

Winnie Wing-Yee Tse



(213) 703-8313 | winnietse.wingyee@gmail.com

Website: <https://winniewytse.rbind.io/>

EDUCATION

Ph.D., Quantitative Methods and Computational Psychology

University of Southern California

- Dissertation: Pooling historical information while addressing bias and uncertainty: A Bayesian approach for designing single-level and multilevel studies 2019-2024

M.A., Quantitative Methods and Computational Psychology

University of Southern California

- Thesis: Incorporating uncertainty in design parameters: A hybrid classical-Bayesian power analysis approach for two-level cluster randomized trials 2019-2021

B.A., Psychology

University of British Columbia

2015-2018

CURRENT POSITION

Psychometrician

Vretta Inc.

- Conduct and oversee psychometric analyses of primary, junior, and secondary school assessments in Ontario, British Columbia, and Alberta 2023-Present
- Develop and maintain the automated process of psychometric analyses with classical test theory and item response theory using R
- Conduct simulation studies to determine underlying parameters, such as the optimal routing thresholds for multistage adaptive testing

RESEARCH INTERESTS

- Bayesian approach for classical power analysis, addressing biases and uncertainty
- Power analysis for multilevel studies
- Reliability and measurement invariance of factor scores and sum scores
- Data harmonization accounting for measurement errors and biases

AWARDS & FELLOWSHIPS

Finalist of the Graduate Research Competition on Generative AI <i>Psychometric Society</i> Project title: A Battle of Wits: Comparing the Capabilities of Generative AI and Humans in Scale Development	2024
Excellence in Scientific Writing <i>University of Southern California</i>	2023
Social Sciences and Humanities Research Council (SSHRC) Doctoral Fellowship (CAD \$40,000) <i>University of Southern California</i>	2022-2024
Spencer Foundation (USD \$49,796) <i>University of Southern California</i> Role: Graduate student investigator	2021-2022
Natural Sciences and Engineering Research Council of Canada (NSERC) (CAD \$12,900) <i>University of British Columbia</i>	2018

PUBLICATIONS

- 9 **Tse, W. W.-Y. & Lai, M. H. C.** (under review). Publication-bias-and-uncertainty-adjusted Bayesian (PUB) method for classical power analysis. *Psychological Methods*. Manuscript submitted for publication.
- 8 **Lai, M. H. C., Zhang, Y., Ozcan, M., & Tse, W. W.-Y.** (invited for revision). fMACS: Generalizing dMACS effect size for measurement noninvariance with multiple groups and multiple grouping variables. *Structural Equation Modeling*. Manuscript submitted for publication.
- 7 **Lai, M. H. C. & Tse, W. W.-Y.** (2024). Are factor scores measurement invariant? *Psychological Methods*. Advance online publication.
<https://doi.org/10.1037/met0000658>
- 6 **Tse, W. W.-Y., Lai, M. H., & Zhang, Y.** (2024). Does strict invariance matter? Valid group mean comparisons with ordered-categorical items. *Behavior Research Methods*, 56(4), 3117-3139. <https://doi.org/10.3758/s13428-023-02247-6>
- 5 **Zhang, Y., Tse, W. W.-Y., & Lai, H. C.** (2024) Bootstrap methods for robust multilevel analysis. In M. Stemmler, W. Wiedermann, & F. L. Huang (eds), *Dependent Data in Social Sciences Research*. Springer, Cham. https://doi-org.libproxy1.usc.edu/10.1007/978-3-031-56318-8_13

- 4 Cárdenas, S. I., Tse, W. W.-Y., León, G., Kim, A., Tureson, K., Lai, M., & Saxbe, D. E. (2023). Prenatal testosterone synchrony in first-time parents predicts fathers' postpartum relationship quality. *Hormones and Behavior*, 156, 105440. <https://doi.org/10.1016/j.yhbeh.2023.105440>
- 3 Lai, M. H. C., Tse, W. W.-Y., Zhang, G., Li, Y., & Hsiao, Y. Y. (2023). Correcting for Unreliability and Partial Invariance: A Two-Stage Path Analysis Approach. *Structural Equation Modeling: A Multidisciplinary Journal*, 30(2), 258-271. <https://doi-org.libproxy2.usc.edu/10.1080/10705511.2022.2125397>
- 2 Lai, M. H. C., Liu, Y., & Tse, W. W.-Y. (2021). Adjusting for partial invariance in latent parameter estimation: Comparing forward specification search and approximate invariance methods. *Behavior research methods*, 54(1), 414-434. <https://doi.org/10.3758/s13428-021-01560-2>
- 1 Zhang, X., Tse, W. W.-Y., & Savalei, V. (2019). Improved properties of the big five inventory and the Rosenberg self-esteem scale in the expanded format relative to the Likert format. *Frontiers in Psychology*, 10, 1286-1286. <https://doi.org/10.3389/fpsyg.2019.01286>

