**Supplementary Information: “Is mentalizing essential to predict human network size? Reexamining the social brain hypothesis from a social network perspective”**

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*Measurement of mentalizing (EQ-8)*

The items of EQ-8 (Loewen et al., 2010) are derived from the results of principal component analysis reported in Wakabayashi et al. (2006, Table 2) which developed the short version of the 40-item EQ scale (Baron-Cohen & Wheelwright, 2004). Loewen et al. chose the four affirmative and the four reversal items with the highest principal component factor loadings from the 40 items EQ scale. The items are shown in Table S1. This scale was validated in relation to sex differences (women were higher than men in the EQ-8 score) and altruistic behavior (the EQ-8 score was positively related to the amount of charitable giving in the past two years) among a general population sample in Canada (*N* = 4682).

**Table S1.** EQ-8 items (adapted from Loewen et al., 2010).

|  |  |
| --- | --- |
| No. | Item |
| 1. | I find it easy to put myself in somebody else’s shoes.  |
| 2. | I am good at predicting how someone will feel.  |
| 3. | I am quick to spot when someone in a group is feeling awkward or uncomfortable.  |
| 4. | Other people tell me I am good at understanding how they are feeling and what they are thinking.  |
| 5. | I find it hard to know what to do in a social situation.\* |
| 6. | I often find it hard to judge if something is rude or polite.\*  |
| 7. | It is hard for me to see why some things upset people so much.\*  |
| 8. | Other people often say that I am insensitive, though I don’t always see why.\*  |

\* Reversal items.

*Sample heterogeneity*

We found an unexpected significant negative correlation between age and the active network size (Tables 1 and 3). Our sample consisted of students from two departments of one university (Department of Education and Engineering), suggesting sample heterogeneity in our data. If students in one department were younger and had larger active networks than those in the other department, a pooled sample would show a spurious negative association between age and active network size. We conducted supplementary analyses to test this possibility. Descriptive statistics of each department are presented in Table S2. We found significant differences in age, mentalizing, and extraversion between the two departments. Active network size (and the other two network indices) did not differ significantly between the departments. These results suggested sample heterogeneity, so we conducted a regression analysis including the interactions of the department (dummy variable) and the network indices. As reported in Table S3, none of the interactions were significant and the main findings reported in Table 3 in the main text did not change. We concluded that the heterogeneity of the sample was not problematic in performing pooled sample analyses.

**Table S2.** Descriptive statistics for each subsample.

**Table S3.** Results of regression analysis including interaction terms of department.

*Result of negative binomial regression on the number of dyads*

The number of dyads was positively skewed (see Figure 1, panel A); thus, we conducted a negative binomial regression on the size of the dyads. The result is shown in Table S4. Mentalizing and extraversion significantly predicted the number of dyads, consistent with Table 3.

**Table S4.** Result of negative binomial regression on the number of dyads.

*References*

Baron-Cohen, S., & Wheelwright, S. (2004). The empathy quotient: an investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *Journal of Autism and Developmental Disorders, 34*(2), 163–175. [https://doi.org/10.1023/b:jadd.0000022607.19833.00](https://doi.org/10.1023/b%3Ajadd.0000022607.19833.00)

Loewen, P. J., Lyle, G., & Nachshen, J. S. (2010). An eight-item form of the Empathy Quotient (EQ) and an application to charitable giving. Unpublished manuscript. Retrieved from <https://www.researchgate.net/publication/254000149_An_eight-item_form_of_the_Empathy_Quotient_EQ_and_an_application_to_charitable_giving>

Wakabayashi, A., Baron-Cohen, S., Wheelwright, S., Goldenfeld, N., Delaney, J., Fine, D., Smith, R., & Weil, L. (2006). Development of short forms of the Empathy Quotient (EQ-Short) and the Systemizing Quotient (SQ-Short). *Personality and Individual Differences*, *41*(5), 929–940. <https://doi.org/10.1016/j.paid.2006.03.017>