Supporting Information Appendix

Empathy and Well-Being Correlate with Centrality in Different Social Networks

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Table S1. Demographics of the Stanford dorm sample.

Demographics	Category	Dorm 1	Dorm 2	Dorm 3	Dorm 4	Total	% of Total
Total Dorm Residents		79	88	79	88	334	
N in study		53	43	46	51	193	
% recruited		67.1%	48.9%	58.2%	58%	57.8%	
Mean Age		18.38	18.49	18.11	18.12	18.27	
Gender							
	Male	23	19	24	28	94	48.7%
	Female	30	24	22	23	99	51.3%
Ethnicity							
	East Asian	*	*	11	*	34	17.6%
	Black/African American	*	*	*	*	12	6.22%
	White/Caucasian	21	14	14	19	68	35.2%
	Hispanic/Latino/a	*	*	*	*	19	9.84%
	South Asian	*	*	*	*	*	4.66%
	Other	*	*	*	*	*	3.63%
	Mixed Race	12	14	*	11	44	22.8%

Note. Any entries in the table with fewer than 10 respondents are reported as * to preserve privacy.

Table S2. A list of all trait questionnaires.

All Scales Included in Initial Factor Analyses		
Scale Name	**Variable in Data File**	**Citation**
Interpersonal Reactivity Index Empathic Concern Perspective Taking Personal Distress	 IRI_EC IRI_PT IRI_PD	Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, *44(1)*, 113.
Positive Empathy	PosEmp_avg	Morelli, S. A., Lieberman, M. D., Telzer, E. H., & Zaki, J. (under review). Positive empathy: Its structure and relation to prosociality, social connection, and well-being.
Lay Theories of Empathy Scale	LTES_avg	Schumann, K., Zaki, J., & Dweck, C. S. (2014). Addressing the empathy deficit: beliefs about the malleability of empathy predict effortful responses when empathy is challenging. *Journal of Personality and Social Psychology*, *107(3)*, 475.
Prosocialness Scale for Adults	PSA_avg	Caprara, G. V., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. *European Journal of Psychological Assessment*, *21*(2), 77-89.
Big Five Inventory Extraversion Agreebleness Conscientiousness Neuroticism Openness	 BFI_e BFI_a BFI_c BFI_n BFI_o	John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research*, *2*, pp. 102-138.
Behavioral Activation System Reward Fun Drive	BAS_avg BAS_reward BAS_fun BAS_drive	Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*(2), 319.
Behavioral Inhibition System	BIS_avg	Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*(2), 319.
Need to Belong	NTB_avg	Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*(3), 497.

All Scales Included in Initial Factor Analyses		
Positive and Negative Affect Scale Positive Affect Negative Affect	 PANAS_PosAvg PANAS_NegAvg	Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063.
Satisfaction with Life Scale	SWLS_avg	Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71-75.
Subjective Happiness Scale	SHS_avg	Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*,*46*(2), 137-155.
UCLA Loneliness Scale	Loneliness_avg	Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, *66(1)*, 20-40
Perceived Stress Scale	PSS_avg	Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 385-396.
Family Social Status Ladder	FmlyStatus	Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, *19*(6), 586.
School Social Status Ladder	SSS_Stnfrd	Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, *19*(6), 586.

Table S3. Descriptive statistics for the four trait factors.

Factor	Mean	SD	Min	Max
Empathy	6.15	0.997	4.02	8.4
Life Satisfaction	7.21	2.89	0	15
Positive Emotion	2.1	0.323	1.33	2.87
Negative Emotion	3.22	0.701	1.44	4.81

Table S4. Correlation matrix for the 8 networks.

Network	Close Friend	Spend Time	Social Advice	Bad News	Good News	Support	Empathetic
Close Friend	-	-	-	-	-	-	-
Spend Time	0.833 (0)	-	-	-	-	-	-
Social Advice	0.621 (0)	0.642 (0)	-	-	-	-	-
Bad News	0.612 (0)	0.633 (0)	0.707 (0)	-	-	-	-
Good News	0.735 (0)	0.751 (0)	0.671 (0)	0.72 (0)	-	-	-
Support	0.658 (0)	0.658 (0)	0.645 (0)	0.689 (0)	0.709 (0)	-	-
Empathetic	0.521 (0)	0.521 (0)	0.544 (0)	0.596 (0)	0.552 (0)	0.628 (0)	-
Feel Positive	0.596 (0)	0.571 (0)	0.501 (0)	0.54 (0)	0.592 (0)	0.587 (0)	0.522 (0)

Notes. p-values based on the Quadratic Assignment Procedure (QAP) are in parentheses.