TEACHING EXPERIENCE

Co-Instructor, A Practical Introduction to Data Harmonization Using Latent Variable Modeling

Annual Conference of the Society for Research on Educational Effectiveness (SREE) 2024

- [Workshop Materials](#)

Undergraduate-Level Course Teaching Assistant, Statistics (PSYC 271)

University of Southern California 2023, 2019

- Statistical methods for psychological research, including t-tests, ANOVA, and regressions, with SPSS and R

Graduate-Level Course Teaching Assistant, Multilevel Modeling (PSYC 575)

University of Southern California 2022

- Topics include two-level and three-level hierarchical linear models, longitudinal models, and growth curve models
- [Course Materials](#)

Graduate-Level Course Guest Lecturer, Multilevel Modeling (PSYC 575)

University of Southern California 2022, 2021

- Statistical foundations and tools for sample size planning in multilevel studies
- [2022 Course Materials](#)
- [2021 Course Materials](#)

Co-Instructor, Incorporating Uncertainty in Power Analysis to More Realistically Determine Sample Size

Society for the Improvement of Psychological Science (SIPS)

2022

- [Workshop Materials](#)

Co-Instructor, Advancing Quantitative Science with Monte Carlo Simulation

PsyPag & MSCP-Section Simulation Summer School

2019

- Monte Carlo Simulation on Structural Equation Modeling using the SimDesign Package in R
- [Workshop Materials](#)

CONFERENCE PRESENTATIONS

- 10 **Tse, W.W.-Y. & Lai, M. H. C. (Jul 25, 2023).** *Addressing publication bias and uncertainty for power analysis: A hybrid classical-Bayesian approach* [Oral Presentation]. Annual Meeting of the Psychometric Society (IMPS). [Schedule](#)
- 9 **Tse, W.W.-Y. & Lai, M. H. C. (Apr 13, 2023).** *Addressing uncertainty in power analysis for designing cluster randomized trials* [Paper Session]. American Educational Research Association (AERA) Annual Meeting, Chicago, IL, United States. [Program](#)
- 8 **Tse, W.W.-Y. & Lai, M. H. C. (Jul 11, 2022).** *Incorporating information from historical studies for power analysis: A hybrid classical Bayesian approach for multilevel studies* [Paper Session]. Annual Meeting of the Psychometric Society (IMPS), Bologna, Italy. [Schedule](#)
- 7 **Tse, W.W.-Y. & Lai, M. H. C. (Sep 26, 2021).** *Sample size determination in the presence of uncertainty: A hybrid classical-Bayesian approach for two-level cluster randomized trials* [Paper Session]. Annual Conference of the Society for Research on Educational Effectiveness (SREE), Arlington, VA, United States. [Schedule](#)
- 6 **Tse, W.W.-Y. & Lai, M. H. C. (Aug 12, 2021).** *A Bayesian approach to power analysis and sample size planning for cluster randomized trials* [Poster Session]. Virtual conference at the American Psychological Association (APA) Annual Convention due to covid-19.
- 5 **Tse, W.W.-Y. & Lai, M. H. C. (Jul 20, 2021).** *Incorporating uncertainty in design parameters: A hybrid classical-Bayesian power analysis approach for two-level cluster randomized trials* [Paper Session]. Virtual conference at the Annual Meeting of the Psychometric Society (IMPS) due to covid-19. [Schedule](#)
- 4 **Cardenas, S.I., Tse, W.W.-Y., & Saxbe, D.E. (Apr 29, 2021).** *Prenatal and postpartum testosterone synchrony in first time parents: Links with suboptimal relationship functioning and enhanced parenting outcomes* [Paper Session]. Virtual conference at the meeting of Western Psychological Association due to covid-19.

