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Do subjective or objective cognitive measures better predict social network type among older adults?

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Abstract

A large literature highlights the link between cognitive function and social networks in later life. Yet there remains uncertainty about the factors driving this relationship. In the present study, we use measures of subjective cognitive decline and clinical cognitive assessments on a sample of older adults to investigate whether the relationship between cognitive function and social networks is driven by psychosocial factors. We found a consistent link between clinical cognitive assessments and social network type, but no association between subjective concerns of cognitive decline and networks. Participants who exhibited signs of clinical cognitive impairment were more likely to have restricted networks (i.e., smaller networks consisting of fewer contacts, more interconnectivity, and less social diversity) compared to their cognitively normal counterparts, regardless of subjective measures of cognitive decline—both from the participant’s perspective and study partner’s perspective. These findings suggest that neither cognitively impaired older adults nor their network members appear to consciously dissolve social ties on the basis of perceived cognitive decline. However, it remains unclear whether the association between clinical cognitive impairment and social network type indicates the protective nature of social networks against cognitive decline or a subconscious process leading to social contraction.

Keywords

Social networks; social relationships; cognitive function; aging

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Introduction

Numerous empirical studies spanning multiple disciplines document a consistent link between cognitive function and social networks in later life. These studies find that older adults who routinely engage with large and expansive social networks tend to be those who also exhibit higher levels of cognitive function compared to their socially isolated peers (Crooks et al., 2008; Evans et al., 2019; Fratiglioni et al., 2004; Perry, McConnell, Peng, et al., 2021; Schwartz et al., 2019). Although most studies take cognitive function as the dependent variable that can be explained by one's engagement in a social network, others argue that cognitive function should instead be taken as an independent variable that predicts social networks as an outcome in later life (Aartsen et al., 2004; Cornwell, 2009; Hosking et al., 2017). This latter argument posits that older adults are likely to experience social attrition (i.e., withdrawal/exclusion from social activities and relationships) as their cognitive abilities decline. Although there is likely a bidirectional pathway between networks and cognition (Dyer et al., 2020; Kelly et al., 2017), the present study focuses primary attention on two possible psychosocial dimensions of social attrition.

According to the social attrition perspective, the onset of cognitive impairment may alter the commitment to or interpersonal dynamics of social relationships, and therefore lead to inactivity or deterioration of more peripheral social ties (Donovan et al., 2016; Perry, 2012). As relatively weak ties to friends and other community members atrophy, the networks of cognitively impaired older adults will become smaller and denser (i.e., greater interconnectivity) and comprise of stronger, kin-based ties compared to cognitively healthier older adults. There are two potential psychosocial mechanisms underlying this process. First, the social withdrawal hypothesis states that cognitively impaired individuals will intentionally withdraw from social relationships due to the perceived stigma associated with cognitive impairment and related shame or depression (Perry, 2012; Perry & Pescosolido, 2012). Indeed, depression—which is often associated with subjective accounts of cognitive decline—may cause certain network ties to weaken due to the commitment required to maintain such ties. Second, the social rejection hypothesis states that network members will withdraw due to the changing nature of the relationship or the difficulty of engaging in shared activities with the impaired individual (Dubreucq & Franck, 2019).

Both of these mechanisms are contingent on impaired individuals exhibiting cognitive or behavioral changes that are perceptible to themselves and or their network members. Yet these perceptions do not perfectly correspond to objective assessments of cognitive function. Indeed, clinical studies of autopsies have found that certain individuals exhibited no noticeable signs of cognitive impairment during their lifetime yet showed pathological evidence of widespread Alzheimer's disease upon their death (Katzman et al., 1988). Conversely, a meta-analysis of studies that employ subjective measures of cognitive impairment found that approximately 17% of sample subjects reported concerns over their cognitive health despite failure to demonstrate any objective cognitive impairment relative to population based norms (Mitchell, 2008). Measuring subjective cognitive decline alongside traditional clinical assessments therefore provides a novel way to assess potential social attrition mechanisms since perceptions of impairment should predict social network characteristics regardless of whether the subject is clinically impaired. Incorporating both

types of assessments helps identify mismatched cases in which individuals score either (a) low on subjective assessments and high on clinical assessments or (b) high on subjective assessments and low on clinical assessments. If individuals in the former group report having small, restricted social networks composed mainly of close family members this would suggest evidence of either social withdrawal or social rejection depending on whether the subjective concerns came from the focal individual or from a secondary account.

