Cooperation, Resources, and Network Structure

Theory and Evidence from the Syrian Refugee Crisis [*]

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Abstract

How does network structure affect the capacity of communities to respond to
public goods problems? Arguments that make explicit or implicit claims about
the effects of network features – like group homogeneity and shared ethnicity –
have failed to account for the unavoidable endogeneity of network features. For
most network features, we cannot manipulate one feature of a network without
varying other features. I offer a theory that explicitly frames the trade-off
between network features, and argue that in situations where external resources
are necessary to mitigate problems, diverse groups will have an advantage over
homogeneous groups because of greater access to diverse resources, despite
their disadvantage in monitoring free-riding. Refugee communities are one
such setting. Although dense homogeneous networks facilitate cooperation by
helping to overcome the free-rider problem, they make cooperation less effective
by constraining access to external information about resources. I draw on a
social-network field experiment with Syrian refugees in Lebanon and Jordan
to show that while dense groups collaborated more in responses to community
problems, diverse groups demonstrated access to a wider range of information
and resources in their responses.

1   Introduction

How does network structure affect the capacity of communities to respond to public goods problems? A large body of literature makes explicit or implicit claims about the effects of network features, including group homogeneity and shared ethnicity, generally arguing that the density of shared ascriptive characteristics is robustly correlated with higher public goods provision (Habyarimana et al., 2009; Miguel and Gugerty, 2005). But until now this literature has largely failed to account for the unavoidable endogeneity of network features. For most network features, any naturalistic variation in one dimension, even random variation, will cause variation in other features as well. For example, we cannot conceive of naturalistic variation in group density that does not simultaneously alter other features of the network.

Explicitly incorporating this endogeneity into theory, I present an argument where higher network density comes at the cost of lower network diversity. Contrary to existing theory on group homogeneity and cooperation, I argue that when resource access is the binding constraint on cooperation diverse groups have a unique advantage in mitigating collective problems. This flows from the insight from network theory that groups with bridging ties to diverse individuals can access a broader range of resources and information to draw on to confront their problems (Granovetter, 1973).

Although dense homogeneous networks facilitate cooperation by helping to over-

come the free-rider problem, they make cooperation less effective by constraining access to external information about resources. This matters because the free-rider problem is neither the sole nor the primary obstacle to cooperation. Looking broadly at responses to social dilemmas, whether people have access to resources and information necessary for effective action will shape their choice to act or not. The availability of and constraints on information and resources are critical determinants of cooperation, and some communities lack resources to solve public goods problems even in the presence of strong trust and reciprocity. Although scholarship on resource availability and the prospects for effective cooperation has a long tradition in sociology and political science (McCarthy and Zald, 1977; Morris, 1986; McCarthy and Wolfson, 1996; Weinstein, 2006; Staniland, 2012), it remains missing from literature on group structure and cooperation. Whereas political science scholarship on networks and cooperation emphasizes the importance of internal information, which concerns the actions and resources of people in a group and serves to disincentivize free-riding, I highlight the role of external information about the actions and resources of people outside the group, which can incentivize cooperation by increasing the efficacy of contributions.

Refugee communities are one setting where resource access is the binding constraint on cooperation. Existing scholarship on refugee crises emphasizes the impor-

tance of refugees' networks in acquiring quotidian essentials like housing and a mobile phone (Steinberg, 2015) and obtaining the money and information needed to flee a war zone and settle in a safe country (Jacobsen and Landau, 2003). Beyond refugee contexts, networks have been widely demonstrated to affect political behavior. In their role as conduits of information, networks affect public goods provision and co-operation (Miguel and Gugerty, 2005; Habyarimana et al., 2009; Larson, 2017*b*) the survival of insurgencies (Parkinson, 2013), as well as people's choices to protest or rebel (Hassanpour, 2017; Steinert-Threlkeld, 2017).

This article offers theory and evidence about the effects of group structure on co-operation and public-goods provision within groups. Theoretically, I explicitly frame the trade-off between network features, and argue that in situations where external resources are necessary to mitigate problems, diverse groups will have an advantage over homogeneous groups because of greater access to diverse resources, despite their disadvantage in monitoring free-riding. This prediction flows from the distinction be-tween internal and external information and their respective functions in facilitating cooperation. By explicitly framing the claims of existing literature on the effects of group structure in terms of network theory, I highlight that although dense networks facilitate cooperation by helping groups overcome the free-rider problem, they limit access to information and resources from outside the group.