- 3 **Tse, W.W.-Y. & Lai, M. H. C.** (Jul 14, 2020). *Measurement invariance for ordered categorical variables: The necessity of strict invariance for valid group comparisons* [Poster Session]. Annual Meeting of the Psychometric Society (IMPS). [Schedule](#)
- 2 **Tse, W.W.-Y. & Lai, M. H. C.** (Jun 25, 2020). *Measurement invariance for ordered categorical variables: The necessity of strict invariance for valid group comparisons* [Paper Session]. A Meeting of Methodologies (AMOM). [Slides](#)
- 1 **Tse, W.W.-Y., Zhang, X., & Savalei, V.** (Apr 1, 2017). *Examining the order effects in psychological scales in the expanded format* [Poster Session]. Psychology Undergraduate Research Conference, University of British Columbia, Vancouver, BC.

RESEARCH & PROFESSIONAL EXPERIENCE HIGHLIGHTS

Psychometric Intern

Pearson

- Performed calibration, equating, and scoring for K-12 Mathematics and Reading assessments
 - Conducted simulations of computer adaptive testing (CAT) to evaluate the performance of the adaptive algorithm
 - Created an R Shiny application to visualize students' performance on the computer adaptive tests
- 2023

Statistical Consultant

McArdle GC-3 Center, University of Southern California

- Provided statistical consultation to faculty and graduate students in the USC Psychology Department
 - Addressed questions related to, for example, Bayesian analysis, multilevel analysis, power analysis, and structural equation modeling
 - Give workshop on topics including data manipulation and visualization with R and power analysis
- 2022-2023

Graduate Research Assistant

Department of Health and Human Services, Office of Population Affairs

- Pregnancy Prevention Research Grants (Sep 30, 2020–Sep 29, 2021 PA-PHE-20-002)
 - Project: "Secondary Data Analysis of Effective TPP Programs: Setting, Youth Context, and Characteristics" (PI: Clark, PHEPA000003)
 - Harmonized and integrated survey data of 8 school-randomized controlled trials, totaling 135 schools and 13,665 participants from the schools' characteristics
 - Performed latent class analyses on the harmonized data and identified 5 classes from the schools' characteristics
- 2021-2022

Graduate Research Assistant*University of Southern California*

- Original grant funded by Department of Education, Investing in Innovation Fund [i3] Development Grants
- Project: Evaluation of “Identity-Based Motivation Journey to Academic Success.” (Co-PIs: Katie Anderson and Daphna Oyserman, U411C150011) 2020
- Merged longitudinal academic data (PSAT, SAT) from 14 high schools for the evaluation of Pathways-to-Success intervention on students’ academic outcomes
- Performed descriptive analyses on the pooled data

STATISTICAL TOOL DEVELOPMENT

R2spa

- An R package that facilitates modeling observed and latent variables while accounting measurement errors and biases
- Role: Author and maintainer

BACpowr

- An R package designed for power analysis in the design of single-level multilevel studies using a Bayesian approach
- Role: Author and maintainer

hcbApp

- An interactive application designed for power analysis in the design of multilevel studies using a Bayesian approach
- Role: Author and maintainer

SERVICES

Reviewer*Behavior Research Methods*

2022

Ad-hoc Reviewer*Asian American Journal of Psychology*

2020

Ad-hoc Reviewer*Alcohol and Alcoholism*

2019

COURSEWORK HIGHLIGHTS

- **Teaching:**
 - Practicum in Teaching Psychology (PSYC 593)
- **Measurement:**
 - Fundamentals of Psychological Measurement (PSYC 520)
- **Statistics:**
 - Introduction to the Theory of Statistics (PM 522A, PM 522B)
 - Data Analysis for Categorical data (PM 511B)
 - Bayesian Statistics (PSYC 621)
 - Multilevel Modeling (PSYC 575)
 - Research Design in Developmental Psychology (PSYC 524)
- **Machine Learning:**
 - Applied Machine Learning (PSYC 625)
 - Computational Social Sciences (PSYC 626)
 - Advanced Statistical Computing (PM 520)

SKILLS

- **Statistics and Programming:** R, Python, Stata SPSS, SAS, Mplus, Julia
 - Structural equation modeling: lavaan, OpenMx
 - Multilevel modeling: lme4, glmmTMB
 - Bayesian statistics: rstan, brms, cmdstanr, rjags
 - Item response theory: mirt, eRm
- **Document Preparation**
 - Quarto, LaTeX, RMarkdown, MS Excel, Word, Powerpoint