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Extraversion is associated with advice network size, but not network density or emotional closeness to network members

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Article

1 **Extraversion is associated with advice network size, but not network density or emotional**

2 **closeness to network members**

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1

Abstract

Friendship networks are instrumental to a whole range of outcomes including career success and personal wellbeing, and as such it is important to ask how social networks are shaped by personality variables. However, previous research examining how extraversion is associated with social network size and closeness to social network members has produced inconsistent findings. Here, we assessed how extraversion (HEXACO model) was associated with three key features of advice networks (size, density, and emotional closeness to network members) in a sample of 199 participants (17 - 75 years, $M = 25$, $SD = 11$; 146 women). We found that higher levels of extraversion (and its four facets: social self-esteem, social boldness, sociability, and liveliness) corresponded to a significantly larger advice network, but not greater network density, or greater emotional closeness to network members. The social manifestation of extraversion here seems to be operationalised in terms of a greater number of interactive advice partners, but no increased probability of ensuring that contacts are connected to each other, or of developing emotionally deep relationships with contacts.

1. Introduction

Friends, family, and acquaintances play an important role in an individual's physical and mental wellbeing, social capital, and organisational performance, *inter alia* (Berkman, Glass, Brissette, & Seeman, 2000; Landis, 2016). Accordingly, researchers have been interested in examining how individual differences in personality could drive friendship formation and intensification. It

50   might seem a reasonable hypothesis that extraversion should lead to larger social networks, given

51   that the extraverted personality is more outgoing and sociable (e.g., Asendorpf & Wilpers, 1998;

52   Harari et al., 2020). In line with this, Dutch adults (mainly non-students) who were more

53   extraverted reported a greater number of people that they were close to and had seen recently,

54   more contact with people within the last month, and a larger number of other friends and

55   acquaintances (Pollet, Roberts, & Dunbar, 2011). Similarly, extraversion corresponded positively

56   to the number of people in the social networks of student samples (Kalish & Robins, 2006;

57   Selfhout et al., 2010; Swickert, Rosentreter, Hittner, & Mushrush, 2002). Elsewhere, extraverts

58   cited more friends, and were more likely to be cited as a friend (Feiler & Kleinbaum, 2015).

59   However, extraversion does not unambiguously explain all aspects of social network size. A

60   study of new students entering university for the first time found that extraversion corresponded

61   to greater numbers of people cited as currently personally important in the first year, but not for

62   the few months subsequently studied (Asendorpf & Wilpers, 1998). In another large sample,

63   extraversion was positively related to the size of the support group (the people that one would

64   turn to in times of severe stress), but not to the size of the sympathy group (the larger group of

65   people whose permanent loss would be upsetting) (Molho, Roberts, de Vries, & Pollet, 2016). In

66   a further study of university undergraduates, there was no direct association between network

67   size and extraversion, although network size was related to a measure of 'feeling enthusiastic'

68   (Totterdell, Holman, & Hukin, 2008; see also Totterdell, Wall, Holman, Diamond, & Epitropaki,

69   2004). Equally, in a study that sampled beyond the typical undergraduate cohort, the relationship

70   between extraversion and network size was no longer statistically significant once participant age

71   was controlled for (Roberts, Wilson, Fedurek, & Dunbar, 2008). It might be that social strategies,

72   work opportunities, and life stages have larger effects on network size than extraversion, leading

73   to inconsistent findings depending on the sample used (Totterdell et al., 2008).

74

75   The enhanced sociality of extraversion might also be related to other elements of the social

76   network, such as greater social network density (calculated as the number of people within a

77   network who know each other, relative to the theoretical maximum number who could know

78   each other). Social network density is considered an important variable of study (DeLamater,

79   2006) and has implications for material and informational transmission between people,

80   including the transmission of practices and diseases (Zelner et al., 2012). In denser networks,

81   more of an individual's family and friends know each other, perhaps leading the individual to

82   feel they are part of a close-knit social network. Bell (1991) found that, in a sample of adults

83   from the United States, those with denser networks had significantly lower levels of loneliness,

84   and suggested this may be because in denser networks, network members can better coordinate

85   support when individuals are in need. If it is easier to develop new social relationships within a

86   dense than sparse network, then this could mean that those who regularly seek new social

87   relationships (i.e. extraverts) could be more likely to add contacts from dense than sparse

88   networks, thereby creating a positive relationship between extraversion and network density.

89   However, if extraverts have larger social networks, then they have more network members to

90   connect before a network can be as dense as a smaller network, as network density is negatively

91   associated with network size (Faust, 2006). Extraverted Australian students were more likely to

92   report strong ties between network members, whereas the relationship between extraversion and

93   network density was positive but not significant (Kalish & Robins, 2006).