Empirically, I draw on a social-network field experiment with Syrian refugees in Lebanon and Jordan. To test my theory, I conducted a randomized controlled network field experiment in 56 focus group discussions with Syrian refugees, across 14 cities, towns, and refugee camps in Lebanon and Jordan. I randomly sampled 56 individuals from the UN Refugee Agency census and randomly assigned them to sit with a dense or diverse group in focus group discussions. A dense group is one where a high share of group members know each other and a diverse group is one where people have few redundant in-group connections. Experimental variation included recruiting other participants through either random sampling or referral recruiting, both from the UN Refugee Agency census.

To study cooperation around public goods problems in the focus groups, I presented participants with audio vignettes about community problems that are common in refugee communities. I developed the content of the vignettes based on over a year of qualitative fieldwork in Syrian communities in Lebanon, and in conjunction with Syrian, Lebanese, and Jordanian NGO staff who work with Syrian refugees. The public goods issues presented to participants included public safety, freedom of movement, redistribution of humanitarian resources, protection of private property rights and the right to income, and interaction with public authorities/security forces. Outcomes include metrics of cooperation and deliberation from focus group

transcripts, and survey data on participant characteristics.

Focus groups are an ideal and underutilized setting for experimental research and offer rich qualitative and quantitative data for ends ranging from exploratory research to theory testing (e.g., Cyr 2017). For this article, theory testing using a focus-group experiment, offers advantages over alternative experimental designs like survey experiments or lab games. A focus group experiment allows the researcher control over the group structure of participants, and provides an ideal setting for studying group deliberation.

To illustrate how networks facilitate responses to community problems, I present two case studies of camps in Lebanon's Beka'a valley in the online appendix, examining the ways that the two communities varied in the structure of their social ties, how residents leverage their networks to mitigate community problems, and the effectiveness of their responses to the 2015 trash collection crisis. Although the cases do not serve as dispositive evidence about causal relationships, they provide complex grounded discussion of networks, resources, collective problems and responses in the context of the Syrian refugee crisis, thereby complementing the more abstract theory and quantitative theory testing.

Both the experimental results and the comparative case studies provide evidence that dense groups demonstrate greater collaboration around collective problems, and

diverse groups draw on a wider range of resources. These findings provide novel evidence that dense networks have a disadvantage in the flow of external information and access to useful resources. Furthermore, the results resolve the tension between predictions from social network theory on diffusion through networks (e.g., Granovetter 1973, Granovetter 1983, Centola 2015) and the dominant explanation in political science and economics that dense networks transmit internal information well, which facilitates cooperation and public goods provision (e.g., Putnam 2007, Habyarimana et al. 2009). Theories that offer a link between group structure and cooperation without reference to information flow, such as altruism (Alesina and La Ferrara, 2005), norms of strong reciprocity (Putnam, 2000), and preference homogeneity (Alesina, Baqir and Easterly, 1999; Goldin and Katz, 1999), do not find support in the data.

2 Networks, Resources, and Cooperation

To explore the conditions that facilitate cooperation around community problems in refugee communities, I need a working definition of cooperation and community. I define *cooperation* as engaging with others in mutually beneficial activity (Bowles and Gintis, 2011). In addition to collaborative actions with a collective benefit, this definition of cooperation encompasses both actions where individual behavior has some collective benefit (e.g., voting in a democracy) and where multiple people work

together toward a common goal with benefits only for the actors (e.g., some forms of criminal activity). In this article, I examine problems where the benefits of responses are imperfectly excludable, or where there are positive externalities from the action. The key feature of the responses that I focus on is not that more than one person acts, but that any given person would be better off if someone else solved the problem. Consider the trash collection crisis that I discuss in the comparative case studies in the online appendix. In theory, trash collection could have selectively imperfect exclusion. One family could be excluded from trash collection, but the family would nonetheless benefit from the fact that trash collection made the community, in general, cleaner.

