Social Resources as Cognitive Structures:

Thinking about a Dense Support Network Increases Perceived Support

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Abstract

Two experiments examined how the ways in which people mentally represent their personal networks affect perceptions of social support. Social support research often uses "name generators" in which individuals are asked to choose how many people they receive support from, resulting in cognitive networks that confound size and density. Taking a fixed size approach, Study 1 showed that the density of chronically activated networks predicted perceived support in both emotional and informational domains. Study 2 assigned participants to think of a dense or sparse personal network of equal size to test whether experimentally-manipulated density can influence perceived support. Results indicated that thinking of a dense (vs. sparse) network led to higher perceived support, which in turn, promoted more confidence in coping with life stressors. Collectively, these studies highlight how moment-to-moment changes in cognitive networks can influence social resources and explicate key psychological mechanisms tied to cognitive social structures.

Keywords: network cognition, network activation, density, perceived support

Introduction

One of the most resounding effects in the social sciences is that perceived social support—the belief that one can rely on others for necessary aid—represents a robust predictor of mental and physical well-being (e.g., Cohen and Wills 1985; House, Landis, and Umberson 1988). In general, perceived support is a stronger predictor of coping and well-being outcomes than actual support received (see Barrera 1986; Haber et al. 2007). Unsurprisingly, there exists an enormous body of research on perceived support across numerous disciplines (e.g., Berkman and Syme 1979; Cobb 1976; Thoits 1995). However, the varied approaches taken have also left some notable knowledge gaps. In particular, social psychological studies have often focused on understanding the mechanisms underlying how people perceive individual support providers to be "supportive" (e.g., Lakey and Cassady 1990; Maisel and Gable 2009). At the same time, these studies have overlooked the role of social network cognition – i.e., how individuals cognitively represent their broader social environment, such as perceptions of interconnectedness between friends. By comparison, social network research has provided extensive insights into how the structural features of personal networks (e.g., size, density) influence social resources (e.g., Lin 1999; Thoits 2011), yet overlooked their links to psychological mechanisms such as the self or group processes (Tajfel and Turner 1979; Turner 1987; see Ellemers, Spears, and Doosje 2002).

The disparate foci of these disciplines have contributed to the lack of understanding of a vital question: what are the psychological mechanisms by which structural aspects of personal networks lead to perceived support? Here we take an integrative approach, examining how the ways in which people mentally organize their social networks can influence in-the-moment perceptions of support. In doing so, we contribute to the social support literature by providing insight into the cognitive network antecedents of perceived support. In parallel, we build on

research related to cognitive social structures (e.g., Brands 2013; Burt, Kilduff, and Tasselli 2013; Krackhardt 1987) by highlighting key mechanisms that further our understanding of the interplay between cognitive networks and social resources. More broadly, we contribute to the rich body of work that examines the link between structural and functional aspects of social support (e.g., Cohen and Janicki-Deverts 2009; Lin 1999; Meng et al. 2016), and affirm the need to investigate the everyday effects of social network cognition.

Background

Cognitive Social Structures and Network Activation

According to past research on cognitive social structures (CSS), how people encode, represent, and retrieve their personal networks can have distinct psychological and behavioral consequences (Brands 2013; Krackhardt 1987). As such, the ways in which people mentally organize their relationships – i.e., the *structure* of person-nodes on one's mind – may potentially anchor perceptions of social resources. Linking the CSS perspective with recent work in social psychology, the present research seeks to clarify how the *perceived* structure within a personal network can shift the amount of support individuals view as available.

Specifically, we draw on emerging research showing that cognitive social networks may be conceptualized as dynamic rather than static, and that their structures can be shaped by contextual and psychological factors (e.g., Menon and Smith 2014; Smith, Menon, and Thompson 2012). This dynamism is driven by *network activation*, a process in which the network an individual calls to mind can shift from moment to moment based on environmental or motivational cues that change who is salient in memory (Bayer, Lewis, and Stahl 2020). For example, Small and colleagues (2015) showed that people's core discussion network changed dynamically to fulfill their needs in the moment – and this influenced whom people sought out

for social support. Other recent work displays parallel patterns. When experiencing positive (vs. negative) affect, people activated larger and more sparsely connected (vs. smaller and redundant) personal network structures (Shea et al 2015). When under a job threat, people with low (vs. high) status activated smaller and tighter (vs. larger and less constrained) subsections of their networks (Smith et al. 2012). These results underscore the situational nature of cognitive social networks, raising significant questions about how dynamic construction processes may help to explain in-the-moment perceptions of support.

Activated Network Density and Perceived Support

To understand how network activation can influence perceived support, we also build on prior research linking social network characteristics and chronic perceptions of support (e.g., Acock and Hurlbert 1993; Perry and Pescosolido 2010; Song and Lin 2009). Most notably, recent work affirms that perceived network density – the level of interconnectedness among alters as perceived by the ego – is positively associated with perceived support (Cheng, Meng, and Liu 2018; Lee, Chung, and Park 2018). Yet missing from prior work is the explanation of *why* perceived density of personal network would increase perceived support, including the psychological mechanisms that underlie this key link. Some studies find that dense networks can provide support that is high in quantity and quality (see Lin 2001; Lin et al. 1999; Thoits 1985); however, actual support is often unrelated to or weakly correlated with perceived support and is considered a distinct construct (Barrera 1986; Haber et al. 2007; see Lakey and Orehek 2011). Other research suggests that dense networks are associated with emotional well-being (Acock and Hurlbert 1993) and community belonging (Lin 1999), but does not speak to the cognitive mechanisms that would matter in network activation (cf. Bayer et al. 2018). Understanding the precise mechanisms can be critical, for example, when designing interventions to increase

perceived support through network activation – or to clarify why some studies do not observe the link at all (e.g., Israel and Antonucci 1987; Stokes 1983).