The present study uses data from the Social Networks in Alzheimer Disease (SNAD) project to examine a sample of older adults that includes measures of subjective cognitive decline, clinical cognitive assessments, and a host of network variables. As empirically and theoretically suggested in the cognitive health literature, social networks are multidimensional and should be considered holistically in terms of how they relate to cognition (Kelly et al., 2017; Peng et al., 2021). Therefore, we adopt a network typology approach in which we cluster participants into separate groups based on distinct social network types (Fiori et al., 2006; Litwin & Shiovitz-Ezra, 2011; Wenger, 1991). Upon identifying the network types, we use logistic regression models to determine whether subjective perceptions of cognitive impairment is associated the odds of being assigned to one of two network types. In defining subjective cognitive decline from the perspective of the focal participants as well as a secondary informant, we assess the social withdrawal and social rejection mechanisms of social attrition.

Methods

Study population

The Social Networks in Alzheimer Disease (SNAD) project is a concurrent study being conducted at the Indiana Alzheimer Disease Research Center (IADRC) (Perry, McConnell, Peng, et al., 2021). The IADRC recruits participants via multiple mechanisms, including community outreach and advertisements, clinical referral, and participation in studies of familial genetic disorders. Exclusion criteria for the IADRC include history of schizophrenia; bipolar disorder; other major psychiatric disorders; history of cancer with chemotherapy or radiation treatment; traumatic brain injury with loss of consciousness; developmental disabilities; and history or active alcohol/substance abuse disorders. Additional exclusion criteria for this study include IADRC participants with a Montreal Cognitive Assessment (MoCA) score below 10; known family history of dominantly inherited dementia genes, such as APP, GSS, and PSEN-1; age below 45; and Prion disease. Between March 2015 and May 2019, all eligible IADRC participants were approached to voluntarily complete the SNAD protocol to elicit personal social network data for each participant. SNAD data were collected on 276 participants via face-to-face modality using computer-assisted personal interviewing in a private office during a routine IADRC clinic visit. To qualify for enrollment at the IADRC, each participant had to co-enroll with a study partner who served as a secondary informant. For the present study, we excluded 128 participants who were missing measures social networks (n=1) or depression (n=1) as well as those whose informants failed to provide subjective cognitive assessments (n=126). The final study sample includes 148 participants with complete data. Table A1 provides an overview of the key variables for the 148 participants who are included in the analytic

sample compared to the 128 participants who were excluded from the analytic sample. The primary difference between the two groups—other than the absence of the informant-assessment of subjective cognitive decline—is that those excluded from the study had, on average, slightly worse cognitive scores.

Social networks

The outcome measure was social network type. To elicit social network data, each participant provided the names of all people with whom they discussed either important matters or health matters (Perry & Pescosolido, 2010). No limit was placed on the number of people that could be named. Upon identifying the members of their social networks, participants were asked how often they interacted with each member ('often,' 'occasionally,' 'hardly ever'), how emotionally close they were with each member ('very close,' 'sort of close,' 'not very close'), and the type of relationship they shared with each member ('spouse/partner,' 'parent,' 'child,' 'friend,' 'neighbor,' etc.). These three survey items were all aggregated to form three respective network-level variables: proportion of network members with whom the participant interacted with 'often,' proportion of network members to whom the participant was emotional 'very close,' and proportion of network members who were kin. Participants were also asked whether network members knew each other. This latter line of questioning was used to calculate network density, a measure that quantifies the proportion of network members who are interconnected. Network density ranges from 0.0 (no network members know each other) to 1.0 (all network members know each other).