I draw on Bowles and Gintis (2002, 420) to define a *refugee community*, the unit of analysis for the study, as "a group of [refugees] who interact directly, frequently, and in multi-faceted ways." I conceive of *interaction* as relations between individuals or groups implying that parties are potential contributors and beneficiaries from each other's cooperation. Bowles and Gintis (2002)'s definition of community emphasizes the interactional and non-geographic nature of community, which is more general and useful for understanding how social ties define communities among people who do not necessarily live as close neighbors. Nonetheless, for populations with limited mobility, such as refugees facing legal vulnerability, a community must be geographi-

cally clustered for members to mutually contribute to and benefit from public goods. Therefore, in my conception of the interactions that define community, the interactions should take place within a fairly small geographic area, such as a town or an urban neighborhood. Accordingly, the primary sampling unit for focus groups was defined geographically as the village in rural areas, the town in peri-urban areas, and the neighborhood in cities.

Two literatures have developed separately related to network structure and information flow. A majority of work in political science and economics argues that one should observe more cooperation in densely connected groups because free-riding is more likely to be detected (e.g., Fearon and Laitin 1996, Miguel and Gugerty 2005, Habyarimana et al. 2009). Much of the work specifically studies the effects of shared ethnicity, which can be viewed as a network characteristic where density is defined with respect to ascriptive similarity. Social network theory, however, suggests that higher network density may inhibit the flow of information and resources important for cooperation (e.g., Granovetter 1973, Centola 2015), meaning that lower density networks may provide unique benefits for groups that need external resources for effective action.

In what follows, I discuss the predictions from the two literatures and highlight unexplored tensions and complementarities. Political science has largely failed to

recognize the implications of network endogeneity for causal claims about the effect of variation in network features. Social network theory has been more nuanced in considering this endogeneity, but has not considered implications for the study of cooperation. I then offer a set of testable predictions that emerge from the clarification of each theory. The project reported here advances this research agenda by bringing together two prominent literatures with a single theoretical and empirical strategy, resolving a previously unacknowledged tension, and expanding our theories of cooperation to refugee crises and groups with serious objective deprivations striving for social change.

2.1   Information flow and punishment

The dominant explanation in political science for the correlation between group density and public goods provision states that high-density networks facilitate information flow and effective in-group sanctioning (Fearon and Laitin, 1996; Putnam, 2000; Miguel and Gugerty, 2005). The flow of information increases the likelihood that free-riding is detected, that information spreads about the free-riding, and that the person in question can be located and punished. Because social ties transmit information, the higher a network's density the more opportunities people will have to share and receive information. Miguel and Gugerty (2005) clearly presents the

theoretical intuition in their model's assumption that "social sanctions and coordination are possible within groups due to the dense networks of information and mutual reciprocity that exist in groups but are not possible across groups" (p. 2330).

A great deal of empirical evidence supports these theories. Miguel and Gugerty (2005) find evidence in western Kenya that higher ethnic homogeneity in villages resulted in better provision of local public goods and services, a result that they argue is due to homogeneous communities facing lower costs in overcoming collective action problems associated with applying social sanctions. Tsai (2007) shows that local officials in China are more likely to provide goods and services when they are part of the same social groups as citizens, such as churches, rendering social sanctions more feasible. In Kampala, Uganda, Habyarimana et al. (2009) find evidence for a number of mechanisms for the robust positive correlation between ethnic concentration and public goods provision: people tend to interact more frequently with coethnics, believe they can better read information about coethnics, and may be better able to locate a specific coethnic if necessary.

2.2 Information flow and resource access

If we turn to social-network theory we find a seemingly contradictory prediction. Work on diffusion through networks states that members of a densely connected

group are more likely to be homogeneous, more likely to have redundant information, and less likely to have diverse information. If we think of information flow as the volume of *non-redundant* information that people transmit, the work in social network theory would predict that a dense group will have less information flow than a diverse group.

Social network theory offers numerous informal and formal theoretical tools for thinking about how diversity in a network increases the flow of non-redundant information. Granovetter (1973, 1983) argues that bridging ties between distant parts of a network tend to link diverse individuals, spreading information that recipients could not otherwise access. Blau and Schwartz (1984) writes that dense groups can be so clustered as to prevent meaningful contact outside that group, thereby stymying the flow of resources and information. Centola (2015) makes an argument with similar implications, writing that as the similarity of groups increases, the narrower the subset of the population to whom each person is exposed, arguing that the relationship between group similarity and information flow follows an inverse U-shaped curve.[1] Watts (1999, p.14) argues that the network characteristics of two connected