94

95   The data are similarly inconsistent when it comes to the relationship between extraversion and

96   emotional closeness to others. Some studies have reported that extraversion relates positively to

97   emotional closeness to friends (e.g., Berry, Willingham, & Thayer, 2000; Neyer & Asendorpf,

98   2001), and to the amount of support anticipated from others (Asendorpf & Wilpers, 1998;

99   Stokes, 1985). However, extraversion was not related to reports of higher levels of satisfaction

100   with the support received from the people in one's social network, nor to the perceived

101   availability of people to discuss problems with (Swickert et al., 2002), nor to the relationship-

102   relevant variables of interpersonal affect or succorance (Ashton, Jackson, Helmes, & Paunonen,

103   1998). Dutch adults (mainly non-students) who were more extraverted were no more or less

104   emotionally close on average to the people that they knew best (Pollet et al., 2011). Indeed,

105   people reported lower average emotional closeness to others if they had larger overall social

106   networks (Pollet et al., 2011; Roberts, Dunbar, Pollet, & Kuppens, 2009), perhaps because

107   investing in larger numbers of people means that less investment can be made in each

108   relationship, resulting in a quality-quantity trade-off (Dunbar, 2018).

109

110   Given the discrepancies in previous research, and the limited attention paid so far to personality

111   and network density (Kalish & Robins, 2006), we examined the relationship between

112   extraversion and social networks in a preregistered study (https://osf.io/q8my3). Unlike much

113   other research, we assessed extraversion under the HEXACO model (Lee & Ashton, 2018) rather

114   than the Big Five; HEXACO as a model of personality is gaining traction within the field (de

115   Vries, Tybur, Pollet, & van Vugt, 2016). Further, we went beyond previous work, which has not,

116   to our knowledge, examined the impact of narrow traits on the social network dimensions of

117   interest to us, by examining the impact of the four narrow traits of HEXACO extraversion (social

118   self-esteem, social boldness, sociability, and liveliness) in finer detail. We collected data on three

119   important features of social networks, namely, social network size, density, and emotional

120   closeness to network members. The impact of extraversion on network density, in particular, has

121   been little explored beyond a study of first-year Psychology undergraduate students (Kalish &

122 Robins, 2006). Our predictions were that extraversion would correspond to a larger social

123 network (Hypothesis 1), greater network density (Hypothesis 2), and lower emotional closeness

124 to others (Hypothesis 3).

125

126 **2. Materials and Methods**

127

128 2.1 Sample size

129 We pre-registered a target sample size of between 100 and 200 participants, which was informed

130 by our previous work (n = 117, Pollet et al., 2011), and took into account the constraints of

131 collecting data during the available 6-week time period. A sample size of 100 - 200 would

132 provide 80% power at $p = .05$ to detect an effect of $R^2 = .102$ - .053.

133

134 2.2 Participants

135 Our survey recorded data from a participant only once they completed the final page of the

136 survey ($n = 200$). One participant did not input any answers, leaving a final sample of 199 (146

137 women; 163 British, 36 'Other' nationality [27 not specified, 8 American, 1 preferred not to

138 say]). Participants were aged 17 – 75 ($M = 25$ years, $SD = 11$ years; 8 provided no age and their

139 age was replaced with the mean age for analysis). There were 90 participants aged under 20, 78

140 aged 20-29, 11 aged 30-39, 11 aged 40-49, 5 aged 50-59, 1 aged 60-69, and 3 aged 70-75.

141 Participants were recruited mainly through a university student research participation scheme, a

142 university open day, and social media.

143

144 2.3 Materials

145 2.3.1 GENSI

146 In order to collect participant data, we used an amended version of GENSI (Graphical Ego-

147 centred Network Survey Interface, Stark & Krosnick, 2017; Stulp, 2020), a visually-interactive

148 interface designed for social network reporting. Data quality can be enhanced by the use of such

149 visually-interactive methods (Tubaro, Casilli, & Mounier, 2014), something that is particularly

150 important for social network data collection online (Matzat & Snijders, 2010).

