
2017-2018	Merit Fellowship, University of North Carolina at Chapel Hill
2009-2013	Dean's List, North Carolina State University
2013	Outstanding Senior Award – Economics Department, North Carolina State University
2012	Outstanding Junior Award – Economics Department, North Carolina State University

SERVICE

Reviewer	*Addictive Behaviors*, *Association for the Advancement of Artificial Intelligence*, *Applied Psychological Measurement, British Journal of Mathematical and Statistical Psychology*, *Journal of Educational and*

Behavioral Statistics, *Multivariate Behavioral Research*, *National Science Foundation, Psychological Methods, Psychometrika, Structural Equation Modeling*

MEMBERSHIP

Psychometric Society, National Council of Measurement in Education

TEACHING

Structural Equation Modeling (Teaching Assistant, 2018), Cognition and Thinking (Teaching Assistant, 2017), Introduction to Statistics (Teaching Assistant, 2016), Research Methods in Social Psychology (Teaching Assistant, 2016), Research Methods in Personality (Teaching Assistant, 2015)

OTHER WORK

2020	Data Scientist Intern, Google
2019-2021	Statistician, School of Business at University of San Diego
2019-2021	Statistician, School of Medicine at UNC-Chapel Hill
2018-2019	Statistician, School of Social Work at UNC-Chapel Hill
2013-2015	Financial Market Analyst, Ipreo (now S&P Global)