Bentler, Peter M.

Ph.D., Clinical Psychology, Stanford University	1964
NIMH Postdoctoral Fellow, Educational Testing Service	1964-65
Staff Psychologist, Psychology Clinic, UCLA	1965-79
Assistant Professor-Distinguished Professor of Psychology, UCLA	1965-
Director, Social Science Computing, UCLA	1985-92
Professor-Distinguished Professor of Statistics, UCLA	1998-
Chair, Department of Psychology, UCLA	1999-2002

Member, American Statistical Association; Institute of Mathematical Statistics; International Academy of Sex Research; Psychometric Society; Society of Multivariate Experimental Psychology.

Fellow, American Educational Research Association, American Psychological Association, American Psychological Society, American Statistical Association, Western Psychological Association.

Editorial Board, Educational and Psychological Measurement; Journal of Health Psychology; Multivariate Behavioral Research; Prevention Science; Structural Equation Modeling.

Editorial Board, Archives of Sexual Behavior, 1971-2010; Computational Statistics & Data Analysis, 1983-2013; Evaluation Review, 1979-81; Journal of Abnormal Psychology, 1983-87; Sage Series on Quantitative Applications in the Social Sciences, 1983-88; Journal of Educational Statistics, 1980-94; Journal of Sex Research, 1987-89; Psychological Bulletin, 1988-90; Psychometrika, 1981-2015; Sociological Methods & Research, 1985-2016.

Recipient, Cattell Award for Distinguished Multivariate Research, Society of Multivariate Experimental Psychology, 1972.

Recipient, Distinguished Scientific Contributions Award, Division of Evaluation, Measurement, and Statistics, American Psychological Association, 1995/6.

Recipient, Sells Award for Outstanding Career Contributions to Multivariate Experimental Psychology, Society of Multivariate Experimental Psychology, 2005.

Recipient (with Karl Jöreskog), American Psychological Association Distinguished Scientific Award for the Applications of Psychology, 2007.

Recipient, Career Award for Lifetime Achievement, Psychometric Society, 2014.

Recipient, Lifetime Achievement Award, Western Psychological Association, 2015.

Recipient, Research Scientist Development Award, 1976-86; Research Scientist Award, 1986-1996; NIH Senior Scientist Award, 1996-2014.

President, Society of Multivariate Experimental Psychology, 1979-80.

President, Psychometric Society, 1982-83.

President, Division of Evaluation, Measurement, and Statistics, American Psychological Association, 1987-88.

President, Western Psychological Association, 2007-08.

Chairman, Editorial Advisory Board, Multivariate Behavioral Research, 1977-78.

Board of Trustees, Psychometric Society, 1979-81.

Board of Trustees, Society of Multivariate Experimental Psychology, 1978-82.

Editorial Council, Psychometric Society, 1984-1990.

Member, Drug Abuse Epidemiology and Prevention Research Review Committee, ADAMHA, Department of Health & Human Services, 1987-1988.

Director, National Institute on Drug Abuse research center on psychosocial aspects of drug and alcohol use, 1974-2013.

Statistical Publications by Topic (selected from 517)

Structural Equation Modeling (SEM)

Applications of SEM

Bentler, P. M., & Speckart, G. (1979). Models of attitude-behavior relations. *Psychological Review*, *86*, 452-464.

Newcomb, M. D., & Bentler, P. M. (1988). *Consequences of adolescent drug use: Impact on the lives of young adults*. Beverly Hills: Sage Publications.

Barnes, G. E., Murray, R. P., Patton, D., Bentler, P. M., & Anderson, R. A. (2000). *The addiction-prone personality*. New York: Kluwer Academic /Plenum Publishers.

Xie, J., & Bentler, P. M. (2003). Covariance structure models for gene expression microarray data. *Structural Equation Modeling*, *10*, 566-582.

Kim, J., Zhu, W., Chang, L., Bentler, P. M., & Ernst, T. (2007). Unified structural equation modeling approach for the analysis of multisubject, multivariate functional MRI data. *Human Brain Mapping*, *28*, 85-93.