151

152 2.3.2 Advice Network

153 Participants were presented with the following standard text to generate an advice network

154 (McPherson, Smith-Lovin, & Brashears, 2006): "From time to time, most people discuss

155 important matters with other people they trust. These important matters may be personal or

156 social. The people with whom you discuss important matters may be friends, family or co-

157 workers. Looking back over the last six months, who are the people with whom you discussed

158 matters important to you over the telephone, text or in person?". Participants who listed <10

159 people were prompted: "You have not entered 10 people. Are you sure that there is no one else

160 with whom you discuss important matters? If so, please click 'Next' to continue. If there is

161 someone else, please enter the name and click 'add person'." We used a limit of 10 network

162 members so as not to overburden participants. Participant workload increases rapidly with larger

163 networks: a 10-member network has 45 possible ties, while a 20-member network has 190. 66%

164 of our participants listed <10 network members, suggesting that this network size limitation did

165 not unduly restrict our dataset. A study of internet-based data collection of social networks found

166 that most people listed between 1 and 10 people in response to 4 different network-generating

167 questions (including one specifically on advice network), despite being allowed to enter up to 30

168 names, and supplied full additional information only in relation to a total of about 5 network

169 members (Manfreda, Vehovar, & Hlebec, 2004).

170

2.3.3 Emotional Closeness

Participants responded to the question "How close is your relationship with each person?" by using the GENSI interface to drag each person listed into the appropriate box (labelled: 'Extremely close', 'Very close', 'Moderately close', 'A little close', or 'Not at all close'), which we recoded on a 1-5 scale (higher score = greater closeness) (cf similar scales in e.g.Kenny & Acitelli, 2001).

2.3.4 Network Density

Participants indicated which network members knew one another by using the GENSI interface to draw ties between the people they listed. Network density is the number of ties that exist in an individual's network as a proportion of the number of ties that would exist if all network members knew each other, and is operationalised from 0 - 1 (0 = no / 1 = all network members know each other).

2.3.5 Extraversion

Participant personality was assessed with the extraversion scale of the HEXACO 100 item model (Lee & Ashton, 2018), consisting of 16 items on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). The scores for extraversion and its four facets showed good reliability, with Cronbach's α calculated as .88 (extraversion), .82 (social self-esteem), .79 (social boldness), .78 (sociability), and .75 (liveliness) (see also Lee & Ashton, 2018 for reliability and validity).

2.4 Procedure

193   The study was approved by the University ethics committee. Participants completed the survey

194   online, using GENSI. They provided informed consent and basic socio-demographic

195   information, then nominated network members, categorised those members in terms of

196   emotional closeness, and indicated which members knew each other. Finally, participants

197   completed the extraversion scale, and then the 20-item UCLA Loneliness scale (Russell, 1996).

198   Loneliness is not considered here, given focus and space constraints, but the data, additional

199   analyses, and all our materials are provided on the OSF (https://osf.io/w2umt/).

200

201   2.5 Analysis

202   Following the pre-registration (https://osf.io/q8my3), we carried out a series of ordinary least

203   squares (OLS) regressions in R 4.01 (R Core Development, 2019), where we considered

204   extraversion as a predictor of three key variables: number of network members, network density,

205   and mean emotional closeness. We added additional demographic variables (gender, age,

206   nationality) to examine whether any effect of extraversion would be upheld with the inclusion of

207   these control variables. We also included the number of network members (when examining

208   network density and emotional closeness), and network density (when examining emotional

209   closeness), because larger networks tend to be sparser and have lower closeness ratings to alters

210   (S. G. B. Roberts et al., 2009). Checks on regression assumptions did not indicate particular

211   causes for concern. As an additional robustness check, we conducted bootstrapping on the

212   standardized regression coefficients with 10,000 samples. We assumed the effects were robust if

213   the 95% confidence intervals did not include 0. Additional descriptive statistics, analyses,

214   findings, and checks are shown on the OSF (https://osf.io/w2umt/).

215

216   **3. Results and Discussion**

217

218   Hierarchical OLS regression analyses demonstrated that, in line with Hypothesis 1, higher

219   extraversion predicted a greater number of network members (Table 1). Furthermore, in separate

220   OLS regression analyses, all four facets of extraversion (liveliness, sociability, social boldness,

221   social self-esteem) were positively and significantly associated with the number of network

222   members (Figure 1). Given the items used to assess extraversion (e.g., "I rarely express my

223   opinions in group meetings", reverse-scored, and "I enjoy having lots of people around to talk

224   with"), it is perhaps of little surprise to find that participants who scored higher on these also

225   reported that they had discussed important matters with more people in the preceding six months

226   (i.e. the question in our network generator). Indeed, differences between extraverts and introverts

227   in terms of self-disclosure, talkativity, or flexibility, could all contribute to differences between

228   extraverts and introverts in terms of the size of their advice network that we assessed, and which

229   might differ from other conceptualisations of one's number of friends. We were not able to

230   consider the issue of causality, although we suggest that extraversion drives advice network size

231   rather than vice versa, given the stability of personality over time (B. W. Roberts & DelVecchio,

232   2000), and the previous demonstration that personality shapes network size (Asendorpf &

233   Wilpers, 1998). Longitudinal studies are better able to address questions of causality, and one

234   limitation of our study is its cross-sectional (and self-reported) nature, although a great many

235   studies of social networks use such a design (Wrzus, Hänel, Wagner, & Neyer, 2013).