Table S5. Statistics describing the dispersion in indegree for each of the 8 networks. The dispersion parameter quantifies how much larger the variance is than the mean. All 8 networks were over-dispersed (i.e., dispersion parameter > 1).

Indegree	Mean	Variance	Dispersion parameter (θ)
Close Friends	4.18	8.64	2.01
Spend Time	3.60	6.91	1.85
Social Advice	2.01	2.77	1.32
Bad News	1.84	2.42	1.24
Good News	2.75	4.02	1.45
Support	2.40	4.36	1.63
Empathetic	1.96	4.45	1.93
Feel Positive	2.73	5.47	1.75

Notes. The dispersion parameter was obtained from a quasi-Poisson model in R with the glm function.

Table S6. Results of the likelihood ratio tests comparing a negative binomial model to a poisson model. Both models include the four trait factors predicting indegree for each network. For all 8 outcomes, a significant deviance statistic indicates that the negative binomial model was a significant improvement over the poisson model.

Indegree	Deviance
Close Friends	58.9*
Spend Time	43.01*
Social Advice	7.06*
Bad News	4.02*
Good News	13.14*
Support	25.22*
Empathetic	55.41*
Feel Positive	36.97*

Notes. $*p < .05$. The deviance statistic was compared to a χ^2 distribution with 1 degree of freedom.

Table S7. Results of the Vuong tests comparing a negative binomial (Model 1) to a zero-inflated negative binomial model (Model 2). Both models include the four trait factors predicting indegree for each network. A large, positive test statistic provides evidence of the superiority of Model 1 over Model 2, while a large, negative test statistic is evidence of the superiority of Model 2 over Model 1. Overall, the models were either indistinguishable (i.e., not significantly different) or the negative binomial model was superior (see BIC-corrected statistic).

Indegree	Raw Vuong z-statistic	AIC-corrected Vuong z-statistic	BIC-corrected Vuong z-statistic
Close Friends	1.08	1.68*	2.66*
Spend Time	1.12	1.82*	2.97*
Social Advice	-1.52	-0.32	1.65*
Bad News	-1.24	0.59	3.56*
Good News	-1.06	0.27	2.42*
Support	-0.04	1.11	2.99*
Empathetic	0.21	1.10	2.55*
Feel Positive	0.56	1.53	3.10*

Notes. $*p < .05$. AIC = Akaike Information Criterion. BIC = Bayesian information criterion. The z-statistic is asymptotically distributed standard normal under the null that the models are indistinguishable.

Table S8. Standardized factor loadings for the initial five-factor model.

Composite Score	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
IRI - Perspective Taking	-0.07	0.58	-0.08	-0.03	0.31
IRI - Empathic Concern	0.21	0.65	-0.03	0.12	0.14
IRI - Personal Distress	0.65	-0.07	0.03	-0.1	-0.24
Positive Empathy	0.03	0.54	-0.04	0.37	0
Lay Theories of Empathy	-0.21	0.1	-0.08	0.03	0.06
Prosocialness Scale for Adults	-0.03	0.55	-0.1	0.24	0.19
Need to Belong	0.59	0.16	-0.03	0	-0.29
Family Social Status Ladder	0.07	-0.04	0.54	-0.06	-0.02
School Social Status Ladder	0.03	-0.12	0.82	0.02	0.13
Positive Affect Scale	-0.05	0.17	0.23	0.57	0.03
Negative Affect Scale	0.71	-0.19	-0.22	0.23	0.09
BFI - Extraversion	-0.09	-0.01	-0.04	0.79	0.01
BFI - Agreeableness	-0.09	0.71	-0.03	-0.07	-0.17
BFI - Conscientiousness	-0.13	0.33	0.24	0.02	-0.08
BFI - Neuroticism	0.86	-0.04	0.08	-0.11	0.13
BFI - Openness	-0.03	0.26	0.16	0.08	0.64
Behavioral Activation System	0.11	0	-0.03	0.72	0.05
Behavioral Inhibition System	0.74	0.28	0.04	-0.1	-0.19
UCLA Loneliness Scale	0.25	-0.16	-0.26	-0.39	0.1
Satisfaction with Life Scale	-0.09	0.1	0.43	0.22	-0.41
Subjective Happiness Scale	-0.27	0.1	0.23	0.48	-0.3
Perceived Stress Scale	0.65	-0.07	-0.12	-0.03	0.27

