

KE-HAI YUAN
CURRICULUM VITAE
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ADDRESS

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EDUCATION

1992-1995 Ph.D. in Mathematics with Concentration in Statistics, UCLA
1985-1988 M.S. in Applied Mathematics with Concentration in Statistics
Beijing Institute of Technology
1981-1985 B.S. in Applied Mathematics, Beijing Institute of Technology

POSITIONS

2008- Professor, Department of Psychology
University of Notre Dame
2016-2019 Visiting Chair Professor, School of Statistics
2021-2023 Renmin University of China
2018-2020 Visiting Professor, Department of Statistics
Nanjing University of Posts and Telecommunications
2016(09-10) Visiting Professor, Graduate School of Engineering Science
Osaka University
2014(01-04) Visiting Professor, Department of Psychology
The Chinese University of Hong Kong
2005-2008 O'Neill III Associate Professor, Department of Psychology
University of Notre Dame
2001-2005 Associate Professor, Department of Psychology & Lab for Social Research
University of Notre Dame
1998-2001 Assistant Professor, Department of Psychology
University of North Texas
1995-1998 Statistician, Department of Psychology, UCLA
1992-1995 Graduate Student Researcher, Department of Psychology, UCLA
1988-1992 Assistant Professor, Department of Applied Mathematics
Beijing Institute of Technology

PROFESSIONAL SERVICES

- Member of Editorial Board, Educational and Psychological Measurement (2000-).
- Member of Editorial Board, Structural Equation Modeling (2006-).
- Consulting Editor, Multivariate Behavioral Research (2006-).
- Member of Editorial Board, Journal of Educational and Behavioral Statistics (2011-).
- Member of Editorial Board, JSM Mathematics and Statistics (2014-).

- Member of Advisory Board, Behaviormetrika (2016-).
- Consulting Editor, Psychological Methods (2016-).
- Member of Editorial Board, Psicologia: Reflexão e Crítica (2018-).
- Guest Editor, Sage Open (2017-2018).
- Associate Editor, Journal of Multivariate Analysis (2008-2016).
- Associate Editor, Psychological Methods (2013-2015).
- Member of Editorial Board, Sociological Methodology (2007-2009).
- Member of Editorial Board, Educational Researcher (2013-2019).
- Reviewed grant proposals for NSF, Institute of Education Sciences, Spencer Foundation, Research Council of Canada, The Research Grant Council of Hong Kong, books for Lawrence Erlbaum Associates, Taylor and Francis Group, Guilford Press, and manuscripts for over twenty journals.

PROFESSIONAL HONORS

- The James McKeen Cattell Sabbatical Award (2005).
- The Raymond B. Cattell Award for Early-Career Outstanding Multivariate Research (2002) from the Society of Multivariate Experimental Psychology.
- Elected member of the Society of Multivariate Experimental Psychology (2002-).

GRANTS AND SPONSORED PROGRAMS

- Co-PI, Institute of Education Sciences (Zhiyong Johnny Zhang, PI): Methods and software for handling network data and text data in structural equation modeling (\$861,354), 2021–2024.
- PI, National Science Foundation: Structural equation modeling with small N and large p (\$349,998), 2015–2018.
- Co-PI, Organization for Autism Research (Juhi Kaboski, PI): Comorbidities in ASD: Developmental trajectories and predictors of adult outcomes. (\$30,000), 2016.
- Co-PI, Institute of Education Sciences (Zhiyong Johnny Zhang, PI): A general framework for statistical power analysis with non-normal and missing data through Monte Carlo simulation (\$573,097), 2014–2017.

TOPICS WORKED ON

Mean comparison; regression; factor analysis; structural equation modeling; multilevel modeling; growth curve model; mixture model; item response model; measurement invariance; mediation and moderation analysis; post-hoc power; meta analysis/combining mean differences; asymptotics; statistical computation; estimating equations; bootstrap and cross-validation; nonnormal distribution; robust methods; missing data; big data (data with many variables but limited sample size); and software development.

COURSES TAUGHT

Experimental psychology I: Statistics; Psychometric theory; Multivariate statistics; Factor analysis; Structural equation modeling; Advanced structural equation modeling; Multilevel modeling; Computational statistics; Statistical methods; Exploratory data analysis; Missing data analysis.