236

237   Not all previous research has found this relationship between extraversion and network size (see

238   Introduction), and there are perhaps two systematic sources of variation that could help to

239   explain the discrepancies. First, some studies elicit social networks with reference to frequency

240   of contact (e.g. Feiler & Kleinbaum, 2015; S. G. B. Roberts et al., 2008), while others rely on

241   some sort of evaluation of the importance or quality of the relationship (e.g. Asendorpf &

242   Wilpers, 1998; Molho et al., 2016). Although frequency of contact generally corresponds to

243   emotional closeness, it is not identical (Hill & Dunbar, 2003), and assessing these different

244   things in slightly different ways could generate different estimations of network size. Second, the

245   homogeneity in the sample will be important; the impact of extraversion will be more apparent

246   where there are fewer other differences between participants. Accordingly, we believe that our

247   finding that network size increases with extraversion (and its facets) will be apparent in any

248   fairly homogeneous sample, but might be obscured with increasing environmental and contextual

249   differences between people in the sample. For instance, if some people have work that provides

250   them with larger networks of contacts, this could reduce or obscure an impact of extraversion on

251   network size. In this context, however, we would note one limitation of the text used to generate

252   the network, namely, that it asked for people to recount interactions via the telephone, text, or in

253   person. Although this wording is taken from previous research, it omits increasingly common

254   forms of communication such as email, something which could be impactful in particular given

255   that introverted people are more likely to prefer email communication (Hertel, Schroer, Batinic,

256   & Naumann, 2008), and although it is perhaps unlikely that someone would correspond with an

257   advice network member exclusively by email, future research might consider updating this

258   method of obtaining network members.

259

260   Table 1

DV: number of network members

| Model:	(1)	(2)	(3)	(4)
Extraversion	0.324***	0.324***	0.345***	0.354***
Gender (Female → Male)		-0.054	-0.030	-0.029
Age			-0.147*	-0.149*
Nationality (Other → British)				-0.039
R^2	0.105	0.108	0.128	0.130
Adjusted R^2	0.100	0.099	0.115	0.112
Residual Std. Error (df)	0.946 (198)	0.947 (197)	0.938 (196)	0.940 (195)
F Statistic (df)	23.156*** (1,198)	11.883*** (2,197)	9.620*** (3,196)	7.271*** (4,195)

261

262   Table 1: Hierarchical OLS regressions with number of network members as dependent variable

263   (standardised coefficients and concomitant test statistics). N = 199.