Upon recording the network measures, participants were assigned to one of two groups based on their overall network typology. A *k*-means cluster analysis was used to create a 'restricted network type' and a 'diverse network type.' These two types of networks—which holistically contain the types of network characteristics that have been theoretically and empirically linked with cognitive impairment (Cornwell, 2009; Perry, McConnell, Peng, et al., 2021; Schwartz et al., 2019)—were derived through an iterative procedure which assigned participants into non-overlapping clusters based on their similarity across a designated set of criterion variables. Centroids for each of the initial clusters were randomly generated and iteratively updated until optimal clustering was achieved based on Euclidean distance (Milligan & Cooper, 1985). Consistent with network theory, the restricted networks tend to provide participants with emotionally close and theoretically supportive social ties, but lack the range of exposures to different types of people (Ashida & Heaney, 2008; Schwartz et al., 2019). Diverse networks, meanwhile, tend to provide access to a range of social situations (via the loosely-connected nature of the network), but simultaneously lack the strong, bonding nature that is present in restricted networks (Cornwell, 2009; Perry, McConnell, Peng, et al., 2021).

Subjective cognitive decline

Subjective cognitive decline was assessed using the Cognitive Change Index (CCI). The CCI contains of 20 items asking participants to subjectively assess their cognitive performance compared to the previous five years (Rattanabannakit et al., 2016). The items were answered and summed using a five-point scale with higher scores indicating greater decline (1= 'no change or normal ability,' 2 = 'minimal change or slight/occasional problem,' 3 = 'some

change or mild problem,’ 4 = ‘clearly noticeable change or moderate problem,’ 5 = ‘much worse or severe problem’). Scores were summed across the 20 items such that the index theoretically ranges from 20 to 100. This procedure was repeated for the informant to achieve a secondary account of subjective cognitive decline.

Clinical cognitive assessment

In addition to the CCI, all participants were administered a series of clinical cognitive assessments. We use two of these clinical assessments—Montreal Cognitive Assessment and Craft Story Delayed Recall—to assess levels of cognitive function. The *Montreal Cognitive Assessment* (MoCA) assesses global cognitive function across multiple domains, including attention, memory, visuospatial ability, abstraction, delayed recall, and orientation to time and place (Nasreddine et al., 2005). Although potential scores range from 0 to 30 with higher scores indicating better cognitive function, enrollment in SNAD was conditional on MoCA score of 10 or greater. The *Craft Story* is an informationally dense paragraph story that is read aloud to participants directly after which they are prompted to recall details of the story (Kaur et al., 2018). Twenty minutes later, participants are again asked to recall the story verbatim as well as paraphrasing. For this study, we used only the delayed paraphrase recall score. The Delayed Recall (Craft Story DR) scores range from 0 to 22 with higher scores indicating better cognitive function.

Covariates

We adjust for the following variables in the final analysis: age (years), sex (0 = male, 1 = female), education (years), a 15-item geriatric depression scale (GDS-15) (Sheikh & Yesavage, 1986), and clinical diagnosis. Participants were diagnosed as either ‘cognitively normal’ (CN), ‘mild cognitive impairment’ (MCI), or ‘dementia’ based on their physical, neurological, and cognitive status during a consensus conference attended by study neurologists, neuropsychologists and staff.

Statistical analyses—The characteristics of the two social network types were described and compared using t-tests. Mean and proportional statistics for all measures were described for the sample. Logistic regression models were used to assess the probability of being assigned to the restricted network type compared to the diverse network type. Baseline models assess whether CCI, MoCA, and Craft Story DR are independently associated with network type. In a second set of models, interaction terms were used between CCI and each of the two clinical measures to assess whether the association between cognitive health and social networks was driven by subjective concerns (i.e., social withdrawal hypothesis or social rejection hypothesis), objective cognitive impairment, or a combination of the two. This interaction term assesses whether people who are subjectively concerned about their cognition in the absence of clinical impairment—who are likely more neurotic—are more likely to experience social withdrawal or rejection. Average marginal effects and 95% confidence intervals (95% CIs) were calculated and plotted to ease interpretation. The delta method was used to provide accurate group comparisons (Xu & Long, 2005). Associations were considered statistically significant at $\alpha = 0.05$. All analyses were conducted using Stata 16 (StataCorp, 2019).

Results

Table 1 presents the descriptive statistics for the sample as well as a breakdown by network type. The mean age was 71.4 years (SD = 8.29, range = 46 – 91), 62 percent of the sample was female, and the mean education was 16.39 years (SD = 2.09, range = 4 – 21). The mean MoCA score was 24.47 (SD = 3.88, range = 11 – 30) and the mean Craft Story DR score was 12.34 (SD = 5.54, range = 0 – 22). The subjective cognitive scores, as assessed on the CCI, were slightly higher when viewed from the participant's viewpoint (\bar{x} = 39.03, SD = 15.22, range = 20 – 85) compared to the informant's viewpoint (\bar{x} = 35.74, SD = 18.55, range = 20 – 97). In other words, participants were more self-critical than study partners. The majority of participants were clinically diagnosed as cognitively normal (65 percent), one quarter were MCI, and 10 percent were diagnosed with dementia.