DOCTORAL DISSERTATIONS DIRECTED

- Agung Santoso, University of Notre Dame (2018): *Equivalence testing for anchor selection in differential item functioning (DIF) detection.*
- Ge (Gabriella) Jiang, University of Notre Dame (2018): *Ridge methods for confirmatory factor analysis of ordinal variables.*
- Miao (Michelle) Yang, University of Notre Dame (2018): *Optimizing ridge generalized least squares for structural equation modeling.*
- Meghan Cain, University of Notre Dame (2017, co-directed with Zhiyong Zhang): *Fit for a Bayesian: An Evaluation of PPP and DIC.*
- Laura Lu, University of Notre Dame (2011, codirected with Zhiyong Zhang): *Bayesian inference of robust growth mixture models with non-ignorable missing data.*
- Wei Zhang, University of Notre Dame (2010): *Estimating latent variable interactions with missing data.*
- Xiaoling Zhong, University of Notre Dame (2010): *Model selection, evaluation and tests of invariance in finite factor mixture modeling using a two stage approach.*
- Summer Zu, University of Notre Dame (2009): *Robust procedures for mediation analysis.*
- Ken Kelley, University of Notre Dame (2005, codirected with Scott Maxwell): *Estimating nonlinear change models in heterogeneous populations when class membership is unknown: Defining and developing the latent classification differential change model.*
- Richard Herrington, University of North Texas (2001): *Simulating statistical power curves with the bootstrap and robust estimation.*

PUBLICATIONS/IN PRESS PAPERS (TOTAL 179): (*publications are classified by topics, each article appears only in one category although it may touch more than one topic*)

Measurement

- Yuan, K.-H., & Bentler, P. M. (2002). On robustness of the normal-theory based asymptotic distributions of three reliability coefficient estimates. *Psychometrika*, *67*, 251–259.
- Yuan, K.-H., Guarnaccia, C. A., & Hayslip, B. J. (2003). A study of the distribution of sample coefficient alpha with the Hopkins Symptom Checklist: Bootstrap versus asymptotics. *Educational and Psychological Measurement*, *63*, 5–23.
- Yuan, K.-H., Fung, W. K., & Reise, S. (2004). Three Mahalanobis-distances and their role in assessing unidimensionality. *British Journal of Mathematical and Statistical Psychology*, *57*, 151–165.
- Cheng, Y., & Yuan, K.-H. (2010). The impact of fallible item parameter estimates on latent trait recovery. *Psychometrika*, *75*, 280–291.

- Schuster, C., & Yuan, K.-H. (2011). Robust estimation of latent ability in item response models. *Journal of Educational and Behavioral Statistics*, *36*, 720–735.
- Cheng, Y., Yuan, K.-H., & Liu, C. (2012). Comparison of reliability measures under factor analysis and item response theory. *Educational and Psychological Measurement*, *72*, 52–67.
- Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2012). Capitalization on chance in variable-length classification tests employing the sequential probability ratio test. *Psychological Test and Assessment Modeling*, *54*, 432–449.
- Zu, J., & Yuan, K.-H. (2012). Standard error of linear observed-score equating for the NEAT design with nonnormally distributed data. *Journal of Educational Measurement*, *49*, 190–213.
- Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2013). The influence of item calibration error on variable-length computerized adaptive testing. *Applied Psychological Measurement*, *37*, 24–40.
- Yuan, K.-H., Cheng, Y., & Patton, J. (2014). Information matrices and standard errors for MLEs of item parameters in IRT. *Psychometrika*, *79*, 232–254.
- Patton, J., Cheng, Y., Yuan, K.-H., & Diao, Q. (2014). Bootstrap standard errors for maximum likelihood ability estimates when item parameters are unknown. *Educational and Psychological Measurement*, *74*, 697–712.
- Deng, L., Marcoulides, G., & Yuan, K.-H. (2015). Psychometric properties of measures of team diversity with Likert data. *Educational and Psychological Measurement*, *75*, 512–534.
- Zhang, Z., & Yuan, K.-H. (2016). Robust coefficients alpha and omega and confidence intervals with outlying observations and missing data: Methods and software. *Educational and Psychological Measurement*, *76*(3), 387–411.
- Yuan, K.-H., & Chan, W. (2016). Measurement invariance via multi-group SEM: Issues and solutions with chi-square-difference tests. *Psychological Methods*, *21*(3), 405–426.
- Jiang, G., Mai, Y., & Yuan, K.-H. (2017). Advances in measurement invariance and mean comparison of latent variables: Equivalence testing and a projection-based approach. *Frontiers in Psychology* 8:1823. doi: 10.3389/fpsyg.2017.01823
- Hayashi, K., Yuan, K.-H., & Sato, R. (in press). On the coefficient alpha in high-dimensions. *Quantitative psychology: The 84th Annual Meeting of the Psychometric Society* New York: Springer.
- Yuan, K.-H., Liu, H., & Han, Y. (in press). Differential item functioning analysis without *a priori* information on anchor items: QQ plots and graphical test. *Psychometrika*.