Notes. IRI = Interpersonal Reactivity Index; BFI = Big Five Inventory. Cells highlighted in green are greater than .4 or less than -.4.

Table S9. Standardized factor loadings for the initial four-factor model.

Composite Score	Factor 1	Factor 2	Factor 3	Factor 4
IRI - Perspective Taking	-0.09	0.63	-0.25	0
IRI - Empathic Concern	0.21	0.68	-0.06	0.1
IRI - Personal Distress	0.68	-0.12	0.15	-0.11
Positive Empathy	0.05	0.56	0.08	0.31
Lay Theories of Empathy	-0.22	0.13	-0.09	0.02
Prosocialness Scale for Adults	-0.05	0.61	-0.14	0.22
Need to Belong	0.63	0.11	0.19	-0.06
Family Social Status Ladder	0.06	-0.11	0.37	0.02
School Social Status Ladder	-0.03	-0.17	0.43	0.15
Positive Affect Scale	-0.05	0.17	0.26	0.55
Negative Affect Scale	0.66	-0.14	-0.31	0.24
BFI - Extraversion	-0.13	0.06	0.05	0.73
BFI - Agreeableness	-0.03	0.69	0.2	-0.16
BFI - Conscientiousness	-0.09	0.28	0.32	0
BFI - Neuroticism	0.8	-0.05	-0.14	-0.03
BFI - Openness	-0.12	0.31	-0.34	0.21
Behavioral Activation System	0.09	0.04	0.04	0.69
Behavioral Inhibition System	0.78	0.22	0.16	-0.13
UCLA Loneliness Scale	0.23	-0.14	-0.38	-0.35
Satisfaction With Life Scale	0	-0.02	0.76	0.15
Subjective Happiness Scale	-0.22	0.06	0.52	0.38
Perceived Stress Scale	0.58	-0.01	-0.42	0.05

Notes. IRI = Interpersonal Reactivity Index; BFI = Big Five Inventory. Cells highlighted in green are greater than .4 or less than -.4.

Table S10. Standardized factor loadings for the final four-factor model.

	Factor 1	Factor 2	Factor 3	Factor 4
IRI - Perspective Taking	-0.08	0.59	-0.25	0.03
IRI - Empathic Concern	0.2	0.67	-0.08	0.1
IRI - Personal Distress	0.68	-0.11	0.13	-0.1
Positive Empathy	0.04	0.58	0.11	0.28
Prosocialness Scale for Adults	-0.07	0.62	-0.14	0.19
Need to Belong	0.63	0.12	0.12	-0.04
Family Social Status Ladder	0.1	-0.12	0.43	-0.03
School Social Status Ladder	0.02	-0.2	0.56	0.06
Positive Affect Scale	-0.06	0.15	0.28	0.54
Negative Affect Scale	0.6	-0.14	-0.34	0.28
BFI - Extraversion	-0.17	0.08	0.07	0.7
BFI - Agreeableness	-0.03	0.71	0.19	-0.17
BFI - Neuroticism	0.79	-0.07	-0.16	-0.02
Behavioral Activation System	0.06	0.02	0.06	0.69
Behavioral Inhibition System	0.78	0.21	0.09	-0.1
Satisfaction With Life Scale	0	0.01	0.71	0.1
Subjective Happiness Scale	-0.21	0.09	0.59	0.32

Notes. IRI = Interpersonal Reactivity Index; BFI = Big Five Inventory. Cells highlighted in green are greater than .4 or less than -.4.