Separately, some perspectives indicate that the role of density in perceived support may also depend on the type of support network (Lun, Roth, Oishi, and Kesebir 2013; Marin and Hampton 2007; Walker 2015). For instance, although a denser emotional support network may signal group solidarity and thus promote perceived support (Acock and Hurlbert 1993; Lin 1999), a sparser informational network may be perceived as more beneficial, as it can lead to new opportunities and novel information (Granovetter 1983; Smith et al. 2012). For these reasons, whereas certain research traditions focus on distinguishing emotional and instrumental support, we examined the density-support link in the context of emotional and informational networks to provide a more conservative test of the effect.

In addition, several methodological flaws of prior studies limit our understanding of how cognitive network density relates to perceived support. For instance, studies suggest that perceived support judgments can be influenced by a trait-based tendency to view others as positive (Lakey and Cassady, 1990). Thus, it is unclear whether the previously observed correlation between perceived density and support is driven by cognitive social structures or trait tendencies (see Zhu et al. 2013). To the best of our knowledge, no experimental data testing the link exists. This makes it difficult to rule out the possibility that a person who already views their social network members as supportive is more likely to see them as more interconnected. Furthermore, prior studies have usually measured perceived support *after* network generation (see Cheng et al. 2016; Lee et al. 2018). This approach is problematic because research in survey methodology (e.g., Schwarz 1999) would assert that perceived support judgments assessed after network construction are likely to be influenced by factors such as who comes to mind in the

moment or how difficult it was to generate the network. Given these issues, prior studies cannot rule out reverse causality or confounding variables (e.g., positivity, self-esteem). Our studies sought to address these issues. Study 1 adopted a more controlled questionnaire design to examine how chronic perceptions of support are associated with the density of cognitive network. Study 2 experimentally manipulated perceived density to directly assess its causal effect on in-the-moment perceptions of support. By testing how network density is associated with perceived support both chronically and in-the-moment, our goal was to provide robust evidence related to the directionality of the density-support link.

Beyond the above individual-level limitations, previous research does not account for how density is influenced by other dimensions of a given network's structure. We thus approached the dynamic construction of support networks by delineating two separate but related questions: how many people come to mind, and how are they connected? These questions help distinguish activated network size from structure, which have typically been confounded in past work on cognitive social structures and perceived support. Because network size and structure are correlated (including density, in particular), separating their unique effects on subjective perceptions of support is difficult (see Maya-Jariego 2018; Borgatti et al. 2006; Valente et al. 2008). This issue is especially problematic when examining the effects of cognitive structures, given that thinking of different numbers of people is also likely to activate different numbers of schematic connections. In response to this issue, the current studies utilize fixed-size network generators to isolate the distinctive effect of density on perceived support.

Mechanisms and Consequences of Perceived Support

The foundation above thus suggests that the denser the activation, the greater the support individuals will perceive from their network. However, research to date does not explicate the

cognitive pathways that might explain why density can amplify perceptions of support. While past perspectives on the psychological basis of social networks highlight the idea that dense structures can provide "safety" (Kadushin 2012), a number of socio-cognitive processes may be at play when people think of their relationships. Recent psychological studies suggest that how people mentally represent or frame their supportive others can influence the level of perceived support (e.g., Lee and Ybarra 2017; Marigold, Holmes, and Ross 2007). In this vein, viewing one's support network members as a cohesive entity may serve to frame them as a protective base, and in turn enhance the belief that one can rely on them for support (Feeney 2004; Igarashi and Kashima 2011). Alternatively, perceived density may promote a sense of belonging and commitment to the group (Ellemers et al. 2002; Lin 1999), which should also enhance the belief that one can rely on them (Sprecher 1988).

Consequently, we expected that denser cognitive networks would generate higher levels of perceived support through facilitating the belief that one's support network members are one entity (Igarashi and Kashima 2011) and/or are part of one's identity (Ellemers et al. 2002). Finally, since perceived support fosters self-confidence (Lee et al. 2018a), one potential consequence of dense activated network is the enhanced belief that one has the personal resources to cope with problems (Cohen and Wills 1985). Therefore, we predicted that the increased perceived support (associated with perceived network density) would promote coping, such as confidence in dealing with stressors.