Mean comparison and power

- Yuan, K.-H., & Hayashi, K. (2003). Bootstrap approach to inference and power analysis based on three statistics for covariance structure models. *British Journal of Mathematical and Statistical Psychology*, *56*, 93–110.
- Yanagihara, H., & Yuan, K.-H. (2005). Four improved statistics for contrasting means by correcting skewness and kurtosis. *British Journal of Mathematical and Statistical Psychology*, *58*, 209–237.
- Yanagihara, H., & Yuan, K.-H. (2005). Three approximate solutions to the multivariate Behrens-Fisher problem. *Communications in Statistics: Simulation and Computation*, *34*, 975–988.
- Yuan, K.-H., & Maxwell, S. (2005). On the post hoc power in testing mean difference. *Journal of Educational and Behavioral Statistics*, *30*, 141–167.
- Yuan, K.-H., & Bentler, P. M. (2006). Mean comparison: Manifest variable versus latent variable. *Psychometrika*, *71*, 139–159.

- Lu, Z., & Yuan, K.-H. (2010). Welch's t test. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1620–1623). Thousand Oaks, CA: Sage.
- Deng, L., & Yuan, K.-H. (2016). Comparing latent means without mean structure models: A projection-based approach. *Psychometrika*, *81*, 802–829.
- Du, H., Zhang, Z., & Yuan, K.-H. (2017). Power analysis for t -test with non-normal data and unequal variances. In A. van der Ark, D.M., M. Wiberg, S.A. Culpepper, J. A. Douglas, & W.-C. Wang (Eds.), *Quantitative psychology: The 81th Annual Meeting of the Psychometric Society* (pp. 373–380). Switzerland: Springer.
- Yuan, K.-H., Zhang, Z., & Zhao, Y. (2017). Reliable and more powerful methods for power analysis in structural equation modeling. *Structural Equation Modeling*, *24*, 315–330. doi: 10.1080/10705511.2016.1276836

Correlation, regression, meta analysis, and mixture models

- Yuan, K.-H., & Bentler, P. M. (2000). Inferences on correlation coefficients in some classes of nonnormal distributions. *Journal of Multivariate Analysis*, *72*, 230–248.
- Yuan, K.-H., & Bushman, B. J. (2002). Combining standardized mean differences using the method of maximum likelihood. *Psychometrika*, *67*, 589–607.
- Yuan, K.-H., & Bentler, P. M. (2010). Finite normal mixture SEM analysis by fitting multiple conventional SEM models. *Sociological Methodology*, *40*, 191–245.
- Zu, J., & Yuan, K.-H. (2010). Serial correlation. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1352–1358). Thousand Oaks, CA: Sage.
- Yuan, K.-H., & Chan, W. (2011). Biases and standard errors of standardized regression coefficients. *Psychometrika*, *76*, 670–690.
- Yuan, K.-H. (2016). Meta analytical structural equation modeling: Comments on issues with current methods and viable alternatives. *Research Synthesis Methods*, *7*, 215–231.
- Cain, M., Zhang Z., & Yuan, K.-H. (2017). Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. *Behavior Research Methods*, *49*, 1716–1735.
- Yuan, K.-H., & Kano, Y. (2018). Meta analytical SEM: Equivalence between maximum likelihood and generalized least squares. *Journal of Educational and Behavioral Statistics*, *43*(6), 693–720.