Bentler, P. M., Satorra, A., & Yuan, K. –H. (2009). Smoking and cancers: Case-robust analysis of a classic data set. *Structural Equation Modeling*, *16*, 382 – 390.

Ibabe, I., Jaureguizar, J., & Bentler, P. M. (2013). Protective factors for adolescent violence against authority. *Spanish Journal of Psychology*, *16*: e76, 1-13.

Bae, J., Bentler, P. M., & Lee, Y.-S. (2016). On the role of content in writing assessment. *Language Assessment Quarterly*, *13*, 302-328.

Ibabe, I., & Bentler, P. M. (2016). The contribution of family relationships to child-to-parent violence. *Journal of Family Violence*, *31*, 259-269.

Asymptotic robustness in SEM

Satorra, A., & Bentler, P. M. (1990). Model conditions for asymptotic robustness in the analysis of linear relations. *Computational Statistics & Data Analysis*, *10*, 235-249.

Mooijaart, A., & Bentler, P. M. (1991). Robustness of normal theory statistics in structural equation models. *Statistica Neerlandica*, *45*, 159-171.

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., & Bentler, P. M. (2006). Asymptotic robustness of standard errors in multilevel structural equation models. *Journal of Multivariate Analysis*, *97*, 1121-1141.

Case-robust methods in SEM

Yuan, K. –H., & Bentler, P. M. (1998). Structural equation modeling with robust covariances. In A. Raftery (Ed.), *Sociological methodology* (pp. 363-396). Malden, MA: Blackwell.

Yuan, K. –H. & Bentler, P. M. (2000). Robust mean and covariance structure analysis through iteratively reweighted least squares. *Psychometrika, 65*, 43-58.

Yuan, K. -H., Bentler, P. M., & Chan, W. (2004). Structural equation modeling with heavy tailed distributions. *Psychometrika*, *69*, 421-436.

Yuan, K. –H., & Bentler, P. M. (2007). Robust procedures in structural equation modeling. In S. –Y. Lee (Ed.), *Handbook of latent variable and related models* (pp. 367-397). Amsterdam: North-Holland.

Categorical variable methods in SEM

Lee, S.-Y., Poon, W.-Y., & Bentler, P. M. (1990). Full maximum likelihood analysis of structural equation models with polytomous variables. *Statistics & Probability Letters*, *9*, 91-97.

Lee, S. –Y., Poon, W. –Y., & Bentler, P. M. (1995). A two-stage estimation of structural equation models with continuous and polytomous variables. *British Journal of Mathematical and Statistical Psychology*, *48*, 339-358.

An, X., & Bentler, P. M. (2011). Extended mixture factor analysis model with covariates for mixed binary and continuous responses. *Statistics in Medicine*, *30*, 2634-2647.

Yuan, K. –H., Wu, R., & Bentler, P. M. (2011). Ridge structural equation modeling with correlation matrices for ordinal and continuous data. *British Journal of Mathematical and Statistical Psychology*, *64*, 107-133.

An, X., & Bentler, P. M. (2012). Efficient direct sampling MCEM algorithm for latent variable models with binary responses. *Computational Statistics and Data Analysis*. *56*, 231-244.

Wu, J., & Bentler, P. M. (2012). Application of H-likelihood to factor analysis models with binary response data. *Journal of Multivariate Analysis*, *106*, 72-79.

Wu, J., & Bentler, P. M. (2013). Limited information estimation in binary factor analysis: A review and extension. *Computational Statistics & Data Analysis*, *57*, 392-403.

Savalei V., Bonett, D. G., & Bentler, P. M. (2015). CFA with binary variables in small samples: A comparison of two methods. *Frontiers of Psychology*, *5*(1515), 1-11. doi: 10.3389/fpsyg.2014.01515

Fit indices in SEM

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*, 588-606.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238-246.

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance Structural equation modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*, 424-453.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55.

Li, L., & Bentler, P. M. (2011). Quantified choice of root-mean-square errors of approximation for evaluation and power analysis of small differences between structural equation models. *Psychological Methods, 16*(2), 116-126.

