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Methodological Appendix A for: McQuillan, J., A. L. Greil, A. Rybinsk, S. Tiemeyer, K. M. Shreffler, and C. Warner Colaner. 2020. Is a dyadic stressor experienced as equally distressing by both partners? The case of perceived fertility problems. *Journal of Social and Personal Relationships*. DOI: 10.1177/0265407520953903

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Methodological Appendix A for:

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Barnett, Marshall, Raudenbush, and Brennan (1993) provide an approach to cross-sectional couple data that increases the power and precision of the estimates and allows the simultaneous analysis of both partners. Following Barnett et al (1993), we constructed two parallel versions of the distress scale for each partner by matching standard deviations of individual items. We randomly assigned each of the 10 items to an A or B group (each group had five items). This procedure resulted in two parallel subscales of distress for each partner. Overall, the subscales had equal amounts of error variance. The level 1 data were “stacked” with four rows of data for each couple and columns containing the partner ID, the individual ID, an indicator for women, an indicator for men, and a column for the distress subscales. The level 2 (couple level) data contained one row for each couple and columns for all of the other variables.

To measure his and her depressive symptoms, we used a simple model with no constant, a measure for the women (X_1) and the men (X_2), and an error term (Following Barnett et al., 1993):

$$Y_{ij} = \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + e_{ij} \quad (1)$$

In Equation (1) the dependent variable Y_{ij} is the subscale score (indicated by i) for couple j for the depressive symptoms outcome, with i indicating the scores (1 to 4) for each couple and j indicating each one of the 926 couples. The first indicator variable (X_{1ij}) is for the women and

the second (X_{2ij}) is for the men. Therefore, the coefficient β_{1j} is the true score for the woman and β_{2j} is the true score for the man. The error term (e_{ij}) indicates error in measurement. In multilevel models, the assumption is that the errors are independent and normally distributed with a constant variance σ^2 .

The estimates of the true scores for depressive symptoms for the men and women from equation 1 become the outcomes in for the level 2 model. Even though the models are estimated simultaneously, it is useful to think of them as conceptually unique (also indicated by columns in Table 3) and using additional equations:

$$\beta_{1j} = \gamma_{10} + \gamma_{11} \textit{Woman Self ID}_{11j} + \gamma_{12} \textit{Man Self ID}_{12j} + \gamma_{13} \textit{Both Self ID}_{13j} + \sum \gamma_{1q} W_{1qj} + u_{1j} \quad (2)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} \textit{Woman Self ID}_{21j} + \gamma_{22} \textit{Man Self ID}_{22j} + \gamma_{23} \textit{Both Self ID}_{23j} + \sum \gamma_{2q} W_{2qj} + u_{2j} \quad (3)$$

In equations 2 and 3, the intercept for the women is γ_{10} and for men γ_{20} . The associations for the couple-perception-of-a-fertility-problem variables with partner distress are captured by the indicator variables for the three problem statuses (the woman, the man, or both partners perceived a problem) compared to neither perceived a problem. The set of independent control variables are represented by W_{1qj} for the women and W_{2qj} for the men. There are parallel q sets of predictors for the women and men in the matched pair couples which include the control variables in the full model. All continuous variables were grand mean-centered. Residuals for the women u_{1j} and men u_{2j} are assumed to be bivariate normally distributed over couples with variances T_{11} and T_{22} with the covariance T_{12} . The covariance captures the association of the partner residuals, thus addressing potential violation of the assumption of multiple regression that errors be independent.