Mediation and moderation analyses

- Zu, J., & Yuan, K.-H. (2008). Abstract: Local influence and robust methods for mediation models. *Multivariate Behavioral Research*, *43*, 661.
- Zu, J., & Yuan, K.-H. (2010). Local influence and robust procedures for mediation analysis. *Multivariate Behavioral Research*, *45*, 1–44.
- Yuan, K.-H., Cheng, Y., & Maxwell, S. (2014). Moderation analysis using a two-level regression model. *Psychometrika*, *79*(4), 701–732.
- Yang, M., & Yuan, K.-H. (2016). Robust methods for moderation analysis with a two-level regression model. *Multivariate Behavioral Research*, *51*, 757–771.
- Zhang, Q., Yuan, K.-H., & Wang, L. (2019). Asymptotic bias of normal-distribution-based maximum likelihood estimates of moderation effects with missing at random data. *British Journal of Mathematical and Statistical Psychology*, *72*, 334–354.
- Fang, J., Wang, X., Yuan, K.-H., & Wen, Z. (2020). Childhood psychological maltreatment and moral disengagement: A moderated mediation model of callous-unemotional traits and empathy. *Personality and Individual Differences*, *157*, 109814. doi: 10.1016/j.paid.2020.109814
- Fang, J., Wang, X., Yuan, K.-H., Wen, Z., Yu, X., & Zhang, G. (2020). Callous-unemotional traits and cyberbullying perpetration: The mediating role of moral

disengagement and the moderating role of empathy. *Personality and Individual Differences*, 157, 109829. doi: 10.1016/j.paid.2020.109829

Liu, H., Yuan, K.-H., & Liu, F. (2020). A two-level moderated latent variable model with single level data. *Multivariate Behavioral Research*, 55(6), 873–893. doi: 10.1080/00273171.2019.1689350

Liu, H., & Yuan, K.-H. (in press). New measures of effect size in moderation analysis. *Psychological Methods*. doi: 10.1037/met0000371

Liu, H., Yuan, K.-H., Gan, K. (2021). Two-level mediated moderation models with single level data and new measures of effect sizes. *Acta Psychologica Sinica*, 53(3), 322–336. doi: 10.3724/SP.J.1041.2021.00322

Liu, H., Yuan, K.-H., Wen, Z. (in press). Two-level moderated mediation models with single level data and new measures of effect sizes. *Behavior Research Methods*.

Missing data methodology

Yuan, K.-H., & Bentler, P. M. (1996). Mean and covariance structure analysis with missing data. In A. Gupta & V. Girko (Eds.), *Multidimensional statistical analysis and theory of random matrices: Proceedings of sixth Eugene Lukacs symposium* (pp. 307–326). Utrecht, Netherlands: VSP.

Yuan, K.-H., & Bentler, P. M. (2000). Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociological Methodology*, 30, 167–202.

Yuan, K.-H., Marshall, L. L., & Bentler, P. M. (2002). A unified approach to exploratory factor analysis with missing data, nonnormal data, and in the presence of outliers. *Psychometrika*, 67, 95–122.

Yuan, K.-H., Lambert, P. L., & Fouladi, R. T. (2004). Mardia's multivariate kurtosis with missing data. *Multivariate Behavioral Research*, 39, 413–437.

Yuan, K.-H. (2008). Effect sizes for testing not missing at random mechanism. In K. Shigemasu, A. Okada, T. Imaizumi, & T. Hoshino (Eds.), *New trends in psychometrics* (pp. 559–583). Tokyo: Universal Academy Press.

Yuan, K.-H., & Lu, L. (2008). SEM with missing data and unknown population using two-stage ML: Theory and its application. *Multivariate Behavioral Research*, 62, 621–652.

Savalei, V., & Yuan, K.-H. (2009). On the model-based bootstrap with missing data: Obtaining a p -value for a test of exact fit. *Multivariate Behavioral Research*, 44, 741–763.

Yuan, K.-H. (2009). Identifying variables responsible for data not missing at random. *Psychometrika*, 74, 233–256.

Yuan, K.-H. (2009). Normal distribution based pseudo ML for missing data: With applications to mean and covariance structure analysis. *Journal of Multivariate Analysis*, 100, 1900–1918.

Yuan, K.-H., & Bentler, P. M. (2010). Consistency of normal distribution based pseudo maximum likelihood estimates when data are missing at random. *American Statistician*, 64, 263–267.

Tong, X., Zhang, Z., & Yuan, K.-H. (2011). Abstract: Evaluation of test statistics for robust structural equation modeling with non-normal missing data. *Multivariate Behavioral Research*, 46, 1016.

Yuan, K.-H., & Bentler, P. M. (2011). Response to Letter to the Editor by S. K. Sapra. *American Statistician*, 65, 69.

Yuan, K.-H., Yang-Wallentin, F., & Bentler, P. M. (2012). ML versus MI for missing data with violation of distribution conditions. *Sociological Methods & Research*, 41, 598–629.