Higher moment models for SEM

Bentler, P. M. (1983). Some contributions to efficient statistics in structural models: Specification and estimation of moment structures. *Psychometrika*, *48*, 493-517.

Mooijaart, A., & Bentler, P. M. (1986). Random polynomial factor analysis. In E. Diday et al. (Eds.), *Data analysis and informatics IV* (pp. 241-250). Amsterdam: Elsevier Science.

Mooijaart, A., & Bentler, P. M. (2010). An alternative approach for nonlinear latent variable models. *Structural Equation Modeling*, *17*(3), 357-373.

Incomplete data in SEM

Tang, M. –L., & Bentler, P. M. (1998). Theory and method for constrained estimation in structural equation models with incomplete data. *Computational Statistics & Data Analysis*, *27*, 257-270.

Jamshidian, M., & Bentler, P. M. (1999). ML estimation of mean and covariance structures with missing data using complete data routines. *Journal of Educational and Behavioral Statistics*, *24*, 21-41.

Yuan, K. H., & Bentler, P. M. (2000). Three likelihood-based methods for mean and covariance structure analysis with non-normal missing data. *Sociological methodology 2000* (pp. 165-200). Washington, DC: American Sociological Association.

Gold, M. S., Bentler, P. M., & Kim, K. H. (2003). A comparison of maximum-likelihood and asymptotically distribution-free methods of treating incomplete nonnormal data. *Structural Equation Modeling*, *10*, 47-79.

Savalei, V., & Bentler, P. M. (2005). A statistically justified pairwise ML method for incomplete nonnormal data: A comparison with direct ML and pairwise ADF. *Structural Equation Modeling*, *12*, 183-214.

Savalei, V., & Bentler, P. M. (2009). A two-stage approach to missing data: Theory and application to auxiliary variables. *Structural Equation Modeling*, *16*, 477-497.

Yuan, K. –H., & Bentler, P. M. (2010). Consistency of normal-distribution-based pseudo-maximum likelihood estimates when data are missing at random. *The American Statistician*, *64*(3), 263-267.

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.

Linear models for SEM

Bentler, P. M. (1976). Multistructure statistical model applied to factor analysis. *Multivariate Behavioral Research*, *11*, 3-25.

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Methodology in SEM

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Chan, W., & Bentler, P. M. (1998). Covariance structure analysis of ordinal ipsative data. *Psychometrika*, *63*, 369-399.

Bentler, P. M., & Yuan, K. –H. (2000). On adding a mean structure to a covariance structure model. *Educational and Psychological Measurement*, *60*, 326-339.

Bentler, P. M. (2005). Latent growth curves. In J. Werner. (Ed.), *Zeitreihenanalysen*, (pp. 13-36). Berlin: Logos.

Bentler, P. M. (2007). Can scientifically useful hypotheses be tested with correlations? *American Psychologist*, *62*, 772-782.

Bentler, P. M., & Satorra, A. (2010). Testing model nesting and equivalence. *Psychological Methods*, *15*, 111-123.

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Bentler, P. M. (2016). Causal indicators can help to interpret factors. *Measurement: Interdisciplinary Research and Perspectives*, *14*, 98-100.

Yuan, K. –H., & Bentler, P. M. (2017). Improving the convergence rate and speed of Fisher-scoring algorithm: Ridge and anti-ridge methods in structural equation modeling. *Annals of the Institute of Statistical Mathematics*, *69*, 571-597.

Bentler, P. M. (2018). Number of factors in growth curve modeling. *Structural Equation Modeling*. DOI:10.1080/10705511.2018.1449112

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Bentler, P. M. (1986). *Lagrange Multiplier and Wald tests for EQS and EQS/PC*. Los Angeles: BMDP Statistical Software.

Bentler, P. M. (1990). Fit indexes, Lagrange multipliers, constraint changes and incomplete data in structural models. *Multivariate Behavioral Research*, *25*, 163-172.

