Preface

Preface to the special issue: Applications of latent variable modeling in educational psychology research

The primary goal of this Special Issue was to assemble a collection of illustrative empirical studies in educational psychology that utilize one or more state-of-the-art latent variable modeling procedures. By latent variable modeling, I refer to a set of data-analytic procedures that can include *but need not be limited to*: (a) structural equation modeling (SEM); (b) latent class analysis; (c) latent profile analysis; and (d) item response theory (IRT). In fact, the authors of this Special Issue applied one or more of these modeling procedures as well as others. The quantitative tools featured in this issue can be used to model complex construct relations, for example, over time, across subject matter domains, across different populations, across multiple levels of data, and with measured variables of different scales. What makes the applications of these modeling procedures unique is that they are not presented as so-called technical developments addressing such issues as new approaches to model specification or parameter estimation. Therefore, they are not the type of applications that are likely to appear in measurement and statistical journals such as *Multivariate Behavioral Research*, *Psychometrika*, or *Structural Equation Modeling: A Multidisciplinary Journal*. Instead, the authors of this volume contributed compositions that have as much to do with educational psychology as they do quantitative methodology. In so doing, each group of authors presented well-known theoretical frameworks and delineated premises related to the definition or description of such constructs as academic motivation, empathy, self-concept, and subject-matter achievement. They then demonstrated how methods in latent variable modeling could be applied to test the tenets of a given framework.

In fact, Greg Hancock and I co-edited this special issue by asking authors to ensure the following elements or sections were included in their manuscripts: (a) presentation of a sound theoretical framework; (b) definition of important terms; (c) specification of variable relations based on the theoretical framework adopted; (d) description of sample size and power considerations; (e) justification of why one or more latent variable modeling procedures were selected to test hypotheses; (f) reporting of results in accordance with contemporary recommendations of psychometricians/statisticians; (g) acknowledgment of limitations; and (h) drawing of implications for future research and practice in educational psychology.

In meeting these objectives, Greg and I relied on the expertise of several renowned scholars to assist in the evaluation of the articles and the theoretical overviews and data analysis strategies summarized within them. We are especially grateful for the assistance provided us by our reviewers. In many instances, our reviewers noted that they read other sources, sometimes from the fields of biostatistics and econometrics, to help guide the authors in clarifying their modeling specifications, analyzing their data, or interpreting their results given many of the complex applications used to address the research questions presented. Our reviewers' narratives were extensive, and in many cases, they provided line-by-line editing of initial drafts.

In our opinion, a Special Issue needs a Special Commentary. Greg and I would like to thank Herb Marsh and K. T. Hau for their excellent analysis and summary which close this volume. This commentary does more than just set the historical placement of the investigations relative to where the current state of quantitative methodology is with respect to the test of theoretical premises in educational psychology and related fields. In coining their term, "methodological-substantive synergies," Herb and KT share their visionary perspective of new directions for research by educational psychologists who seek to test their theoretical frameworks employing advanced latent variable modeling procedures. They highlight a number of *a priori* considerations to be taken by researchers in an effort to contribute state-of-the-art methodological-substantive synergies to the scholarship within our field. We are confident that their summary will serve as a guidepost for researchers who embark on submitting contributions, such as those presented here, to educational psychology and quantitative methodology journal outlets in the future.

Finally, we express our deep gratitude to the authors who have made this volume everything Greg and I thought it could be. The email logs alone would serve as ample evidence of the time and care the authors showed in drafting and re-drafting their works, checking in with Greg and me to provide updates or progress reports, or seeking clarification on how best to modify and revise sections of their compositions. We believe it will be clear to the readers of *Contemporary Educational Psychology* how passionate the authors are about their lines of inquiry. It will also become clear how challenging our undertakings are as educational psychologists and quantitative methodologists who apply these sophisticated procedures to data that are high on what Greg likes to call, "the messy quotient,"—real data belonging to children, adolescents, and adults learning and performing in complex situations.

For the readers of CEP, the order of presentations is as follows. Greg Hancock introduces the Special Issue by setting the theme and tone of the collection of manuscripts. The first article is by Dena Pastor, Kenneth Barron, B. J. Miller, and Susan Davis who illustrate how latent class analysis can be used to profile individual differences given college students' achievement goal orientations. In the second manuscript, Sharon Tettegah and Carolyn Anderson describe the importance of teachers' empathy in classroom instruction and demonstrate how log-multiplicative association models, a family of graphical modeling procedures, can be used to study the latent variable, empathy. The third manuscript was written by Angela Miller and Tamera Murdock. As with the article by Dena Pastor and her colleagues, Angela and Tamera examine students' goal structures. However, they analyze achievement goals given the hierarchical structure of classroom settings. Important issues regarding reliability and validity estimation when dealing with aggregated data structures are discussed in their article. In the fourth manuscript, Dirk T. Tempelaar, Wim H. Gijselaers, Sybrand Schim van der Loeff and Jan F. H. Nijhuis analyzed the relationships