264
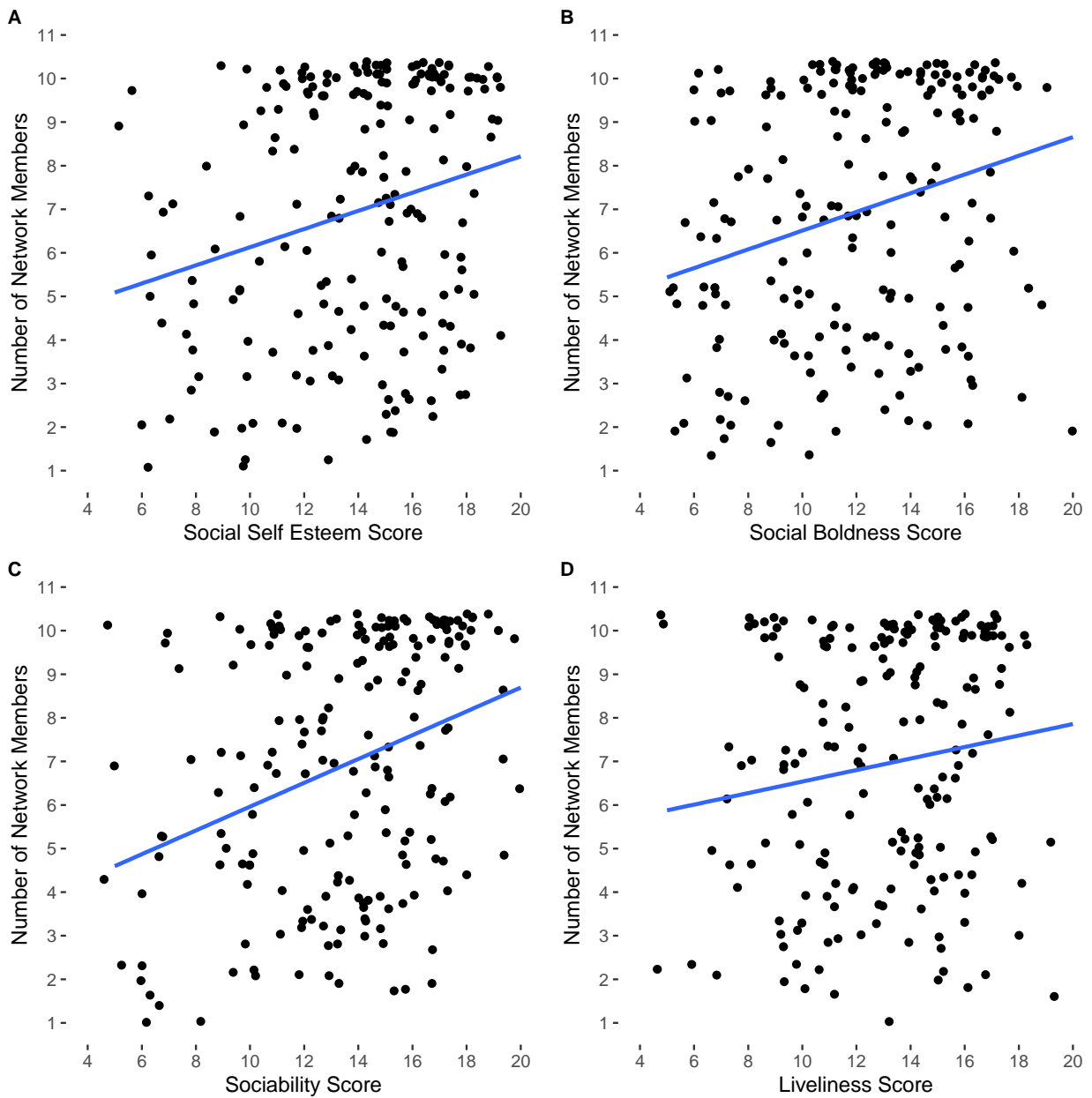
265

266   Figure 1: Simple regression scatter plot grids (jitter added) showing the significant positive

267   bivariate correlations between the facets of extraversion and the number of social network

268   members (n = 199). A: $r = .23$, 95% CI [.10, .36], $p < .01$; B: $r = .26$, 95% CI [.13, .39], $p < .01$;

269   C: $r = .33$, 95% CI [.20, .45], $p < .01$; D: $r = .15$, 95% CI [.01, .28], $p < .05$.

270

271   Advice network size decreased with age, at a rate of a little under 1 advice network member for

272   every couple of decades of age (Table 1). A meta-analysis of research on social networks and

273   age found that personal and friendship networks declined by about one person per decade, while

274   global social networks (i.e. counting all social relationships) increased to the mid-20s, then

275   decreased (Wrzus et al., 2013). This reduction with age might be attributed to a range of

276   influences including transition to parenthood, relocation, loss of a spouse, cohort differences in

277   characterisations of friendships, and a greater focus with age on higher-quality relationships

278   (Wrzus et al., 2013). Further, friendship and personal networks tend to be larger when estimated

279   from student compared with non-student populations, perhaps adding to the age effects we noted

280   (Wrzus et al., 2013).

281

282   Extraversion was not a significant predictor of network density (Table 2: Model 1, $\beta = 0.069$,

283     $t(198) = 1.625$, $p = .27$) and thus Hypothesis 2 was unsupported. Our results suggest that the

284   social manifestation of extraversion does not directly translate into creating relationships

285   between one's key contacts. Notably, it is harder to have a dense network if your network is

286   large, because larger networks must have more ties between network members in raw data terms

287   in order to maintain an equivalent density to smaller networks. Indeed, in our sample, density

288   was significantly and negatively related to the number of network members ($r = -.36$, $p < .01$,

289   95% CI [-.48, -.23]). However, even controlling for this (Table 2, Model 2), extraversion did not

290   significantly predict network density. One limitation of our study was that we capped the number

291   of network members at 10. This had the advantage of not overburdening our unpaid participants,

292   but for greater clarity, we could instead have asked people to list all contacts within a particular

293   category. We would thus be cautious about generalising our null findings of a relationship

294   between extraversion and network density prior to further explorations of this area.