Chou, C.-P., & Bentler, P. M. (1990). Model modification in covariance structure modeling: A comparison among likelihood ratio, Lagrange Multiplier, and Wald tests. *Multivariate Behavioral Research*, *25*, 115-136.

Chou, C. –P., & Bentler, P. M. (1993). Invariant standardized estimated parameter change for model modification in covariance structure analysis. *Multivariate Behavioral Research, 28*, 97-110.

Chou, C. –P., & Bentler, P. M. (1996). Application of AIC to Wald and Lagrange multiplier tests in covariance structure analysis. *Multivariate Behavioral Research*, *31*, 351-370.

Chou, C.- P. & Bentler, P. M. (2002). Model modification in structural equation modeling by imposing constraints. *Computational Statistics & Data Analysis*, *41*, 271-287.

Multilevel SEM

Chou, C. –P., Bentler, P. M., & Pentz, M. A. (1998). Comparisons of two statistical approaches to study growth curves: The multilevel model and the latent curve analysis. *Structural Equation Modeling*, *5*, 247-266.

Yuan, K. -H. & Bentler, P. M. (2002). On normal theory based inference for multilevel models with distributional violations. *Psychometrika*, *67*, 539-562.

Yuan, K.-H., & Bentler, P. M. (2003). Eight test statistics for multilevel structural equation models. *Computational Statistics & Data Analysis*, *44*, 89-107.

Liang, J., & Bentler, P. M. (2004). An EM algorithm for fitting two-level structural equation models. *Psychometrika*, *69,* 101-122.

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.

Yuan, K. –H., & Bentler, P. M. (2007). Multilevel covariance structure analysis by fitting multiple single-level models. In Y. Xie (Ed.), *Sociological methodology 2007* (vol. 37, pp. 53-82). New York: Blackwell.

Bentler, P. M., & Liang, J. (2008). A unified approach to two-level structural equation models and linear mixed effects models. In D. Dunson (Ed.), *Random effects and latent variable model selection* (pp. 95-119). New York: Springer.

Bentler, P. M., Liang, J., Tang, M. –L., & Yuan, K. –H. (2011). Constrained maximum likelihood estimation for two-level mean and covariance structure models. *Educational and Psychological Measurement*, *71*(2), 325-345.

Statistical methods for SEM

Bentler, P. M., & Dijkstra, T. (1985). Efficient estimation via linearization in structural models. In P. R. Krishnaiah (Ed.), *Multivariate analysis VI* (pp. 9-42). Amsterdam: North-Holland.

Satorra, A., & Bentler, P. M. (1988). Scaling corrections for chi-square statistics in covariance structure analysis. *Proceedings of the Business and Economic Statistics Section of the American Statistical Association*, *36*, 308-313.

Kano, Y., Berkane, M., & Bentler, P. M. (1990). Covariance structure analysis with heterogeneous kurtosis parameters. *Biometrika*, *77*, 575-585.

Chou, C.-P., Bentler, P. M., & Satorra, A. (1991). Scaled test statistics and robust standard errors for non-normal data in covariance structure analysis: A Monte Carlo study. *British Journal of Mathematical and Statistical Psychology*, *44*, 347-357.

Berkane, M., & Bentler, P. M. (1993). The geometry of mean or covariance structure models in multivariate normal distributions: A unified approach. In C. M. Cuadras & C. R. Rao (Eds.), *Multivariate analysis: Future directions 2* (pp.153-169). Amsterdam: Elsevier Science.

Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables analysis: Applications for developmental research* (pp. 399-419). Thousand Oaks, CA: Sage.

Yung, Y. –F., & Bentler, P. M. (1994). Bootstrap-corrected ADF test statistics in covariance structure analysis. *British Journal of Mathematical and Statistical Psychology*, *47*, 63-84.

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 & Data Analysis,* 26, 177-198.

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. (1998). Normal theory based test statistics in structural equation modelling. *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.

Yuan, K. –H. & Bentler, P. M. (1999). F tests for mean and covariance structure analysis. *Journal of Educational and Behavioral Statistics*, *24*, 225-243.

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). On normal theory and associated test statistics in covariance structure analysis under two classes of nonnormal distributions. *Statistica Sinica*, *9*, 831-853.