The third and fourth columns in Table 1 contain the characteristics of the social network types that were derived through *K*-means clustering. Participants who were assigned to the 'restricted network' type reported ties to an average of 3.95 network members. Participants who were assigned to the 'diverse network' type reported ties to significantly more network members (\bar{x} = 5.73, $p < 0.001$). Restricted networks were significantly denser (\bar{x} = 0.85 vs. \bar{x} = 0.35, $p < 0.001$), and more kin centered (\bar{x} = 0.85 vs. \bar{x} = 0.43, $p < 0.001$) than diverse networks. Participants with restricted networks were also emotionally closer (\bar{x} = 0.88 vs. \bar{x} = 0.60, $p < 0.001$) and in more frequent contact (\bar{x} = 0.82 vs. \bar{x} = 0.59, $p < 0.001$) with their network members than participants with diverse networks.

Figure 1 visualizes the average social network type for participants separated by CCI (self-assessment) and MoCA. As shown, participants who scored above average on the MoCA (i.e., MoCA >24) had larger, more diverse networks on average than those who scored low on the MoCA regardless of their subjective cognitive status. Interestingly, there were no detectable differences in the networks of those who scored high on the CCI and low on the MoCA compared to those who scored low on the CCI and low on the MoCA. This provides initial evidence that clinical cognitive impairment is more closely related to network type than is subjective accounts of cognitive decline.

Association between network type and cognitive measures

Table 2 shows the odds ratios from the logistic regression models predicting network type using the self-assessments of CCI. As seen in Model 1, the odds of being assigned to the restricted network type was not significantly associated with the CCI self-assessment. The association between CCI and network type was not significant whether adjusting for MoCA (Model 1, OR = 1.01, 95% CI = 0.98, 1.03) or Craft Story DR (Model 2, OR = 1.00, 95% CI = 0.86, 1.16). Both cognitive tests, however, were each independently associated with network type. The odds of reporting a restricted network were 0.16 times lower for each successive point increase in MoCA (Model 1, OR = 0.84, CI = 0.74, 0.94) and 0.54 times lower for each successive point increase in the Craft Story (Model 3, OR = 0.86, CI = 0.79, 0.94). Although these findings demonstrate a consistent significant association between objective cognitive impairment and network type, there is no initial support for the social withdrawal hypothesis, which holds that participants who report concerns of

subjective cognitive decline are more likely maintain restricted social networks compared to participants who fail to report such concerns.

Models 2 and 4 introduce interaction terms between CCI and cognitive assessments. Neither interaction term is statistically significant, which indicates that the odds of reporting a restricted network are not compounded by concurrent measures of perceived cognitive decline. Figure 2 plots the average marginal effects for both interaction terms. The probability of reporting a restricted network decreases as objective cognitive impairment increases yet there is no significant difference between the trend line for participants with high levels of CCI (1 SD above the mean) and participants with low levels of CCI (1 SD below the mean).

The informant-assessment models (i.e., models in which cognitive decline was assessed by a study partner) shown in Table 3 display a similar trend across cognitive measures. The odds of being assigned to a restricted network are not significantly associated with CCI (informant-assessment) whether adjusting for MoCA (Model 1, OR = 1.01, 95% CI = 0.99, 1.04) or Craft Story DR (Model 2, OR = 1.01, 95% CI = 0.98, 1.04). Unsurprisingly, the associations between the clinical assessments (MoCA and Craft Story) and network type remained negative and significant in Models 1 and 3. The interaction terms in Models 2 and 4, similar to the interaction terms from the self-assessment models, were not significant. Collectively, the results from the informant-assessment models provided no support for the social rejection hypothesis.