295

296   Table 2

	DV: Network density				
Model:	(1)	(2)	(3)	(4)	(5)
Extraversion	0.069	0.074	0.073	0.065	0.060
Number of Network Members		-0.020	-0.019	-0.013	-0.011
Gender (Female → Male)			-0.019	-0.025	-0.026
Age				0.037	0.037

15

Nationality (Other → British)					0.026
R^2	0.014	0.014	0.015	0.019	0.021
Adjusted R^2	0.008	0.004	-0.001	-0.003	-0.006
Residual Std. Error (df)	0.567 (181)	0.568 (180)	0.569 (179)	0.570 (178)	0.571 (177)
F Statistic (df)	2.483 (1,181)	1.320 (2,180)	0.937 (3,179)	0.878 (4,178)	0.765 (5,177)

297   Table 2: Hierarchical OLS regressions with social network density as outcome variable

298   (standardised coefficients and concomitant test statistics). Sample includes only those

299   participants who listed ≥ 3 network members, thereby allowing calculation of network density. N

300   = 182.

301

302   We predicted in Hypothesis 3 that extraversion would correspond negatively to average

303   emotional closeness, reflecting a quality-quantity relationship trade-off where those with larger

304   networks are less close to network members (Dunbar, 2018), but did not find any evidence for

305   this (Table 3). Indeed, participants who reported more network members also reported greater

306 average emotional closeness to them (Table 3, Model 2). One limitation of an analysis of

307 participants' mean emotional closeness to network members is that it could obscure any evidence

308 of extraversion's effects on social networks, if extraversion were associated with greater

309 emotional closeness to only one's best friends. Thus, if an extraverted respondent provided

310 closeness ratings of 5,5,5,5,1,1, and an introverted respondent provided ratings of 3,3,3,4,4,5,

311 then the markedly different pattern of closeness at the level of individual network members

312 would be obscured by the identical mean closeness (3.67 for both networks). However, we ruled

313 out this possibility via a multilevel analysis of the ability of extraversion to predict emotional

314 closeness, with individual network members at Level 1 clustered by participants at Level 2. This

315 model did not perform better than a null model ($\chi^2(1) = 1.87$, $p = .172$; see supplementary

316 analyses, https://osf.io/w2umt/). Further research is needed to tease out the variables that can

317 produce positive (e.g., Berry et al., 2000; Neyer & Asendorpf, 2001), negative (Pollet et al.,

318 2011; Roberts et al., 2009), or null relationships (our results; Pollet et al., 2011) between

319 extraversion and emotional closeness to network members, perhaps focussing on size and type of

320 the social network, participant age, and method of assessment of emotional closeness.

321

322 Table 3

	DV: Mean emotional closeness to network members					
Model:	(1)	(2)	(3)	(4)	(5)	(6)

Extraversion	-0.022	-0.119	-0.098	-0.098	-0.068	-0.067
Number of Network Members		0.299^{***}	0.273^{***}	0.273^{***}	0.251^{**}	0.250^{**}
Density			-0.063	-0.063	-0.048	-0.047
Gender (Female → Male)				-0.001	0.023	0.023
Age					-0.136	-0.137
Nationality (Other → British)						-0.010
N	199	199	182	182	182	182
R^2	0.0005	0.081	0.066	0.066	0.085	0.085
Adjusted R^2	-0.005	0.071	0.050	0.045	0.059	0.054
Residual Std. Error (df)	1.000 (198)	0.961 (197)	0.923 (179)	0.925 (178)	0.918 (177)	0.921 (176)

| F Statistic (df) | 0.096 | 8.636*** | 4.195** | 3.129* | 3.296** | 2.734* |
| | (1,198) | (2,197) | (3,179) | (4,178) | (5,177) | (6,176) |

*$p <.05$; **$p <.01$; ***$p <.001$

323 Table 3: Hierarchical OLS regressions with emotional closeness as outcome variable

324 (standardised coefficients and concomitant test statistics). Sample size decreases at Step 3

325 because 17 of the participants listed < 3 network members and so were excluded from network

326 density calculations.

327

328 In conclusion, and consistent with several previous studies (see Introduction), extraversion and

329 its four facets (liveliness, sociability, social boldness, social self-esteem) were significantly and

330 positively associated with network size. However, there was no significant effect of extraversion

331 on the extent to which people in the networks knew each other (network density) or on emotional

332 closeness to network members. Thus, whilst the greater sociability of extraverts translates into a

333 broader set of social ties, it does not necessarily result in extraverts developing more intense

334 emotional connections with network members. Future research could examine whether this is

335 due to the socialising style of extraverts, or inherent trade-offs between network size and

336 emotional closeness (Dunbar, 2018; Roberts et al., 2009). Future research should also compare

337 data from samples from other cultures, where extraversion might be associated with different

338 consequences (Lucas, Diener, Grob, Suh, & Shao, 2000).