Figure S1. Histograms of indegree for each of the 8 networks, collapsed across all the dorms. Indegree is the total number of ties *directed to* each individual from other participants in the dorm.

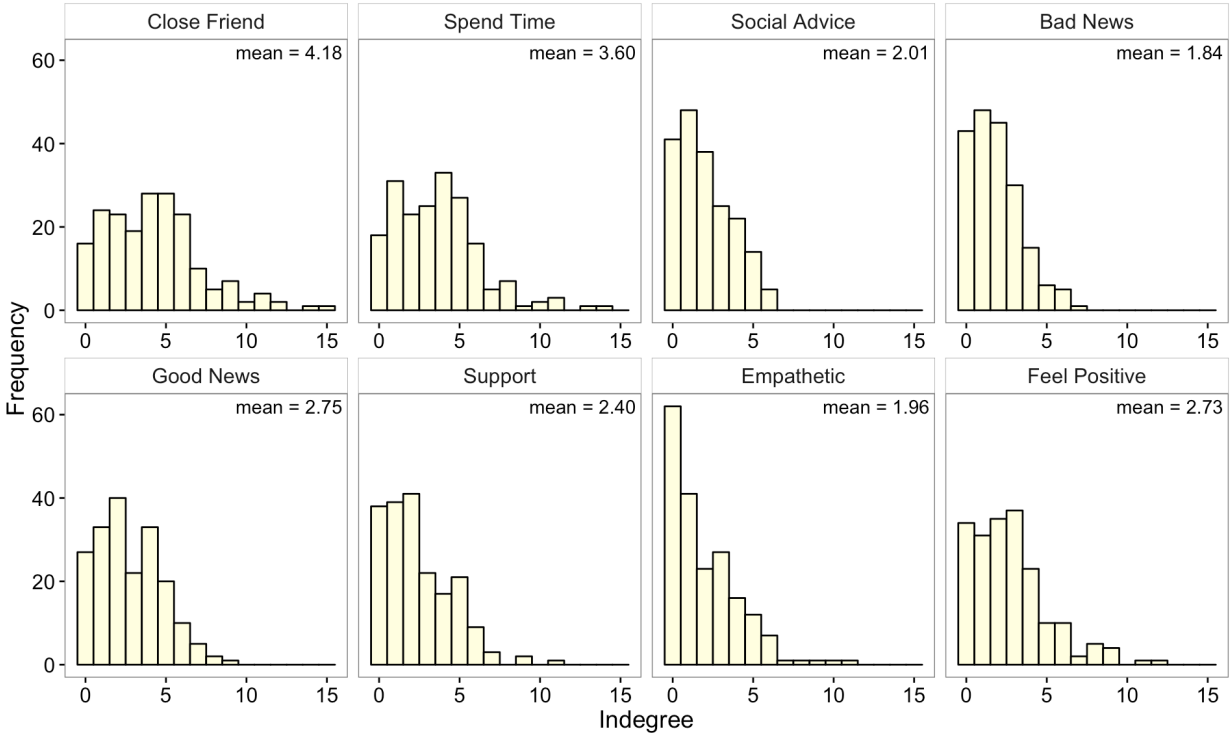

Figure S2. Histograms of outdegree for each of the 8 networks, collapsed across all the dorms. Outdegree is the total number of ties *from* each individual to other participants in the dorm.