Discussion

The present study examined the association between cognitive health and social networks. Although many studies show a clear link between these two concepts using a variety of network measures (Crooks et al., 2008; Ellwardt et al., 2015; Evans et al., 2019; Fratiglioni et al., 2004; Giles et al., 2012; Kelly et al., 2017; Perry, Roth, Peng, et al., 2021; Schwartz et al., 2019), we are unaware of any study that tests whether this association is driven by observable behavioral changes or clinical manifestations of cognitive impairment. By leveraging data from a cohort of older adults that contain information on (a) self-assessments of subjective cognitive decline; (b) informant assessments of cognitive decline; and (c) clinical cognitive assessments, we evaluated whether participants exhibited patterns of social withdrawal or social rejection in regard to their personal social networks. We found a consistent link between clinical cognitive assessments and social networks but no clear link between subjective concerns of cognitive decline and networks.

According to the social attrition perspective, cognitive decline will cause individuals to lose social ties with peripheral members of their personal social networks. The shedding of these ties would, in turn, lead to the emergence of small, densely connected social networks (Cornwell, 2009). Social withdrawal is also likely to cause individuals to have fewer connections to a diverse array of network members (e.g., few social relationship types) and rely instead on a core group of emotionally strong ties. Taken together, these types of networks restrict access to things like novel information, diverse perspectives, and social independence (Burt, 1992; Goldman & Cornwell, 2015; Roth, 2021). Although

cognitively impaired participants in the present study were more likely to report having restricted networks compared to their cognitively normal counterparts, this trend was only observed among participants who were clinically cognitively impaired. Subjective measures of cognitive decline—both from the participant’s perspective and corroboration of cognitive change over time from an informant—were not associated with network type. Collectively, these findings fail to lend support to the social withdrawal hypothesis or the social rejection hypothesis, which each assumed a psychosocial response to cognitive impairment.

The results from this study suggest two alternative explanations. First, it is possible that decline in social cognitive function or other cognitive resources is associated with social attrition (Krendl et al., 2021), whether or not the symptoms of impairment are perceptible to self or others. In other words, impairments in social cognition that often accompany general cognitive decline may make it subconsciously difficult for cognitively impaired older adults to form and maintain diverse relationships with non-kin and other peripheral ties (Cornwell, 2009). If this mechanism—which is related more to cognitive ability than social intention—is at play it could serve as an early behavioral indicator of prodromal dementia.

Alternatively, the results may instead be indicative of a social engagement perspective, which posits that network type influences cognitive outcomes (Perry, McConnell, Coleman, et al., 2021). Indeed, many empirical studies argue that the cognitive stimulation brought on by interacting with a large number of diverse people leads to a decreased risk of cognitive decline in later life (Bosma et al., 2002; Crooks et al., 2008; Ellwardt et al., 2015; Fratiglioni et al., 2004; Peng et al., 2021; Schwartz et al., 2019). Although the present study cannot address the causal direction between cognitive impairment and social networks, it suggests that the association is likely driven by cognitive abilities (or lack thereof) rather than intentional changes in social behavior. It remains entirely possible that the social cognitive mechanism and the social engagement mechanism occur simultaneously to create a feedback loop between cognitive decline and network change that accelerates impairment and reduces cognitively healthy life years.

Limitations

This study has two important limitations. First, our cross-sectional analyses cannot determine whether clinically manifested cognitive impairments precede social network formation or vice-versa. Tracking participants longitudinally will help address these concerns. Second, self-reported data on cognitively impaired participants are subject to recall error (Farias et al., 2005). Social network data are especially sensitive to error given that gathering these data requires participants to name multiple network members in response to name generating prompts (Brashears, 2015; Brewer, 2000; Marsden, 1990). However, this concern is mitigated by a separate study using SNAD data which showed that when contrasted against network data from the study partner, participants with cognitive impairment were no more likely to omit specific members from their social networks compared to cognitively normal participants (Roth et al., 2021).

Conclusion

Cognitive health was associated with social network type but only as a function of objective cognitive impairment, not subjective concerns. Consequently, the present study offered no support for the social withdrawal hypothesis nor the social rejection hypothesis. Findings instead point towards a strong link between clinical cognitive assessments and social networks. Although it remains unclear whether this association indicates the protective nature of social networks against cognitive decline or a subconscious process leading to social contraction, our findings demonstrate that neither impaired individuals nor their network members appear to consciously dissolve ties on the basis of perceived cognitive decline.