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4. References

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Asendorpf, J. B., & Wilpers, S. (1998). Personality effects on social relationships. *Journal of Personality and Social Psychology, 74*(6), 1531-1544. doi:10.1037/0022-3514.74.6.1531

Ashton, M. C., Jackson, D. N., Helmes, E., & Paunonen, S. V. (1998). Joint factor analysis of the Personality Research Form and the Jackson Personality Inventory: Comparisons with the Big Five. *Journal of Research in Personality, 32*(2), 243-250. doi:10.1006/jrpe.1998.2214

Bell, R. A. (1991). Gender, friendship network density, and loneliness. *Journal of Social Behavior & Personality, 6*(1), 45-56.

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science and Medicine, 51*(6), 843-857. doi:10.1016/S0277-9536(00)00065-4

Berry, D. S., Willingham, J. K., & Thayer, C. A. (2000). Affect and personality as predictors of conflict and closeness in young adults' friendships. *Journal of Research in Personality, 34*(1), 84-107. doi:10.1006/jrpe.1999.2271

de Vries, R. E., Tybur, J. M., Pollet, T. V., & van Vugt, M. (2016). Evolution, situational affordances, and the HEXACO model of personality. *Evolution and Human Behavior, 37*(5), 407-421. doi:10.1016/j.evolhumbehav.2016.04.001

DeLamater, J. (Ed.) (2006). *Handbook of Social Psychology*. New York, USA: Springer.

Dunbar, R. I. M. (2018). The anatomy of friendship. *Trends in Cognitive Sciences, 22*(1), 32-51. doi:10.1016/j.tics.2017.10.004

Faust, K. (2006). Comparing social networks: size, density, and local structure. *Metodoloski Zvezki, 3*(2), 185-216.

Feiler, D. C., & Kleinbaum, A. M. (2015). Popularity, similarity, and the network extraversion bias. *Psychological Science, 26*(5), 593-603. doi:10.1177/0956797615569580

Harari, G. M., Müller, S. R., Stachl, C., Wang, R., Wang, W., Bühner, M., . . . Gosling, S. D. (2020). Sensing sociability: Individual differences in young adults' conversation, calling, texting, and app use behaviors in daily life. *Journal of Personality and Social Psychology, 119*(1), 204–228. doi:10.1037/pspp0000245

Hertel, G., Schroer, J., Batinic, B., & Naumann, S. (2008). Do shy people prefer to send e-mail?: Personality effects on communication media preferences in threatening and nonthreatening situations. *Social Psychology, 39*(4), 231-243. doi:10.1027/1864-9335.39.4.231

Hill, R. A., & Dunbar, R. I. M. (2003). Social network size in humans. *Human Nature, 14*(1), 53-72. doi:10.1007/s12110-003-1016-y

381 Kalish, Y., & Robins, G. (2006). Psychological predispositions and network structure: The
382   relationship between individual predispositions, structural holes and network closure.
383   *Social Networks, 28*(1), 56-84. doi:10.1016/j.socnet.2005.04.004

384 Kenny, D. A., & Acitelli, L. K. (2001). Accuracy and bias in the perception of the partner in a
385   close relationship. *Journal of Personality and Social Psychology, 80*(3), 439-448.
386   doi:10.1037/0022-3514.80.3.439

387 Landis, B. (2016). Personality and social networks in organizations: A review and future
388   directions. *Journal of Organizational Behavior, 37*(S1), S107-S121.
389   doi:10.1002/job.2004

390 Lee, K., & Ashton, M. C. (2018). Psychometric properties of the HEXACO-100. *Assessment,*
391   *25*(5), 543-556. doi:10.1177/1073191116659134

392 Lucas, R. E., Diener, E., Grob, A., Suh, E. M., & Shao, L. (2000). Cross-cultural evidence for the
393   fundamental features of extraversion. *Journal of Personality and Social Psychology,*
394   *79*(3), 452-468. doi:10.1037/0022-3514.79.3.452

395 Manfreda, K. L., Vehovar, V., & Hlebec, V. (2004). Collecting ego-centred network data via the
396   web. *Metodoloski Zvezki, 1*(2), 295-321.

397 Matzat, U., & Snijders, C. (2010). Does the online collection of ego-centered network data
398   reduce data quality? An experimental comparison. *Social Networks, 32*(2), 105-111.
399   doi:10.1016/j.socnet.2009.08.002

400 McPherson, M., Smith-Lovin, L., & Brashears, M. E. (2006). Social isolation in America:
401   changes in core discussion networks over two decades. *American Sociological Review,*
402   *71*(3), 353-375.

