

**APPENDIX C:**  
**COMPUTATION OF DIF STATISTICS**

- Computation of DIF Statistics:

Mantel-Haenszel (M-H) statistic (Mantel, 1963):

$$Mantel\ x^2 = \frac{[\sum F_k - \sum E(F_k)]^2}{\sum Var(F_k)},$$

where  $F_k$ , the sum of scores for the focal group at the  $i$ th level of the matching variable is

$$F_k = \sum y_i n_{Fik}$$

The Mantel statistic reduces to the Mantel - Haenszel  $x^2$  statistic when applied to the MC items.

(See Zwick et al., 1996, pp.188-189 for detailed formula)

Standardized Mean Difference (SMD) statistic (Zwick et al., 1996):

$$SMD = \sum p_{Fk} m_{Fk} - \sum p_{Fk} m_{Rk}$$

where

$$p_{Fk} = \frac{n_{F+k}}{n_{F++}},$$

the proportion of focal group members who are at the  $k$ th level of the matching variable;

$$m_{Fk} = \frac{\sum y_i n_{Rik}}{n_{F+k}},$$

the mean item score for the focal group at the  $k$ th level;

$$m_{Rk} = \frac{\sum y_i n_{Rik}}{n_{R+k}},$$

the mean item score for the reference group at the  $k$ th level.

A positive value for a SMD reflects DIF in favor of the focal group.

The SMD is divided by the total group item standard deviation to get a measure of the effect size for the SMD.