

Did You Know? Quantitative Methodology

Courtesy of NAGC Research and Evaluation Division

Missing Data

Data can be missing in specific patterns.

Dedrick et al. (2009) reported findings from Rubin to identify three processes to produce missing data. “First, data that are missing purely due to chance are considered to represent data that are missing completely at random (MCAR). ... Second, data that are classified as missing at random (MAR) do not depend on the missing value itself but may depend on other variables that are measured for all participants under study. Last, and most problematic statistically, are data missing not at random (MNAR). This type of missingness, also referred to as nonignorable missing data, is directly related to the value that would have been observed for a particulate variable” (p. 79).

Effect Size

Effect sizes can help interpret statistical findings.

Reporting of effect sizes helps to facilitate interpretation of statistical findings, providing evidence of “practical” significance in addition to statistical significance. Because of this, there has been a call in the past decade for reporting of effect sizes in publications of quantitative research. However, in many educational journals (both in the field of gifted education and beyond), effect sizes are still inconsistently reported. Recent articles by Alhija and Levy (2009) and Gentry and Peters (2009) discuss the current state of effect size reporting. In addition, Gentry and Peters (in *Gifted Child Quarterly’s* first Methodological Brief) provide guidelines both on reporting effect size and how to estimate effect sizes when not reported in articles.

Multilevel Modeling

Multilevel Modeling can be used to account for groupings of students and for measurements taken across time.

Multilevel modeling is a flexible technique with many benefits in the field of educational research, including the ability to nest students within schools and to allow for between-school variation in the associations between predictors and outcomes. Culpepper and Davenport (2009), for example, used a multilevel model to examine how high school GPA and SAT scores related to college GPA differently across schools and between racial/ethnic groups. However, multilevel modeling can also be used to examine multiple measures within individuals. Muckle and Karabatsos (2009), for example, use multilevel modeling to analyze judge’s ratings of students’ performance in speeches, with individual ratings on different components and from different judges nested within students.

Gain Scores

The use of gain scores may not be a valid way to measure achievement in gifted students.

One common way of measuring growth in achievement is to calculate a “gain score,” in which a score on an assessment given at an earlier time is subtracted from an assessment on the same score given later. However, many argue that gain scores are fraught with methodological limitations. When assessing reliability of such measures, Zimmerman (2009) used computer simulations of difference scores (including gain scores) and found that such scores were not inherently reliable or unreliable. Instead, reliability depended on the reliability of the individual tests as well as the sample size. When examining construct validity, Pomplun (2009) found only limited correlations between grades and gain scores particularly among honors students. He suggested that gain scores might not be especially useful for the highest-achieving students due to ceiling effects. From these studies, we conclude that gain scores should be used only with considerable caution.

References

- Alhija, F. N.-A., & Levy, A. (2009). Effect size reporting practices in published articles. *Educational and Psychological Measurement, 69*, 245-265. doi: 10.1177/0013164408315266.
- Culpepper, S. A., & Davenport, E. C. (2009). Assessing differential prediction of college grades by race/ethnicity with a multilevel model. *Journal of Educational Measurement, 46*, 220-242.
- Dedrick, R. F., Ferron, J. M., Hess, M. R., Hogarty, K. Y., Kromry, J. D., Lang, T. R., . . . Lee, R. S. (2009). Multilevel modeling: A review of methodological issues and applications. *Review of Educational Research, 79*, 69-102. doi: 10.3102/0034654308325581
- Gentry, M. & Peters, S. (2009). Effect sizes in gifted education research. *Gifted Child Quarterly, 53*(3), 219-222. doi: 10.1177/0016986209334976
- Muckle, T. J., & Karabatsos, G. (2009). Hierarchical generalized linear models for the analysis of judge ratings. *Journal of Educational Measurement, 46*, 198-219.
- Pomplun, M. (2009). Do student growth scores measure academic growth? *Educational and Psychological Measurement, 69*, 966-977. doi: 10.1177/0013164409344535.
- Zimmerman, D. W. (2009). The reliability of difference scores in populations and samples. *Journal of Educational Measurement, 46*, 19-42.

The Research and Evaluation Network provides the following member benefits and services:

1. Annual Research Gala
2. Research Crackerbarrel
3. Semi-annual newsletters
4. *Did you know?* Handouts
5. Access to selected AERA articles of interest to R&E members
6. Dissertation Award
7. Frequent email communications to all members
8. Opportunities to serve on committees of interest
9. Conference presentations highlighting the latest research in the field of gifted education

Research and Evaluation Network Membership Application*

Name: _____

NAGC Membership Number: _____

Company or Institution: _____

Position: _____

Address: _____

Telephone: _____ Fax: _____

Email: _____

NAGC membership includes 3 Network memberships. If you are joining R&E and are already a member of 3 Networks, there is a \$25 fee, which adds membership to *all* Networks to your NAGC membership. Your R&E Network will run concurrently with your NAGC membership.

Return to:

National Association for Gifted Children
ATTN: Membership
1331 H Street, NW, Suite 1001
Washington, DC 20005
Or fax to: 202-785-4248

**Please call Member Services with questions:
202-785-4268**

* This form is for current NAGC members. If you are a nonmember, you also must join NAGC to join the R&E Network. Please register online at www.nagc.org.