Overview of the Studies

To test whether perceived support can be influenced by how individuals cognitively construct their social network, we conducted two online experiments. In Study 1, we explored whether spontaneously, and thus naturally, activated network density predicts chronically perceived

support across two domains (emotional vs. information resources). To this end, our approach was to capture the chronic tendency in which participants cognitively organize their support networks and assess its relation to their stable perceptions of support. Here, we sought to build on prior work (e.g., Cheng et al. 2018; Lee et al. 2018b) by enhancing methodological and analytical rigor. First, to prevent the network generation process from influencing the perceived support judgment, we assessed perceived support before perceived density. Second, our design controlled for the number of supportive relationships generated, and our analyses controlled for the amount of support people tend to receive from each individual in their network, in order to demonstrate the unique role of perceived network density. In Study 2, we conducted an experiment to more rigorously test the idea that dynamic cognitive constructions of support networks can influence in-the-moment perceptions of support. Specifically, we manipulated the activated density of personal support networks to assess whether individuals perceive different levels of support in the ensuing moments. In the process, we explored potential psychological mechanisms (i.e., entitativity, identity) underlying this density-support effect.

Study 1

In this study, we examined the association between support network density and perceived support in emotional support and informational support domains. Specifically, we sought to answer our key research question and test the hypothesis below:

RQ1: Does perceived network density relate to perceived support in informational support networks?

H1: Perceived network density will be positively associated with perceived support in emotional support networks.

Method

Participants. We recruited 415 participants (168 females; M_{age} = 34.59, SD_{age} = 11.00; 77.6% Caucasian, 14.2% African American, 3.8% Asian/Pacific Islander, 1.8% American Indian, 1.8% Other, 0.9% Hispanic/Latin American) from Amazon's Mechanical Turk. In terms of annual income, 47.5% was below $40,000, 21.5% between $40,000-59,999, 15.3% between $60,000-79,999, 9.4% between $90,000-99,999, and 6.3% over $100,000. A power analysis based on the effect size reported in similar research (f^2 = .15; Lee et al. 2018b) indicated that a sample size of 105 per each network provides 95% power to detect a significant effect. To ensure sufficient power, we oversampled and determined our sample size as 200 per condition prior to data collection. Participants were compensated $1.95 for their responses to an online survey. The Institutional Review Board at the authors' university approved this study. Participants were randomly assigned to think about either their emotional or informational network ($N_{emotional}$ = 209, $N_{informational}$ = 206).

Procedure and measures. All participants first completed a measure of chronic perceived support from their randomly assigned domain (i.e. informational or emotional support). Next, participants responded to questions pertaining to their personal support network based on their randomly assigned domain (described below). Importantly, we positioned the perceived support measure ahead of the personal (i.e., egocentric or "ego") network generator to prevent it from being influenced by the judgments of specific relationships brought to mind (Schwarz 1999). Thus, by default, this measure represents participants' relatively stable perception of support from people they know.

Chronic perceived support. Participants in the emotional (informational) support network were first provided with the definition of emotional (informational) support. Emotional support was defined as "*the offering of empathy, affection, encouragement, or caring*," and

informational support was defined as "*the offering of advice, guidance, suggestions, or useful information*." To measure chronic perceived support, we included multiple items that were adapted from the Social Provision Scale (Cutrona and Russell 1987). Specifically, participants indicated how much emotional (informational) support they can receive from people they know (1 = *none at all*, 7 = *very much*), how much they can count on people they know for emotional (informational) support (1 = *not at all*, 7 = *very much*), and how certain they are that they can receive emotional (informational) support from people they know (1 = *not at all certain*, 7 = *very certain*). We averaged these ratings to create corresponding composite variables of *perceived emotional support* (α = .94; M = 5.53, SD = 1.44) and *perceived informational support* (α = .94; M = 5.46, SD = 1.35).

***Cognitive network generator*.** Support networks were elicited for all participants using an ego-centered cognitive social structure (ECSS) generator design (Marcum et al. 2017). A fixed-size requirement was implemented to control for network size and examine the unique role of perceived density in shaping perceived support. Additionally, this method enabled us to capture the spontaneous network that is most likely to become salient in participants' minds without sacrificing accuracy (Kogovšek and Hlebec 2005; see Marcum et al. 2017). We used an adaptation of the social support prompt from the General Social Survey (Burt 1984) to measure whom participants would go to for emotional (informational) support:

> *"From time to time, people receive support from others. Looking back over the last six months – who are the eight people in your life that you go to for emotional (informational) support across different situations?"*

After listing their alters, a name interpreter was used to learn more information about the relationships between each ego and their alters, and the relationships between alters. Specifically,

participants indicated how much support they receive from each alter (1 = *none at all*, 7 = *very much*). To assess perceived network density, we asked participants to report how close they perceived each pair of alters to be (1 = *they don't know each other*, 2 = *not at all close*, 7 = *extremely close*). Note that these judgments were undirected; i.e., these single judgments represented a bidirectional relation between each pair of alters. At the end of the survey, the initials of the alters appeared, and participants were asked to categorize each alter by type of relationship (e.g., family, friends, coworker; see Table 1 for the distributions of types of relationships). Moreover, because the ease with which people can generate their networks can influence the perceived support judgment (Schwarz 1999), we also asked participants to indicate how difficult it was to generate their network using a 1 (*not at all*) to 7 (*very much*) scale. Controlling for this variable in our analyses did not change any of the results.