Jamshidian, M., & Bentler, P. M. (2000). Improved standard errors of standardized parameters in covariance structure models: Implications for construct explication. In R. D. Goffin & E. Helmes (Eds.), *Problems and solutions in human assessment*, (pp. 73-94). Dordrecht, Netherlands: Kluwer Academic.

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, *66*, 507-514.

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.), *New developments and techniques in structural equation modeling* (pp. 35-56). Mahwah, New Jersey: Lawrence Erlbaum Associates.

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.

Kim, K. H. & Bentler, P. M. (2002). Tests of homogeneity of means and covariance matrices for multivariate incomplete data. *Psychometrika*, *67*, 609-624.

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., & 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., 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., & Bentler, P. M. (2006). Mean comparison: Manifest variable versus latent variable. *Psychometrika*, *71*, 139-159.

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.

Bentler, P. M., & Savalei, V. (2010). Analysis of correlation structures: Current status and open problems. In S. Kolenikov, D. Steinley, & L. Thombs (Eds.), *Statistics in the social sciences: Current methodological developments* (pp. 1-36). Hoboken NJ: Wiley.

Satorra, A., & Bentler, P. M. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika*, *75*, 243-248.

Yuan, K. –H., & Bentler, P. M. (2010). Finite normal mixture SEM analysis by fitting multiple conventional SEM models. In T. F. Liao (Ed.) *Sociological Methodology 2010* (pp. 191-245). New York: Wiley.

Lin, J., & Bentler, P. M. (2012). A third moment adjusted test statistic for small sample factor analysis. *Multivariate Behavioral Research*, *47*, 448-462.

Tong, X., & Bentler, P. M. (2013). Evaluation of a new mean scaled and moment adjusted test statistic for SEM. *Structural Equation Modeling*, *20*, 148-156.

Bentler, P. M., & Huang, W. (2014). On components, latent variables, PLS and simple methods: Reactions to Rigdon's rethinking of PLS. *Long Range Planning*, *47*, 138-145.

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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.

Arruda, E. H., & Bentler, P. M. (2017). A regularized GLS for structural equation modeling. *Structural Equation Modeling*, *24*, 657-665.

Jalal, S., & Bentler, P. M. (2018). Using Monte Carlo normal distributions to evaluate structural models with nonnormal data. *Structural Equation Modeling*, *25*, 541-557.

Kim, D. S., Reise, S. P., & Bentler, P. M. (2018). Identifying aberrant data in structural equation models with IRLS-ADF. *Structural Equation Modeling*, *25*, 343-358.

Factor Analysis

Algorithms

Bentler, P. M. (1982). Confirmatory factor analysis via non-iterative estimation: A fast, inexpensive method. *Journal of Marketing Research*, *19*, 417-424.

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Jamshidian, M., & Bentler, P. M. (1998). A quasi-Newton method for minimum trace factor analysis. *Journal of Statistical Computation and Simulation*, *62*, 73-89.

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Components vs factors

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Factor analysis models

Bentler, P. M. (1968). Alpha-maximized factor analysis (Alphamax): Its relation to alpha and canonical factor analysis. *Psychometrika*, *33*, 335-345.

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Hayashi, K., & Bentler, P. M. (2000). On the relations among regular, equal unique variances, and image factor analysis models. *Psychometrika*, *65*, 59-72.

Factor rotation

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Bentler, P. M., & Wingard, J. A. (1977). Function invariant and parameter scale-free transformation methods. *Psychometrika*, *42*, 221-240.

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Factor scores

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Yung, Y. –F., & Bentler, P. M. (1999). On added information for ML factor analysis with mean and covariance structures. *Journal of Educational and Behavioral Statistics*, *24*, 1-20.

Hayashi, K., & Bentler, P. M. (2000). The asymptotic covariance matrix of maximum-likelihood estimates in factor analysis: The case of nearly singular matrix of estimates of unique variances. *Linear Algebra and Its Applications*, *321*, 153-173.

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Measurement and Psychometrics

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