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Appendix

Table A1.

Comparison of sample participants versus excluded SNAD participants

	Full sample (N=148)			Excluded (N=128)			P-value
	Mean	SD	Min, Max	Mean	SD	Min, Max	
Network characteristics							
Network size	4.71	2.15	0, 13	5.04	2.78	[0, 17]	0.269
Density	0.63	0.31	[0, 1]	0.59	0.30	[0, 1]	0.426
Prop. kin	0.67	0.29	[0, 1]	0.65	0.29	[0, 1]	0.456
Prop. emotionally close	0.76	0.27	[0, 1]	0.72	0.28	[0, 1]	0.200
Prop. frequent contact	0.72	0.27	[0, 1]	0.67	0.26	[0, 1]	0.098
Cognitive health							
CCI (self-assessment)	39.03	15.22	[20, 85]	34.87	12.10	[20, 85]	0.033
CCI (informant-assessment)	35.74	18.55	[20, 97]	--	--	--	--
MoCA	24.47	3.88	[11, 30]	23.19	5.30	[10, 30]	0.025
Craft Story DR	12.34	5.54	[0, 22]	12.50	6.02	[0, 23]	0.831
Diagnosis							
Cognitively normal	0.65			0.64			0.107

	Full sample (N=148)			Excluded (N=128)			P-value
	Mean	SD	Min, Max	Mean	SD	Min, Max	
Mild cognitive impairment	0.25			0.18			
Dementia	0.10			0.18			
Sociodemographics							
Age	71.36	8.29	[47, 91]	71.31	9.97	[47, 95]	0.582
Sex							0.580
Female	0.62			0.59			
Education (years)	16.39	2.93	[4, 23]	16.19	2.77	[7, 23]	0.582
GDS-15	2.09	2.21	[0, 11]	1.88	2.48	[0, 12]	0.453

Note: There were 126 participants who were only missing variables were the CCI (informant-assessment). The p-value column signifies statistical differences using t-tests for continuous variables and chi-square for categorical variables.

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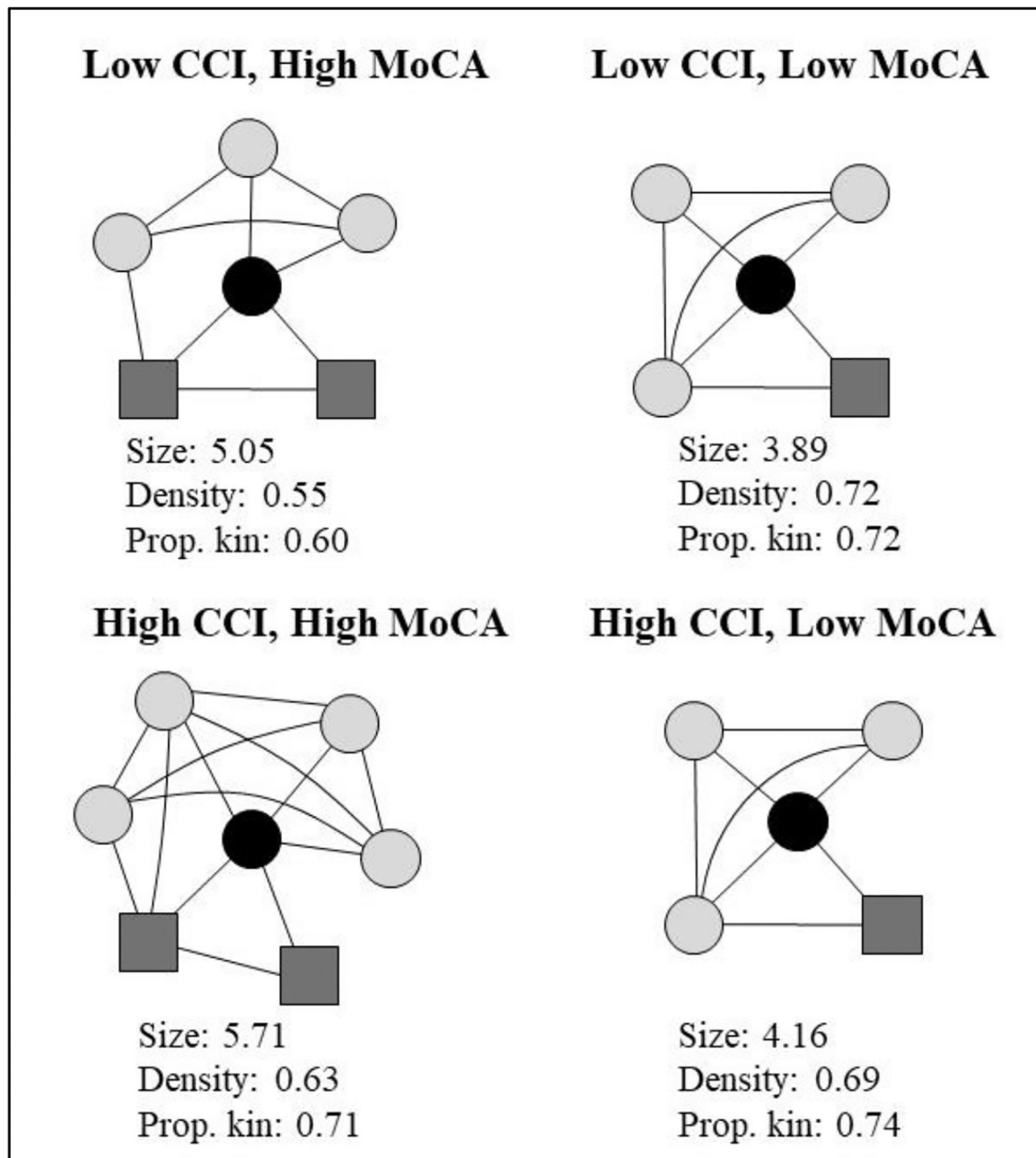