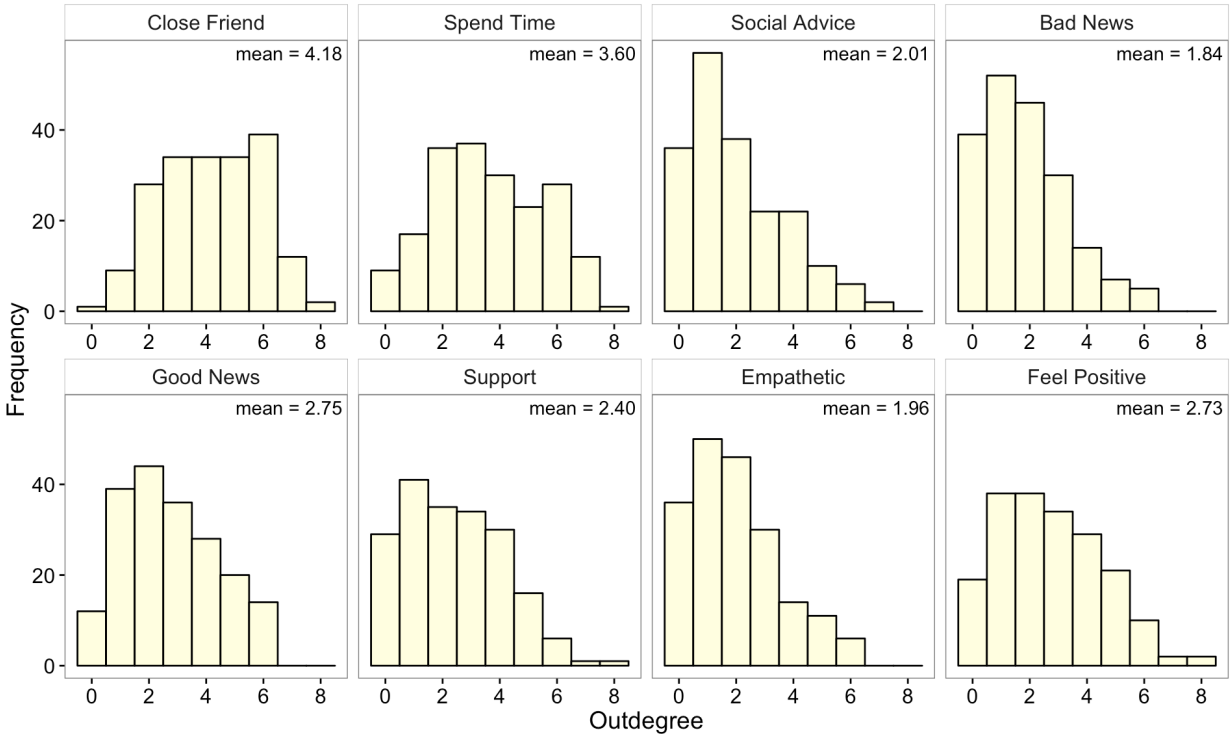

Figure S3. Histograms of reciprocal ties for each of the 8 networks, collapsed across all the dorms. Reciprocal ties are when two participants in the dorm direct a tie to each other. The histograms represent the average number of reciprocal ties *per individual*. So, if Person A nominates Person B and Person B nominates Person A, then this tie would be separately counted as a reciprocal tie for Person A *and* a reciprocal tie for Person B.