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[1]What I refer to as group similarity is formally called 'consolidation,' which is "the degree to which people's social position in one dimension of social life correlates with their position in other dimensions," a network feature conceptually analogous to diversity (Blau and Schwartz, 1984; Centola, 2015)

nodes, and the consequent dynamics of their interactions, are not determined by the type of tie, but rather by the structure of the network around them.[2]

Related predictions flow from resource mobilization theory, which asserts that almost any group of people striving for social change needs to marshal external resources and aggregate the resources for collective purposes subject to the structural constraints they face (Morris, 1986; McCarthy and Wolfson, 1996). Groups with serious objective deprivations will need to rely more heavily on external resources to realize their preferences for social change (McCarthy and Zald, 1977, 1225-6). In refugee communities, which generally face major objective deprivations, resources

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[2]A contrasting prediction comes from Aral and Van Alstyne (2011) who argues that dense networks have a higher volume of information flow in supply-driven environments with a wide range of information and potential ways to mitigate problems. In such situations dense groups may have an advantage. While the likelihood of novelty is higher for any given piece of information between network-distant (diverse) connections, the frequency and volume of information transfer (bandwidth) is higher between closer (more similar) nodes. The theoretical and empirical setting of the essay – employees in a business and acquiring clients – has key differences from refugees settings. Aral and Van Alstyne (2011) test their theory in a supply-driven high-information environment, whereas refugee attempts to mitigate collective problems occur in demand-driven low-information environments. Although the question would require a study that caries information evironments rather than group structure, I argue that in these situations bandwidth will prove to be less important than diversity.

valuable for mitigating community problems can include public services, material goods, information, human capital, and political connections.

2.3   Internal and External Information

Political science literature argues that dense networks facilitate cooperation by disincentivizing free-riding, and theory from network science argues that diverse connections facilitate access to a wide range of information and resources. Although these predictions may seem contradictory, I argue that they are in fact complementary because the literatures are talking about different types of information. Political science pertains to the flow of what I call *internal information*: information about the behavior, characteristics, and resources of in-group members. In contrast, social network theory focuses on the flow of what I call *external information*: information about the behavior, characteristics, and resources of out-group members. I define the relevant group according to the definition of community above as people who regularly interact, implying relations such that members of the group are potential contributors and beneficiaries from each other's cooperation.

In the article's discussion of Syrians' responses to collective problems, the term 'external resources' does not denote resources controlled by non-Syrians, but rather resources not controlled by the people in the group. In a particular refugee camp

facing a trash collection problem, this would probably mean that the in-group is people living in that camp. In a focus group discussion, it refers to the people sitting in a room discussing a topic with each other. The 'in group' and 'out group' for this study are not all Syrians and all non-Syrians in Lebanon, respectively, but rather groups of people who could mutually benefit from cooperation. The bounds of the relevant in-group and out-group for cooperation are shaped by characteristics of the problems that people face in addition to the individuals' characteristics.

2.4   Density-Diversity Trade-off

I use the predictions of the two literatures to develop the *Density-Diversity Trade-off*. A foundational intuition for the trade off is that density and diversity are endogenous and negatively related in social networks. This aligns with a widespread empirical regularity in social network studies that density and diversity are negatively correlated – dense groups tend to be less diverse, and diverse groups tend to be less dense. We can predict from political science that more density and less diversity means more internal information flow. From social network theory, we can predict that more density and less diversity means means less external information flow. As more people within a group share mutual connections, the range of non-redundant relationships decreases.

When we speak about network diversity, we need to define diversity with respect to what. In this context, the relevant content of diversity is the information and connections that in-group members have to out-group members. In the extreme case of a homogeneous group with respect to out-group connections, all group members are connected to the same out-group members. A more diverse group will have more diverse information due to a more diverse set of connections to out-group members.

Social networks exhibit a trade-off between density and diversity, which operates both probabilistically and mechanically. The trade-off operates probabilistically because people are more likely to form and maintain relationships with people similar to them (a feature of network formation known as homophily), a densely connected group is more likely to be homogeneous. We can also see the trade-off between density and diversity mechanically, where if we hold constant the average number of connections that group members have, as the group members know more people in the group, the share of connections to out-group members would need to decrease. This constraint is intuitive based on the plausible assumption that people have a finite amount of resources to establish and maintain relationships.