- Yuan, K.-H., & Zhang, Z. (2012). Robust structural equation modeling with missing data and auxiliary variables. *Psychometrika*, *77*, 803–826.
- Jamshidian, M., & Yuan, K.-H. (2013). Data-driven sensitivity analysis to detect missing data mechanism with applications to structural equation modeling. *Journal of Statistical Computation and Simulation*, *83*, 1344–1362.
- Jamshidian, M., & Yuan, K.-H. (2014). Examining missing data mechanisms via homogeneity of parameters, homogeneity of distributions, and multivariate normality. *Wiley Interdisciplinary Reviews: Computational Statistics*, *6*, 56–73.
- Tong, X., Zhang, Z., & Yuan, K.-H. (2014). Evaluation of test statistics for robust structural equation modeling with nonnormal missing data. *Structural Equation Modeling*, *21*, 553–565.
- Yuan, K.-H., & Savalei, V. (2014). Consistency, bias and efficiency of the normal-distribution-based MLE: The role of auxiliary variables. *Journal of Multivariate Analysis*, *124*, 353–370.
- Yuan, K.-H., Tong, X., & Zhang, Z. (2015). Bias and efficiency for SEM with missing data and auxiliary variables: Two-stage robust method versus two-stage ML. *Structural Equation Modeling*, *22*, 178–192.
- Yuan, K.-H., Jamshidian, M., & Kano, Y. (2018). Missing data mechanisms and homogeneity of means and variances-covariances. *Psychometrika*, *83*(2), 425–442.
- Gomer, B., & Yuan, K.-H. (in press). Subtypes of the missing not at random missing data mechanism. *Psychological Methods*.

Multilevel/hierarchical linear models

- Yuan, K.-H., & Bentler, P. M. (2002). On normal theory based inference for multilevel models with distributional violations. *Psychometrika*, *67*, 539–561.
- Yuan, K.-H., & Bentler, P. M. (2003). Eight test statistics for multilevel structural equation models. *Computational Statistics and Data Analysis*, *44*, 89–107.
- Yuan, K.-H., & Bentler, P. M. (2004). On the asymptotic distributions of two statistics for two-level covariance structure models within the class of elliptical distributions. *Psychometrika*, *69*, 437–457.
- Bentler, P. M., Liang, J., & Yuan, K.-H. (2005). Some recent advances in two-level structural equation models: Estimation, testing and robustness. In J. Fan & G. Li (Eds.), *Contemporary multivariate analysis and design of experiments: In celebration of Prof. Kai-Tai Fang's 65th birthday* (pp. 99–120). NJ: World Scientific.
- Yuan, K.-H., & Bentler, P. M. (2005). Asymptotic robustness of the normal theory likelihood ratio statistic for two-level covariance structure models. *Journal of Multivariate Analysis*, *94*, 328–343.
- Yuan, K.-H., & Hayashi, K. (2005). On Muthén's maximum likelihood for two-level covariance structure models. *Psychometrika*, *70*, 147–167.
- Yuan, K.-H., & Bentler, P. M. (2006). Asymptotic robustness of standard errors in multilevel structural equation models. *Journal of Multivariate Analysis*, *97*, 1121–1141.
- Yuan, K.-H., & Bentler, P. M. (2007). Multilevel covariance structure analysis by fitting multiple single-level models. *Sociological Methodology*, *37*, 53–82.
- Bentler, P. M., Liang, J., Tang, M.-L., & Yuan, K.-H. (2011). Constrained ML estimation for two-level mean and covariance structure models. *Educational and Psychological Measurement*, *71*, 325–345.
- Marcoulides, K., & Yuan, K.-H. (2020). Using equivalence testing to evaluate goodness of fit in multilevel structural equation models. *International Journal of Research & Method in Education*, *43*(4), 431–443. doi: 10.1080/1743727X.2020.1795113