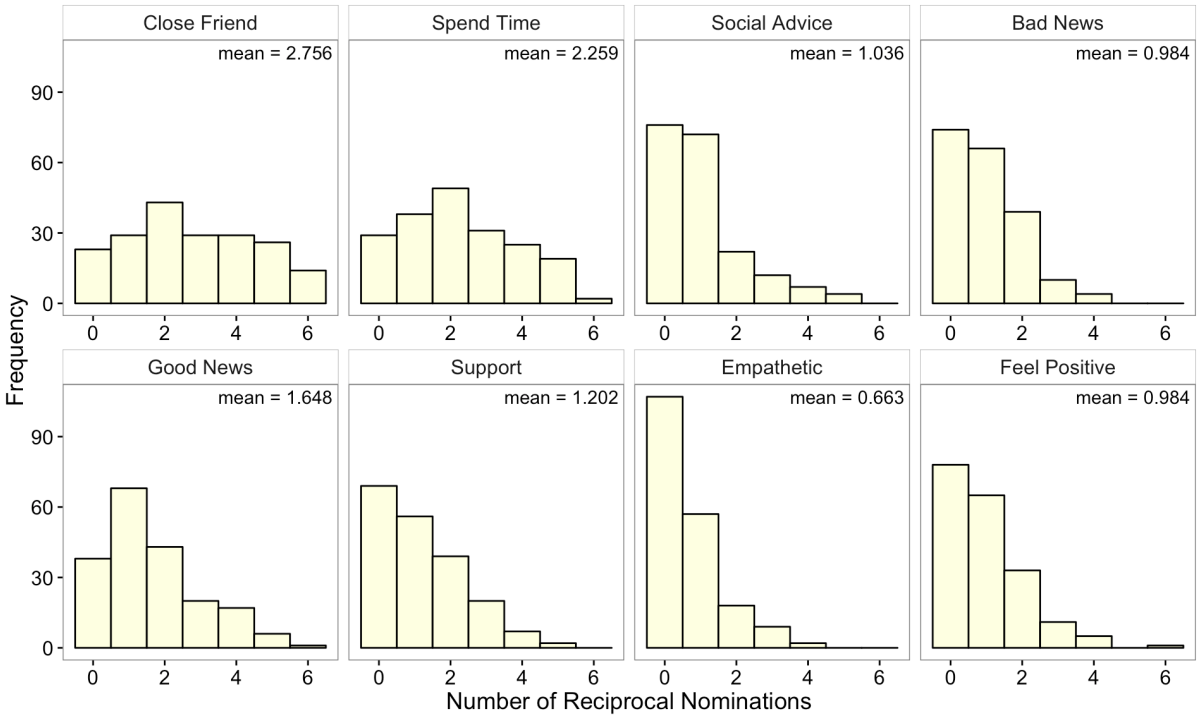

Figure S4. Average ratings (across the UIC participants) on the importance of trust and fun/excitement for each type of network, using a scale from 1 (*not at all important*) to 100 (*very important*).

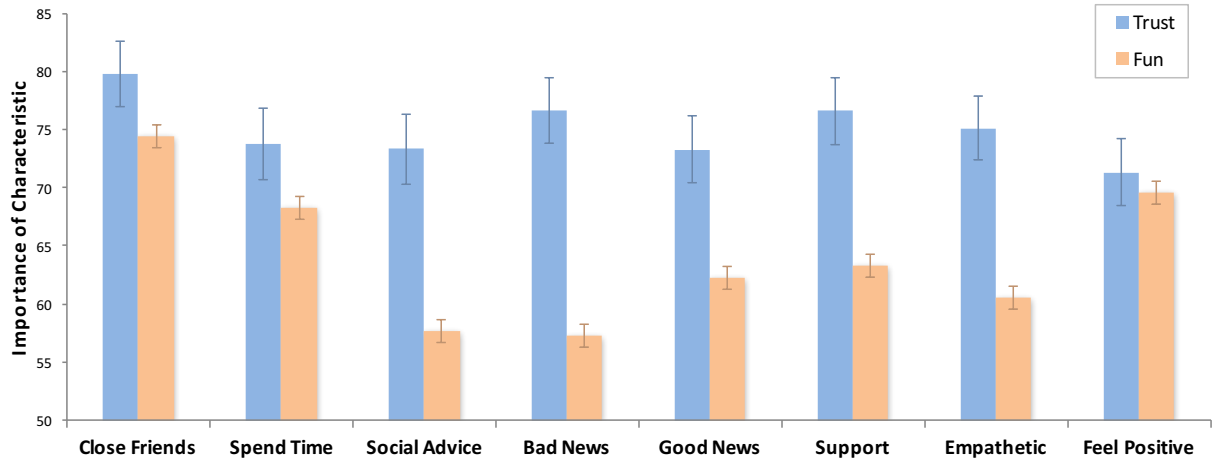

Figure S5. For each type of network, average ratings (across UIC participants) on the importance of (i) emotional closeness, (ii) shared interests, attitudes, and values, (iii) hearing information, (iv) meeting new people, (v) and maintaining connections for a future career, using a scale from 1 (*not at all important*) to 100 (*very important*).

Figure S6. In the left column, network maps of the four dorms showing that students with more nominations (i.e., larger nodes) for the question "Who usually makes you feel positive (e.g., happy, enthusiastic)?" also tend to rank higher on trait positive emotion. In the right column, network maps of the four dorms showing that students with more nominations for the question "Who do you turn to when something bad happens?" also tend to rank higher on trait empathy. Note that all analyses were conducted with continuous trait measures, and median splits are used here only for illustrative purposes.