The trade-off between density and diversity matters for cooperation because, on the one hand, more internal information can facilitate cooperation by reducing the free-rider problem. On the other hand, more external information can facilitate

cooperation by increasing the effectiveness of group responses, and therefore the expectation that contributing to a public good will lead to a productive outcome.

With more access to resources that help mitigate community problems, the rewards of cooperation will be higher, while the costs remain constant, thereby incentivizing cooperation. Even in the absence of the free-rider problem, if people believe that their actions will fail, there is no reason for them to contribute. And in a context where a group doesn't have the internal resources to mitigate its own problems, access to a broader range of external information could be critical for mitigating problems. More diverse information may expand the toolkit that a group can leverage to mitigate a problem.

First, the density-diversity trade-off would predict from political science and economics that treatment groups will have higher internal information flow, which disincentivizes free-riding. Because free-riding is more costly in expectation, dense networks will manifest higher collaboration around community problems. In focus groups, this has the observable implication that people will engage more deliberation around public goods problems. Second, the density-diversity tradeoff would predict from social-network theory that treatment groups will have lower external information flow, which has the observable implication of less diversity of external resources that groups draw on in response to community problems.

H1: From political science and economics

> Treatment groups (recruited to be a dense group) will have higher internal information flow, and therefore more collaboration and deliberation

H2: From social-network theory

> Treatment groups (recruited to be a dense group) will have lower external information flow, and therefore less diversity of resources groups draw on in responses.

The assertion of a trade-off between density and diversity suggests that there may be an optimal balance between the two network features, and I argue that the optimal mix depends on the constraints on effective responses to problems that groups face in a given context. In situations where the free-rider problem is the binding constraint on cooperation, dense groups will do better. That is, if a group possesses the resources to mitigate a problem, then the major problem limiting cooperation will be people taking advantage of a common resource without contributing to it. In such settings, the possible solutions to the collective action problem in the literature (e.g., selective incentives, norms of strong reciprocity, altruism, among others) may prove necessary and sufficient to mitigate collective problems. In contrast, in situations where resource access is the binding constraint, diverse groups may do better.

Even when the conditions exist to overcome the free-rider problem, we are unlikely to see people cooperate by contributing to a public good or common-pool resource if they know that they lack the resources to translate action into outcomes. Because this study did not have variation in types of binding constraints that groups faced, I do not further explore the idea of an optimal balance between density and diversity in this essay.

3   The Syrian Refugee Crisis

In Lebanon and Jordan, most Syrian refugees live in urban and peri-urban settings. In Jordan 20% of Syrians live in formal UN camps, and although the UN has not established official refugee camps in Lebanon, 15% of Syrians live in informal camps.[3] Worldwide, refugees living outside camps is the norm; less than one third of the world's 22.5 million refugees live in camps.

In the early years of the refugee crisis it was fairly simple for Syrians to enter and reside in Lebanon or Jordan. However, legal restrictions on entry, residency,

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[3] People conversant in NGO/UN legalese may be familiar with the term *'informal settlement' (IS)* used to describe refugee camps in Lebanon. The term is meant to emphasize the fact that the camps are not run by the UN Refugee Agency. I maintain that the difference is more bureaucratic than useful, and I deliberately use the term 'camp' rather than IS

and work increased as the conflict continued, severely limiting Syrians' ability to enter the countries, and forcing the majority of those already residing there into legal and financial precarity. Lebanon and Jordan deny Syrians a general right to work and constrain their movement. For most refugees, any interaction with state authorities, such as police or government bureaucracy, can carry significant risk. In Lebanon and Jordan, Syrians fear passing through checkpoints due to the risk of abuse, arrest, and deportation. Traveling even short distances might involve passing through checkpoints, which means that Syrians cannot move freely; those who cannot legally move cannot safely work, visit family, go to hospitals to receive healthcare, or travel to urban centers to renew their documents.

Although Syrians cannot change the fundamental causes of their problems, they leverage their connections and resources in response strategies to meet their daily needs and ease their difficulties (what many Syrians referred to as 'making do,' *zabat al-hal*). The inchoate dynamic nature of refugee communities magnifies the importance of information about social, economic, and bureaucratic processes that many stable communities can take for granted. People continually search for information about safe travel routes, reliable employers, the current state of work-permit laws, and services available from NGOs and international organizations. Even with useful information, people's strategies may only be day-to-day responses rather than

permanent solutions, leaving people frustrated that they could not do more. The responses may be an ongoing negotiation between Syrians, or between Syrians and host-country nationals and organizations, or between Syrians and humanitarian organizations. The responses that people employ may be different each time they encounter a new problem, and may be a process of trial and error where people try a response to their problems, find that the response was ineffective or incomplete and try a different response the next time they encounter the same problem.