Factor analysis and structural equation modeling

- Bentler, P. M., & Yuan, K.-H. (1997). Optimal unbiased equivariant factor score estimators. In M. Berkane (Ed.), *Latent variable modeling and applications to causality* (pp. 259–281). New York: Springer-Verlag.
- Yuan, K.-H., & Bentler, P. M. (1997). Mean and covariance structure analysis: Theoretical and practical improvements. *Journal of the American Statistical Association*, *92*, 767–774.
- Yuan, K.-H., & Bentler, P. M. (1997). Finite sample distribution-free test statistics for nested structural models. *Behaviormetrika*, *24*, 19–26.
- Yuan, K.-H., & Bentler, P. M. (1997). Improving parameter tests in covariance structure analysis. *Computational Statistics and Data Analysis*, *26*, 177–198.
- Yuan, K.-H., Bentler, P. M., & Kano, Y. (1997). On averaging variables in a confirmatory factor analysis model. *Behaviormetrika*, *24*, 71–83.
- Yuan, K.-H., & Bentler, P. M. (1998). Normal theory based test statistics in structural equation modeling. *British Journal of Mathematical and Statistical Psychology*, *51*, 289–309.
- Bentler, P. M., & Yuan, K.-H. (1999). Structural equation modeling with small samples: Test statistics. *Multivariate Behavioral Research*, *34*, 181–197.
- Bentler, P. M., & Yuan, K.-H. (1999). Structural equation models. In S. Kotz, C. B. Read, & D. L. Banks (Eds.), *Encyclopedia of statistical sciences: Update volume 3* (pp. 716–721). NY: Wiley.
- Yuan, K.-H., & Bentler, P. M. (1999). On normal theory and associated test statistics in covariance structure analysis under two classes of nonnormal distributions. *Statistica Sinica*, *9*, 831–853.
- Yuan, K.-H., & Bentler, P. M. (1999). On asymptotic distributions of normal theory MLE in covariance structure analysis under some nonnormal distributions. *Statistics & Probability Letters*, *42*, 107–113.
- Yuan, K.-H., & Bentler, P. M. (1999). F-tests for mean and covariance structure analysis. *Journal of Educational and Behavioral Statistics*, *24*, 225–243.
- Bentler, P. M., & Yuan, K.-H. (2000). On adding a mean structure to a covariance structure model. *Educational and Psychological Measurement*, *60*, 326–339.
- Yuan, K.-H., & Bentler, P. M. (2000). On equivariance and invariance of standard errors in three exploratory factor models. *Psychometrika*, *65*, 121–133.
- Yuan, K.-H., & Bentler, P. M. (2001). Effect of outliers on estimators and tests in covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, *54*, 161–175.
- Yuan, K.-H., & Bentler, P. M. (2001). A unified approach to multigroup structural equation modeling with nonstandard samples. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling: New developments and techniques* (pp. 35–56). Mahwah, NJ: Lawrence Erlbaum Associates.
- Yuan, K.-H., & Chan, W. (2002). Fitting structural equation models using estimating equations: A model segregation approach. *British Journal of Mathematical and Statistical Psychology*, *55*, 41–62.
- Yuan, K.-H., & Bentler, P. M. (2004). On chi-square difference and z tests in mean and covariance structure analysis when the base model is misspecified. *Educational and Psychological Measurement*, *64*, 737–757.
- Yuan, K.-H., & Marshall, L. L. (2004). A new measure of misfit for covariance structure models. *Behaviormetrika*, *31*, 67–90.
- Schuster, C., & Yuan, K.-H. (2005). Factor analysis. In K. Kempf-Leonard (Ed.), *Encyclopedia of social measurement, Volume 2* (pp. 1–8). NY: Elsevier.