Figure 1.

Hypothetical network visualization by cognitive measures

Note. Center circles represent focal individuals, exterior circles represent kin, exterior squares represent non-kin, and lines indicate social connections between network members. *Low CCI* is classified as scoring below the mean on the CCI (self-assessment) and *High CCI* as scoring above the mean. *Low MoCA* is classified as scoring below the mean on the MoCA and *High MoCA* as scoring above the mean.

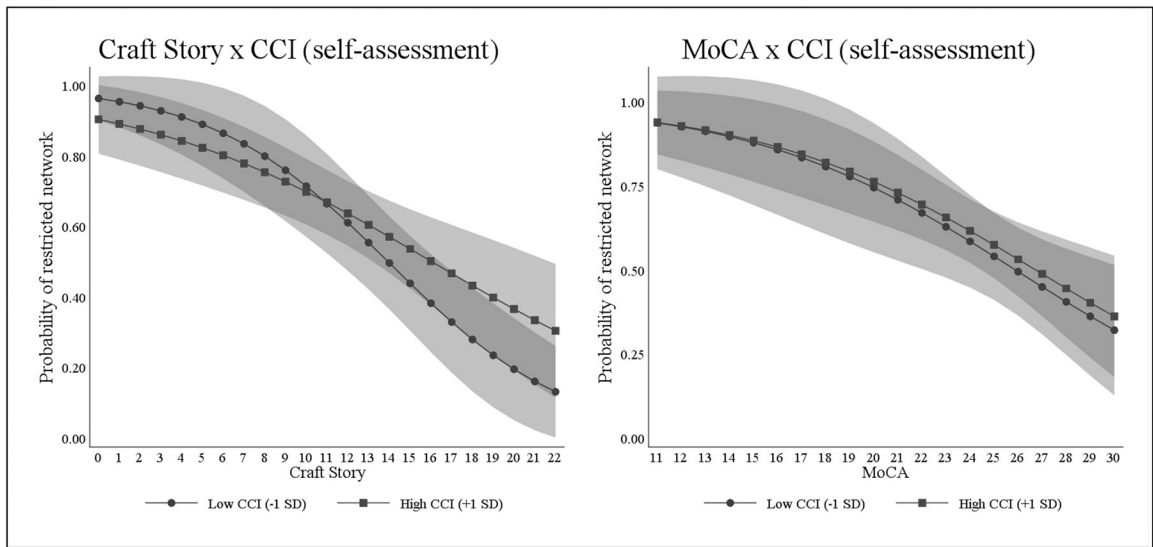


Figure 2.
Interaction between cognitive measures on network type
Note: Average marginal effects derived from logistic regression models in Table 2.