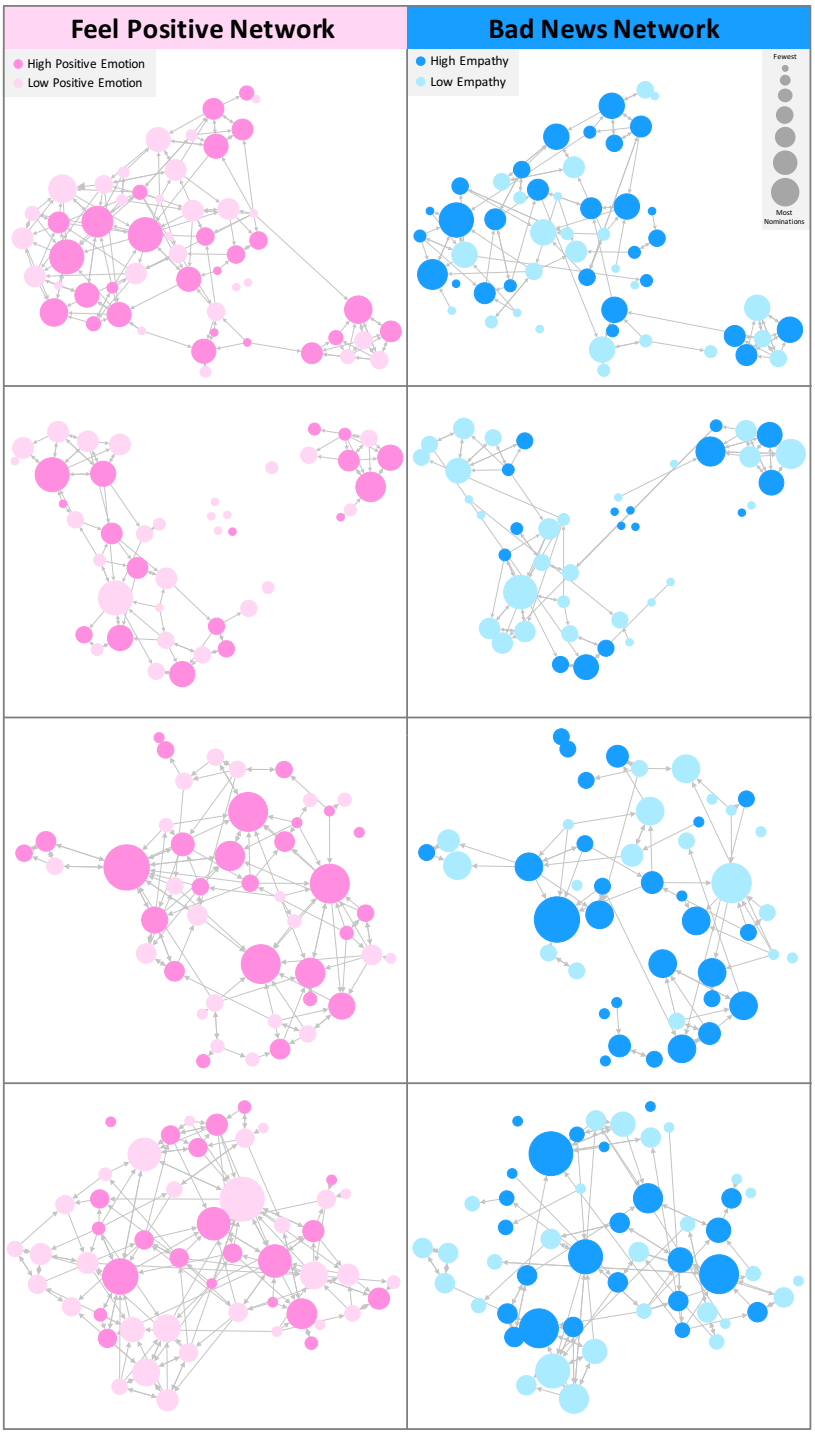

Figure S7. The relationship between each trait and indegree (as indexed by the average standardized betas from Table 1) for high vs. low-selectivity networks.