[Insert Table 1 About Here]

Perceived Network Density. We calculated a weighted and unweighted network density for each participant using their ratings of closeness between alters. Weighted density was calculated as the sum of realized edge weights divided by the total possible number of edges:

$$\frac{\Sigma\, weights(i,j)}{\frac{1}{2}(N \cdot (N-1))}$$

where *i* and *j* are nodes within the network and *N* is the network size (Liu, Wong, and Chua 2009). To calculate unweighted density, edges were coded dichotomously: edges with weights above the midpoint of the scale were coded as present, while edges at or below the midpoint were coded as absent. For ease of interpretation, the ego was removed from each network so that in a network in which no alters know one another, density is 0 (M = .55, SD = .22).

[Figure 1 About Here]

Results and Discussion

We excluded 76 participants (40 in the emotional support condition) who listed alters that were indistinguishable (e.g., sharing the same initials), listed fewer than 8 alters, or if the listed network was clearly fabricated (e.g., listing fictional characters). The final sample size used for analyses was 339 ($N_{emotional}$ = 169).

Table 2 presents correlations among all variables. Consistent with H1, activated emotional support network density positively predicted perceived emotional support, β = 2.52, $t(167) = 5.44$, $p < .0001$, 95% CI = [1.60, 3.44]. Interestingly, the same pattern was also observed for perceived informational support (RQ1), β = 1.43, $t(168) = 3.07$, $p = .003$, 95% CI = [.51, 2.35]. Furthermore, we conducted an additional analysis in which we controlled for the amount of support participants received from each alter. Cluster-robust standard errors were used to correct for the non-independence of observations (McNeish, Stapleton, and Silverman 2017). The above pattern of results held even after controlling for the amount of support received from each individual alter (emotional: β = 1.40, $t(167) = 3.84$, $p < .001$, 95% CI= [.68, 2.12]; informational: β = .74, $t(168) = 2.04$, $p = .04$, 95% CI = [.02, 1.46]), suggesting that activated support networks are more than the sum of their parts.

[Insert Table 2 About Here]

The pattern of results remained consistent when using unweighted density instead of weighted density. Emotional support network density positively predicted perceived emotional support, β = 1.54, $t(167) = 4.76$, $p < .0001$, 95% CI = [.90, 2.18]. Informational support network density predicted perceived informational support, β = 0.97, $t(168) = 3.11$, $p = .002$, 95% CI = [.35, 1.58]. The results again hold when we control for the amount of support received from each alter (emotional: β = .79, $t(167) = 3.26$, $p = .002$, 95% CI = [.31, 1.25]; informational: β = .52, $t(168) = 2.31$, $p = .02$, 95% CI = [.08, .96]).

In line with prior work (Lee et al. 2018), these findings corroborate the idea that perceived network density is associated with perceived support. Importantly, we extend prior work by demonstrating that network density predicts chronic perceived support while directly controlling for network size in two different support domains. Nonetheless, the correlational nature of Study 1 does not allow us to establish a causal link between activated network density and perceived support. Further, because our measures assessed participants' chronically activated network density and chronic perceived support, it still remains unclear whether the findings reflect a dynamic process rather than a stable or trait-based process. A person who tends to think positively about their network members, for example, may also think that those members are closer together. In Study 2, we conducted an experiment to address these issues and investigate potential psychological mechanisms underlying the effect.

Study 2

Building on Study 1, Study 2 manipulated network density to understand its dynamic and potentially causal effect on in-the-moment perceptions of support. To this end, we modified our measures to capture perceived support in-the-moment from a specific set of individuals (vs. general perception of support) and controlled for participants' chronic tendency to perceive others as supportive in our analyses. Specifically, participants were randomly assigned to think about receiving support from either a dense or sparse part of their personal support network. Then, they indicated their level of perceived support from the randomly assigned network and confidence in coping with life stressors. Because we found the same patterns for emotional and informational networks in Study 1, we dropped this distinction and instead focused on general perceptions of support (from their recalled network).

H2: Thinking about receiving support from a dense (vs. sparse) network will lead to higher level of perceived support in-the-moment.

Further, prior research has theorized that perceived support can promote coping by enhancing one's perceived ability to deal with stressors (e.g., Cohen and Wills 1985). Thus, we proposed a mediational hypothesis based on the potential implications for coping:

H3. The increased perceived support from thinking about receiving support from a dense (vs. sparse) network will lead to a higher confidence to cope with future stressors.

Our secondary goal was to explore potential psychological mechanisms underlying the link between network density and perceived support. Specifically, perceiving their network members to be close to one another can lead individuals to think of them as one supportive entity (Igarashi and Kashima 2011) or part of their identity (Ellemers et al. 2002). This in turn, should enhance the belief that they can rely on others for support (Sprecher 1988). Hence, we proposed two additional mediational hypotheses through these mechanisms:

H4a. Thinking about receiving support from a dense (vs. sparse) network will lead individuals to view their network as one entity, which will be associated with higher perceived support in-the-moment.

H4b. Thinking about receiving support from a dense (vs. sparse) network will lead individuals to view their network as part of their identity, which will be associated with higher perceived support in-the-moment.