403 Molho, C., Roberts, S. G. B., de Vries, R. E., & Pollet, T. V. (2016). The six dimensions of
404   personality (HEXACO) and their associations with network layer size and emotional
405   closeness to network members. *Personality and Individual Differences, 99*, 144-148.
406   doi:10.1016/j.paid.2016.04.096

407 Neyer, F. J., & Asendorpf, J. B. (2001). Personality–relationship transaction in young adulthood.
408   *Journal of Personality and Social Psychology, 81*(6), 1190-1204. doi:10.1037/0022-
409   3514.81.6.1190

410 Pollet, T. V., Roberts, S. G. B., & Dunbar, R. I. M. (2011). Extraverts have larger social network
411   layers. *Journal of Individual Differences, 32*(3), 161-169. doi:10.1027/1614-
412   0001/a000048

413 R Core Development, T. (2019). R: A language and environment for statistical computing.
414   Vienna, Austria: R Foundation for Statistical Computing. Retrieved from http://www.R-
415   project.org/

416 Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits
417   from childhood to old age: A quantitative review of longitudinal studies. *Psychological*
418   *Bulletin, 126*(1), 3-25. doi:10.1037/0033-2909.126.1.3

419 Roberts, S. G. B., Dunbar, R. I. M., Pollet, T. V., & Kuppens, T. (2009). Exploring variation in
420   active network size: Constraints and ego characteristics. *Social Networks, 31*(2), 138-146.
421   doi:10.1016/j.socnet.2008.12.002

422 Roberts, S. G. B., Wilson, R., Fedurek, P., & Dunbar, R. I. M. (2008). Individual differences and
423   personal social network size and structure. *Personality and Individual Differences, 44*(4),
424   954-964. doi:10.1016/j.paid.2007.10.033

Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, Validity, and Factor Structure. *Journal of Personality Assessment, 66*(1), 20-40. doi:10.1207/s15327752jpa6601_2

Selfhout, M., Burk, W., Branje, S., Denissen, J., Van Aken, M., & Meeus, W. (2010). Emerging late adolescent friendship networks and Big Five personality traits: A social network approach. *Journal of Personality, 78*(2), 509-538. doi:10.1111/j.1467-6494.2010.00625.x

Stark, T. H., & Krosnick, J. A. (2017). GENSI: A new graphical tool to collect ego-centered network data. *Social Networks, 48*, 36-45. doi:10.1016/j.socnet.2016.07.007

Stokes, J. P. (1985). The relation of social network and individual difference variables to loneliness. *Journal of Personality and Social Psychology, 48*(4), 981-990. doi:10.1037/0022-3514.48.4.981

Stulp, G. (2020). Collecting large personal networks in a representative sample of Dutch women. *PsyarXiv*. doi:10.31219/osf.io/efkuw

Swickert, R. J., Rosentreter, C. J., Hittner, J. B., & Mushrush, J. E. (2002). Extraversion, social support processes, and stress. *Personality and Individual Differences, 32*(5), 877-891. doi:10.1016/S0191-8869(01)00093-9

Totterdell, P., Holman, D., & Hukin, A. (2008). Social networkers: Measuring and examining individual differences in propensity to connect with others. *Social Networks, 30*(4), 283-296. doi:10.1016/j.socnet.2008.04.003

Totterdell, P., Wall, T., Holman, D., Diamond, H., & Epitropaki, O. (2004). Affect networks: A structural analysis of the relationship between work ties and job-related affect. *Journal of Applied Psychology, 89*(5), 854-867. doi:10.1037/0021-9010.89.5.854

Tubaro, P., Casilli, A. A., & Mounier, L. (2014). Eliciting personal network data in web surveys through participant-generated sociograms. *Field Methods, 26*(2), 107-125. doi:10.1177/1525822x13491861

Wrzus, C., Hänel, M., Wagner, J., & Neyer, F. J. (2013). Social network changes and life events across the life span: A meta-analysis. *Psychological Bulletin, 139*(1), 53-80. doi:10.1037/a0028601

Zelner, J. L., Trostle, J., Goldstick, J. E., Cevallos, W., House, J. S., & Eisenberg, J. N. S. (2012). Social connectedness and disease transmission: Social organization, cohesion, village context, and infection risk in rural Ecuador. *American Journal of Public Health, 102*(12), 2233-2239. doi:10.2105/ajph.2012.300795

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