- Yuan, K.-H. (2005). Fit indices versus test statistics. *Multivariate Behavioral Research*, *40*, 115–148.
- Yuan, K.-H., Bentler, P. M., & Zhang, W. (2005). The effect of skewness and kurtosis on mean and covariance structure analysis: The univariate case and its multivariate implication. *Sociological Methods & Research*, *34*, 249–258.
- Yuan, K.-H., & Chan, W. (2005). On nonequivalence of several procedures of structural equation modeling. *Psychometrika*, *70*, 791–798.
- Yuan, K.-H., & Hayashi, K. (2006). Standard errors in covariance structure models: Asymptotics versus bootstrap. *British Journal of Mathematical and Statistical Psychology*, *59*, 397–417.
- Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2007). On the likelihood ratio test for the number of factors in exploratory factor analysis. *Structural Equation Modeling*, *14*, 505–526.
- Yuan, K.-H., & Bentler, P. M. (2007). Structural equation modeling. In C. R. Rao & S. Sinharay (Eds.), *Handbook of statistics 26: Psychometrics* (pp. 297–358). Amsterdam: North-Holland.
- Yuan, K.-H., Hayashi, K., & Bentler, P. M. (2007). Normal theory likelihood ratio statistic for mean and covariance structure analysis under alternative hypotheses. *Journal of Multivariate Analysis*, *98*, 1262–1282.
- Yuan, K.-H., Hayashi, K., & Yanagihara, H. (2007). A class of population covariance matrices in the bootstrap approach to covariance structure analysis. *Multivariate Behavioral Research*, *42*, 261–281.
- Hayashi, K., Bentler, P. M., & Yuan, K.-H. (2008). Structural equation modeling. In C. R. Rao, J. P. Miller, & D. C. Rao (Eds.), *Handbook of statistics 28: Epidemiology and medical statistics* (pp. 395–428). Amsterdam: North-Holland.
- Hayashi, K., & Yuan, K.-H. (2010). Exploratory factor analysis. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 458–465). Thousand Oaks, CA: Sage.
- Yanagihara, H., Himeno, T., & Yuan, K.-H. (2010). GLS discrepancy based information criteria for selecting covariance structure models. *Behaviormetrika*, *37*, 71–86.
- Yuan, K.-H., Cheng, Y., & Zhang, W. (2010). Determinants of standard errors of MLEs in confirmatory factor analysis. *Psychometrika*, *75*, 633–648.
- Yung, Y.-F., & Yuan, K.-H. (2013). Bartlett factor scores: General formulas and applications to structural equation models. In R. E. Millsap, L. A. van der Ark, D. M. Bolt, & C. M. Woods (Eds.), *New developments in quantitative psychology* (pp. 385–401). New York: Springer.
- Yuan, K.-H., & Tian, Y. (2015). Structural equation modeling as a statistical method: An overview. *JSM Mathematics & Statistics* *2*(1):1006.
- Deng, L., & Yuan, K.-H. (2015). Multiple group analysis for structural equation modeling with dependent samples. *Structural Equation Modeling*, *22*, 552–567.
- Yuan, K.-H., Chan, W., Marcoulides, G. A., & Bentler, P. M. (2016). Assessing structural equation models by equivalence testing with adjusted fit indices. *Structural Equation Modeling*, *23*, 319–330.
- Jiang, G., & Yuan, K.-H. (2017). Four new corrected statistics for SEM with small samples and nonnormally distributed data. *Structural Equation Modeling*, *24*, 479–494.
- Marcoulides, K. M., & Yuan, K.-H. (2017). New ways to evaluate goodness of fit: A note on using equivalence testing to assess structural equation models. *Structural Equation Modeling*, *24*, 148–153. doi: 10.1080/10705511.2016.1225260
- Gomer, B., Jiang, G., & Yuan, K.-H. (2019). New effect size measures for structural equation modeling. *Structural Equation Modeling*, *26*(3), 371–389. doi: 10.1080/10705511.2018.1545231

- Yuan, K.-H., Zhang Z., & Deng, L. (2019). Fit indices for mean structures with growth curve models. *Psychological Methods, 24*(1), 36–53.
- Li, Y., Wen, Z., Hau, K.-T., Yuan, K.-H., & Peng, Y. (2020). Effects of cross-loadings on determining the number of factors to retain. *Structural Equation Modeling, 27*(6), 841–863. doi: 10.1080/10705511.2020.1745075

SEM diagnostics

- Yuan, K.-H., Marshall, L. L., & Bentler, P. M. (2003). Assessing the effect of model misspecifications on parameter estimates in structural equation models. *Sociological Methodology, 33*, 241–265.
- Yuan, K.-H., Kouros, C. D., & Kelley, K. (2008). Diagnosis for covariance structure models by analyzing the path. *Structural Equation Modeling, 15*, 564–602.
- Yuan, K.-H., & Zhong, X. (2008). Outliers, leverage observations and influential cases in factor analysis: Minimizing their effect using robust procedures. *Sociological Methodology, 38*, 329–368.
- Yuan, K.-H., & Hayashi, K. (2010). Fitting data to model: Structural equation modeling diagnosis using two scatter plots. *Psychological Methods, 15*, 335–351.
- Yuan, K.-H., & Zhang, Z. (2012). Structural equation modeling diagnostics using R package semdiag and EQS. *Structural Equation Modeling, 19*, 683–702.
- Yuan, K.-H., & Zhong, X. (2013). Robustness of fit indices to outliers and leverage observations in structural equation modeling. *Psychological Methods, 18*, 121–136.

Partial least squares SEM

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