Method

Participants. We recruited 251 participants (107 females; M_{age} = 36.61, SD_{age} = 11.46; 80.9% Caucasian, 8% Asian/Pacific Islander, 5.2% African American, 2.8% Hispanic/Latino,

2% Other, 1.2% American Indian) from Amazon's Mechanical Turk. In terms of annual income, 43.8% was below $40,000, 20.7% between $40,000-59,999, 19.2% over $80,000, and 16.3% between $60,000-79,999. The study was preregistered on AsPredicted (see http://aspredicted.org/blind.php?x=4xe9ti). Sample size was determined following Study 1, assuming a small to medium effect size at an alpha of .05. Participants were compensated $1.50 for their responses to an online survey. The Institutional Review Board at the authors' university approved this study.

Procedure and measures.

Cognitive network generator. All participants started out by generating two support networks: a 4-alter sparse support network and a 4-alter dense support network. In generating a sparse (dense) support network, participants read: "*From time to time, people receive support from different individuals who don't know (also know) each other well. Please think of four people in your life—who are not close (close) to one another—that you go to for support*." We randomized the order in which participants generated two types of networks so that whoever comes to mind first has an equal chance of being included in either networks. Participants were instructed not to list the same person in both networks. As in Study 1, at the end of the survey, the initials of each alter appeared, and participants were asked to categorize each alter by the type of relationship (see Table 3 for the distributions of types of relationships for sparse and dense networks). Participants were more likely to name a family member in a dense network (M = 2.71, SD = 1.70) than in a sparse network (M = 2.01, SD = 1.64), $F(1, 238) = 10.66$, $p = .001$. However, including this variable as a covariate did not change any of our results (all resulting ps < .002). Furthermore, we sought to account for the potential role of subjective fluency from influencing the outcome variables (Schwarz 1999). First, because people may have

varying degrees of difficulty in generating one type of network over the other, we asked all participants to generate both sparse and dense networks. This ensured that all participants started on an equal footing. Second, similar to Study 1, we asked participants to indicate how difficult it was to generate their dense (vs. sparse) network using a 1 (*not at all*) to 7 (*very much*) scale at the end of the survey. While participants reported more difficulty generating sparse (vs. dense) network (M = 2.65 vs. 3.22; SD = 1.80 vs. 1.87), $t(240) = 4.63$, $p < .0001$, 95% CI = [.33, .81], controlling for this variable in our analyses did not change any of the results (all resulting *p*s < .05).

[Insert Table 3 About Here]

Experimental manipulation. Following the cognitive network generator, participants were instructed to imagine themselves in two hypothetical scenarios in which they were in need of support. Specifically, participants read two scenarios in which they imagined that they had just experienced a break-in of their home, which led to severe damage (first scenario) and less severe damage (second scenario) respectively. The first scenario read:

> *Imagine that one day you arrive home and find that your home has been broken into. Some of your things, including irreplaceable keepsakes, have been taken, and others have been thrown on the ground and destroyed. You recount this story to the four people above. Think about how they would react.*

The second scenario read:

> *Now imagine a slightly different scenario. You arrive home and find that your home has been broken into, but nothing significant is missing and damage is minimal. You recount this story to the four people above. Think about how they would react.*

We created two scenarios that vary in their severity to potentially guard against any ceiling or floor effect. For example, it is possible that participants may perceive the hypothetical scenario to be too severe (or too mild), which can influence their perceived support and coping judgments

(e.g., “The damage is too much that my friends won’t be able to help me.”). Critically, participants were randomly assigned to think about receiving help from either their sparse or dense support network; the names of the alters from the corresponding network were listed back to the participants, reminding them of the 4-person network they generated.

Perceived support in the moment. For each scenario, participants indicated their perceived support in-the-moment from the randomly assigned support network using a 1 (*none at all; not at all*) to 7 (*very much; very certain*) scale. Given the high reliability observed among the three items in Study 1, we measured perceived support with two items in this study to avoid redundancy and reduce the survey length. The two items shown were “How much support would you be able to receive from these individuals?” and “How certain are you that you would be able to receive support from these individuals?” Because the ratings for the two scenarios were highly reliable ($\alpha = .91$), we averaged across the two scenarios to create a composite *perceived support* variable ($M = 5.68$, $SD = 1.24$). Analyzing the scenarios separately did not alter our results (all resulting ps $< .022$).

Coping. Participants indicated their sense of confidence in dealing with future problems on a 1 (*not at all*) to 7 (*very much*) scale. The items included “Knowing that you have these individuals to support you, how comfortable would you feel going into a stressful situation?” and “Knowing that you have these individuals to support you, how confident are you that you can overcome an obstacle?” ($\alpha = .85$; $M = 5.39$, $SD = 1.27$).

Mediators. Participants indicated their perceived entitativity of the recalled individuals in their support network (“To what extent do you view these individuals as a group?”; $M = 4.05$, $SD = 1.98$) and their inclusion of those individuals in the self (“How much are these individuals

a part of your identity?"; M = 4.20, SD = 1.67) on a 1 (*not at all*; *none at all*) to 7 (*very much*) scale.

Covariate. Given prior work showing that chronic (vs. state) perceived support operates as a cognitive personality construct (Lakey and Cassady 1990), we sought to control for this individual difference in the tendency to see others as supportive. Controlling for this variable allows us to assess the unique effect of activated density on perceived support above and beyond this trait (cf. Study 1). Specifically, participants indicated how much support they can receive from people they know, how much they can count on people they know for support (1 = *none at all*, 7 = *very much*), and how certain they are that they can receive support from people they know (1 = *not at all*, 7 = *very*). These items were introduced to participants at the very beginning of the survey so that their ratings reflect their chronic tendency to think of others and are not influenced by the process of cognitive network generation (Schwarz 1999). We averaged them to create a composite *chronic perceived support* variable (α = .93; M = 5.52, SD = 1.31).