Table 1.

Descriptive statistics

	Full sample (N=148)			Restricted networks (N=85)			Diverse networks (N=63)			P-value
	Mean	SD	Min, Max	Mean	SD	Min, Max	Mean	SD	Min, Max	
Network characteristics										
Network size	4.71	2.15	[0, 13]	3.95	1.84	[0, 10]	5.73	2.13	[3, 13]	< 0.001
Density	0.63	0.31	[0, 1]	0.85	0.19	[0.33, 1]	0.35	0.19	[0, 1]	< 0.001
Prop. kin	0.67	0.29	[0, 1]	0.85	0.20	[0.20, 1]	0.43	0.21	[0, 1]	< 0.001
Prop. emotionally close	0.76	0.27	[0, 1]	0.88	0.21	[0, 1]	0.60	0.25	[0.11, 1]	< 0.001
Prop. frequent contact	0.72	0.27	[0, 1]	0.82	0.24	[0, 1]	0.59	0.24	[0.13, 1]	< 0.001
Cognitive health										
CCI (self-assessment)	39.03	15.22	[20, 85]	40.40	15.26	[20, 82]	37.17	15.08	[20, 85]	0.203
CCI (informant-assessment)	35.74	18.55	[20, 97]	31.77	20.46	[20, 97]	31.11	14.53	[20, 74]	0.008
MoCA	24.47	3.88	[11, 30]	23.53	4.38	[11, 30]	25.73	2.31	[19, 30]	0.001
Craft Story DR	12.34	5.54	[0, 22]	10.82	5.56	[0, 21]	14.38	4.86	[0, 22]	< 0.001
Diagnosis										
Cognitively normal	0.65			0.58			0.75			0.028
Mild cognitive impairment	0.25			0.27			0.22			
Dementia	0.10			0.15			0.03			
Sociodemographics										
Age	71.36	8.29	[47, 91]	71.78	7.93	[49, 91]	70.78		[47, 90]	0.466
Sex										0.331
Female	0.62			0.59			0.67			
Education (years)	16.39	2.93	[4, 23]	16.12	3.12	[4, 23]	16.75	2.64	[12, 21]	0.198
GDS-15	2.09	2.21	[0, 11]	2.14	2.25	[0, 11]	2.03	2.18	[0, 8]	0.767

Note: The p-value column signifies statistical differences between 'Restricted networks' and 'Diverse networks' using t-tests for continuous variables and chi-square for categorical variables.

Table 2.

Logistic regression predicting restricted network type (self-assessment)

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
CCI (self-assessment)	1.01	[0.98, 1.03]	1.00	[0.86, 1.16]	1.01	[0.98, 1.04]	0.95	[0.90, 1.01]
MoCA	0.84	[0.74, 0.94]	0.85	[0.62, 1.10]	--	--	--	--
Craft story DR	--	--	--	--	0.86	[0.79, 0.94]	0.71	[0.57, 0.88]
SCD*MoCA	--	--	1.00	[0.99, 1.01]	--	--	--	--
SCD*Craft	--	--	--	--	--	--	1.00	[1.00, 1.01]
<i>Pseudo R</i> ²	0.07		0.07		0.09		0.11	
<i>N</i>	148		148		148		148	

Note: Models adjust for age, sex, education, depression, and clinical diagnosis.

Table 3.

Logistic regression predicting restricted network type (informant-assessment)

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
CCI (informant-assessment)	1.01	[0.99, 1.04]	1.04	[0.90, 1.21]	1.01	[0.98, 1.04]	1.02	[0.97, 1.08]
MoCA	0.85	[0.75, 0.97]	0.90	[0.69, 1.16]	--	--	--	--
Craft story DR	--	--	--	--	0.87	[0.79, 0.95]	0.87	[0.75, 1.09]
SCD*MoCA	--	--	1.00	[0.99, 1.01]	--	--	--	--
SCD*Craft	--	--	--	--	--	--	0.99	[0.99, 1.01]
<i>Pseudo R</i> ²	0.08		0.08		0.09		0.09	
<i>N</i>	148		148		148		148	

Note: Models adjust for age, sex, education, depression and clinical diagnosis.