Results

Based on the exclusion criteria established in our preregistration report, we excluded 11 participants (4 in the sparse condition) who failed to provide the full lists of their support networks, leaving a total of 240 participants (N_{sparse} = 122) in the analyses.

Table 4 presents correlations among all variables. To test H2 (i.e., density influences perceived support), we conducted an ANCOVA with condition (sparse vs. dense) as a between-subject factor and perceived support as the dependent variable with chronic support as a covariate. Consistent with H2, participants who imagined receiving support from a dense network reported higher perceived support (M = 5.94, se = .08) than those who imagined receiving support from a sparse network (M = 5.48, se = .08), $F(1, 237) = 15.95$, $p < .001$, d =

.53. Further, the chronic perceived support variable and perceived support variable have VIFs = 1.72 and Tolerance = .58, indicating that multicollinearity was not a concern. Excluding the covariate from the model did not alter the results (M_{dense} = 5.88, se_{dense} = .11, M_{sparse} = 5.53, se_{sparse} = .11), $F(1, 238) = 5.13$, $p = .024$, $d = .29$. This analytic approach is consistent with what we reported in our preregistration.

[Insert Table 4 About Here]

[Figure 2 About Here]

Does perceived network density promote coping through increased perceived support?

To test H3 (i.e., whether the increased perceived support from thinking about receiving support from a dense network promotes coping), we conducted a mediation analysis using Model 4 of the PROCESS macro for SPSS (Hayes 2012) with 10,000 bias-corrected bootstrap samples. Consistent with our hypothesis, the results revealed a significant indirect effect of density on coping through perceived support, effect = .23, 95% CI = [.11, .37]. Excluding the covariate from the model did not alter the results, effect = .24, 95% CI = [.03, .46].

What psychological mechanisms account for the density-perceived support effect?

Using the same approach, we tested for potential mechanisms underlying the link between density and perceived support. We entered both entitativity and inclusion of others in the self as simultaneous mediators in our model while controlling for chronic perceived support. The results provided support for H4a and H4b: Specifically, we observed significant indirect effects of density on perceived support through both greater sense of entitativity (effect = .13, 95% CI = [.007, .27]) and greater inclusion of others in the self (effect = .08, 95% CI = [.01, .17]). Excluding the covariate in the models only supported H4b: we observed a significant

indirect effect of density on perceived support through greater inclusion of others in the self, effect = .19, 95% CI = [.08, .33], but not through entitativity, 95% CI = [-.11, .25].

Full-path model analyses. For exploratory purposes, we also tested the density → entitativity → perceived support → coping serial mediation model with Model 6 of the PROCESS macro for SPSS (Hayes 2012) using 10,000 bias-corrected bootstrap samples. Consistent with our hypothesis, density positively predicted entitativity (b = 1.98, t(237) = 8.97, p < .0001, 95% CI = [1.54, 2.41]), which was positively associated with perceived support (b = .09, t(236) = 2.51, p < .01, 95% CI = [.02, .15]), which in turn predicted coping (b = .50, t(235) = 7.37, p < .0001, 95% CI = [.37, .63]). Importantly, the results indicated a significant indirect effect suggesting that the link between density and coping was partially mediated by entitativity leading to higher perceived support, effect = .09, 95% CI = [.02, .17]. Second, we tested the density → inclusion of others in self → perceived support → coping serial mediation model using the same approach. Density positively predicted inclusion of others in self (b = .98, t(237) = 4.82, p < .0001, 95% CI = [.58, 1.38]), which was positively associated with perceived support (b = .11, t(236) = 2.90, p = .004, 95% CI = [.04, .18]), which in turn predicted coping (b = .46, t(235) = 6.95, p < .0001, 95% CI = [.33, .60]). Again, a significant indirect effect emerged, suggesting that the link between density and coping was partially mediated by inclusion of others in self leading to higher perceived support, effect = .05, 95% CI = [.01, .10]. When we exclude the covariate in the models, only the second model was shown to have a significant indirect effect, effect = .13, 95% CI = [.06, .22].

General Discussion

We conducted two studies to assess how the manner in which people cognitively represent their close ties can influence perceptions of support. Specifically, the density of a cognitive support

network, chronically activated (Study 1) and experimentally manipulated (Study 2), predicted higher perceived support. Notably, the density-support link held while accounting for the amount of support people received from each alter, the domain of support (i.e., emotional, informational), and chronically perceived support among individuals. Moreover, preliminary evidence identified two psychological mechanisms—thinking of support providers as one entity and incorporating the support network as part of one's identity—that could account for our effect. These findings extend prior research by demonstrating the role of dynamic activation in shaping perceived support, as well as uncovering how group and identity processes may relate to cognitive network effects.

The present research makes several contributions. First, prior research posits that the particular cognitive representations of personal networks should lead to distinct psychological outcomes. While recent work has focused on how psychological states can influence the construction and activation of social networks (e.g., Shea et al. 2015; Smith et al. 2012), our findings highlight how the structure of activated networks itself matters for social resources (e.g., social support, coping). This underlines the need to tease apart the network activation process from the effects of the resultant structure. Furthermore, by taking a fixed-size approach in which each participant thought about the same number of alters, our studies extracted the unique role of density and illustrated the potential of manipulating real-world cognitive social structures (CSS). Finally, our findings contribute to the broader social support literature by demonstrating how structural elements of social support (i.e., perceived density) relate to functional aspects of social support (Cohen and Wills 1985).

Our findings also have implications for how people interact with their support networks, including the importance of how people *think* about their social resources. Since the

"supportiveness" of others is an important factor determining whether one would reach out to others for support (Small et al. 2015), it is possible that people are more likely to mobilize their network if they perceive supportive ties to be close to one another. As such, results from this research can inform future interventions aimed at increasing perceived support to produce positive outcomes (e.g., coping, resilience). Specifically, our studies suggest a novel, cost-effective perspective that focuses on helping people view their existing support networks as denser (vs. increasing the number of ties) to enhance perceived support.

Relatedly, the current work suggests that more attention is needed to consider how activated structure matters for daily well-being – regardless of whether direct mobilization occurs. That is, whether or not activated network density facilitates social interaction with different ties, these cognitive activations may still impact how individuals feel and their subsequent social behavior. Such downstream outcomes are increasingly relevant given the role of online technologies in augmenting social network activation in daily life (Bayer and Hofstra 2019). In this vein, the study of social network cognition and social support would benefit from more *in situ* research, which would allow for deeper insight into the moment-to-moment changes in network activation and how they underpin social resources (e.g., Bruening et al. 2016; Pachucki et al. 2015; Sekara and Lehmann 2014; Trieu et al. 2019). In doing so, adopting a dual focus on the scope of activation (i.e., who comes to mind?) and structure of activation (i.e., how are they connected?) may help uncover other psychological mechanisms (e.g., affect, motivation, cognitive load) that contribute to cognitive network construction.

While the current research adopted a fixed name-generator to enhance internal validity, we acknowledge that imposing a cutoff on a list of supportive others may increase disparities between the reported and actual support networks. However, some work suggests that a fixed-

choice generator may produce network structures similar to those created from a free-choice generator (Kogovšek and Hlebec 2005). Additionally, beyond controlling for size-based confounds, a fixed-generator approach provides a way to compare the set of network relationships most salient for different egos based on the context (e.g., support) – producing a proxy for the spontaneous network most likely to come to mind in practice (see also Marcum et al. 2017). Nonetheless, the 8-alter and 4-alter sets of activated nodes in our studies represent a small portion of the total possible network activated in daily life.

Another limitation in this research is the exclusion of ~3% of the sample (N=19 across both studies) from analyses who failed to call to mind 8 individuals in their networks. Future work is needed to understand how social network cognition may operate differently for this sub-population, particularly because our studies collected data exclusively on Mechanical Turk (MTurk). Although MTurk samples tend to be more representative of US population than college or in-person convenience samples, certain characteristics unique to MTurk samples may limit the generalizability of our findings. For example, compared to the general population, MTurkers tend to be younger, more educated, have lower income, and are less likely to live alone (see Paolacci and Chandler 2014). Because factors such as age or co-habitation are likely to influence network size, network density, and social integration (e.g., Cornwell, Laumann, and Schumm 2008), future studies should generalize our findings using diverse samples.

More broadly, given the potential (dis)advantages involved with each generator strategy, researchers should be cognizant of the trade-offs between different modes of network measurement. In particular, follow-up research should more carefully attend to the process of cognitive network generation. Although we sought to gain more control over this process by fixing the number of ties brought to mind and counter-balancing the two 4-alter name generators

to prevent order effects (e.g., participants list closer network members first), it does not allow us to completely tease apart whether participants were coming up with a dense/sparse network vs. close (or more objectively "supportive") network. This concern is somewhat addressed by the finding from Study 1, however, which revealed that density predicted support beyond the amount of support participants received individually from each alter. Given that the scope of our research was oriented toward the cognitive antecedents of perceived support, we believe our findings reflect more of a "psychological" phenomenon (i.e., denser networks are *perceived* to be more supportive) rather than a "structural" phenomenon (i.e., denser networks are objectively more supportive) (see Brands 2013). Nevertheless, pulling apart the close (or supportive) vs. dense network generation processes is a valuable endeavor, especially since close relationships are more likely to be central within a personal network (Freeman 1979).

Overall, the present research contributes to work on perceived support by integrating separate bodies of work. On the one hand, extensive research has focused on how the *structure* of actual (i.e., non-cognitive) social networks influence the quality of enacted support, which can subsequently influence one's perception of support (Lin et al. 1999; Thoits 2011). On the other hand, psychological research has extensively studied the contexts that can influence one's *perception* of support (Collins and Feeney 2004; Maisel and Gable 2009). Here, we build on both foundations by adopting the perspective that perceived support may be in part driven by the structure of the mental network that comes to mind at a given moment.

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Table 1. *Types of relationships for the nominees of emotional support network and informational support network in Study 1*

	Emotional	Informational
Friend	43.42% (587)	42.79% (582)
Family	34.62% (468)	32.36% (440)
Coworker	9.69% (131)	11.77% (160)
Romantic partner	7.47% (101)	6.99% (95)
Classmate	2.15% (29)	2.28% (31)
Roommate	1.41% (19)	0.81% (11)
Other	1.26% (17)	3.01 % (41)

Table 2. *Zero-order correlations for all variables in Study 1*

Variables	1	2	3	4	5
1. Emotional support (N=169)	--				
2. Informational support (N=170)	.62***	--			
3. Support network weighted density	.30***	.30***	--		
4. Support network unweighted density	.26***	.28***	.95***	--	
5. Average alter support	.61***	.60***	.52***	.50***	--

Note. $N_{emotional\ support}$ = 169 and $N_{informational\ support}$ = 170. Correlations have different sample sizes. $^{*}p \leq .05$. $^{**}p \leq .01$. $^{***}p \leq .001$ (two-tailed tests).

Table 3. *Types of relationships for the nominees of sparse network and dense network in Study 2*

	Sparse	Dense
Friend	57.08% (548)	43.96% (422)
Family	17.19% (165)	41.67% (400)
Coworker	16.35% (157)	6.98% (67)
Romantic partner	5.10% (49)	5.42% (52)
Classmate	1.56% (15)	0.63% (6)
Roommate	0.73% (7)	0.63% (6)
Other	1.98% (19)	0.73 (7)

Table 4. *Zero-order correlations for all variables in Study 2*

Variables	1	2	3	4	5
1. Perceived support	--				
2. Coping	.66***	--			
3. Chronic perceived support	.65***	.58***	--		
4. Entitativity	.18***	.10	-.04	--	
5. Inclusion of others in self	.32***	.34***	.20***	.36***	--

Notes. $^{*}p \leq .05$. $^{**}p \leq .01$. $^{***}p \leq .001$ (two-tailed tests).

Figure 1. Distribution of network densities in Study 1

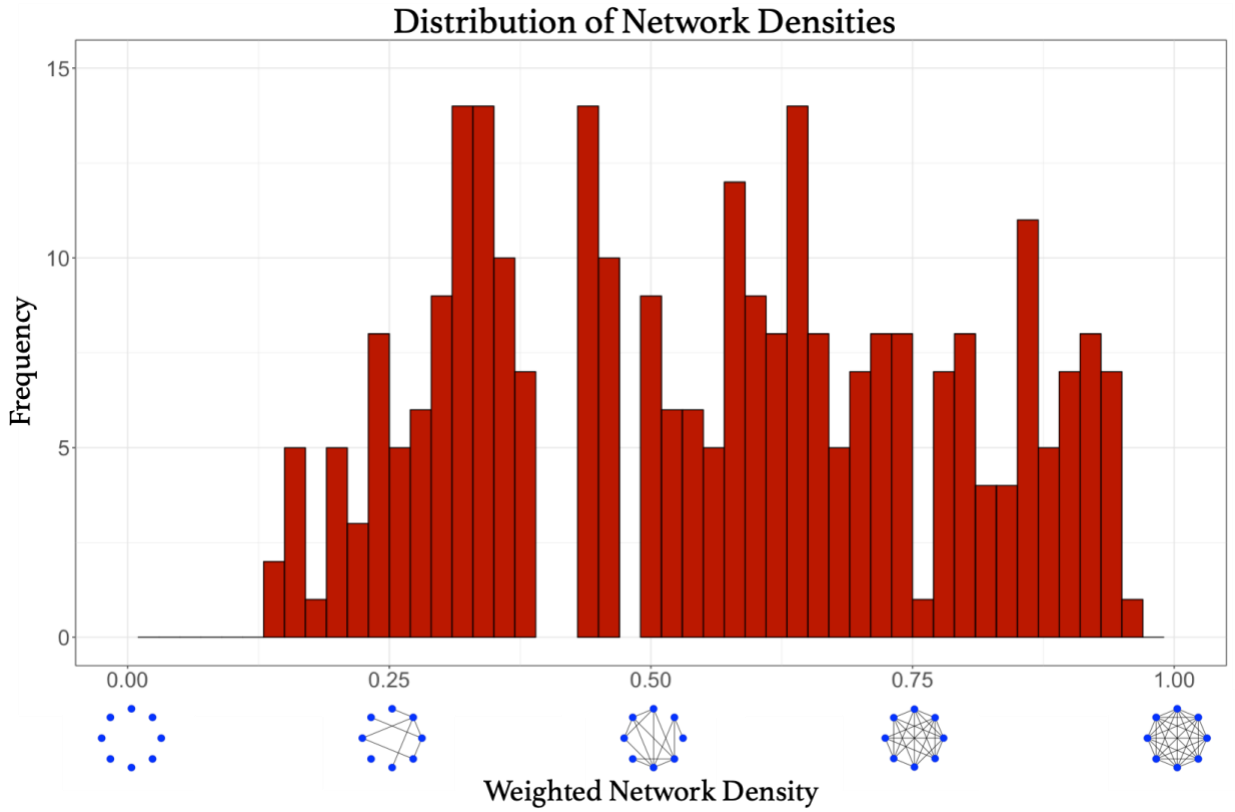

Figure 2: Effects of manipulated density on perceived support in Study 2