4   The Social-Network Field Experiment

I ran 56 focus group discussions with Syrians in Lebanon and Jordan to study how refugee communities cooperate in the face of collective problems. After randomly sampling 56 individuals from the UN Refugee Agency census, I randomly assigned those individuals to sit a focus group that was recruited through either a random sample or a referral sample. These two strategies created groups that have either high or low network density between participants, with respect to pre-existing ties. Random assignment was blocked by country, site, and gender. This produced one treatment group and one control group per gender per site, across 14 research sites in Lebanon and Jordan. Experimental variation in the focus group recruitment strategy allows us to study the impact of group structure on participant discussion of public

goods problems in the focus groups.

We can conceive of the two experimental recruitment strategies in network terminology. For each gender and site, we can conceive of the design as sampling two nodes from an undirected graph representing a social network. In one condition, a randomly sampled node is assigned to a group of other nodes randomly sampled from the graph. Under the counterfactual experimental condition, the randomly sampled node is assigned to serve as a seed for a referral sample of its network neighborhood, forming a dense group. We can directly compare the average characteristics in the two conditions to estimate the effect of a sitting in dense group rather than a diverse group.

I conducted the experimental sampling strategy as follows: First, I obtained the census of 1.7 million registered Syrians refugees in Jordan and Lebanon. I then purposively selected seven localities in each country to sample from. Therefore the network subsampling strategy draws on networks of the census of Syrian refugees in these 14 camps, towns, and cities.

Second, I randomly sampled individuals from the network. This entailed sampling two women and two men at random in each locality. One person of each sex was assigned to sit with a focus group of randomly sampled Syrians from the same locality. The other person of each sex was assigned to serve as a seed for the recruitment of

other participants into the dense focus group. Referrals had to live in the same town as the referrer, be the same sex as the referrer, be registered with UNHCR, not be a member of their nuclear family, and be between the ages of 20 and 50. The recruitment experiment creates variation in the network features of the groups that seeds sat with to discuss community problems. The 14 localities in Lebanon and Jordan range in Syrian population from a couple hundred people to tens of thousands. A random sample from tens of thousands of people will create a diverse groups that spreads far across the network of the sampling frame.

I designed and fielded the study as part of a broader World Bank research project on the effects of the Syrian refugee crisis on Syrians and host communities. Two experienced focus group moderators conducted the focus groups. I discuss details about the moderators, research assistants, transcriptionists, and other project staff in the appendix.

The study was designed such that all focus group participants could have been recruited for either experimental condition, which is critical for avoiding differential attrition correlated with people's social network characteristics. This means that *all focus group participants could have referred three people*. To achieve this, during recruitment I subsetted the data to remove social-network isolates. In practice, this means that when staff called potential recruits, they asked people to refer the three

people they interacted with most in the last two weeks. For both treatment arms, even those people in the diverse group whose referrals we would not subsequently use for recruitment, I ensured that all people sampled from the census could have participated in either experimental condition. If social network isolates had not been excluded, these unconnected people would have needed to drop out of the study if assigned to the dense group condition, but could have remained in the study if assigned tot he diverse group condition.

The research design has two key features: (i) random seed selection and (ii) random assignment of seeds to treatment. I sampled from UNHCR registration data, a census of all registered Syrian refugees in Lebanon and Jordan. The randomly sampled units are representative in expectation of the population meeting the study's inclusion criteria. Because the control group is representative in expectation of the population, we can interpret the experimental results in two non-mutually exclusive ways. The tests show how dense groups differ from the overall population, and we can also compare dense social groups and diverse social groups. Another desirable feature of random selection and assignment is that the characteristics of observed network neighborhoods are representative in expectation of the population's network neighborhoods. Therefore the experiment allows us to the compare groups that are representative of the real-world networks (control) to groups that are representative

of real-world groups (treatment).

4.1   Public Goods Vignettes

To study how Syrians engage in a group around community problems, I presented focus group participants audio vignettes describing problems that are common in refugee communities, and . In the audio vignettes, two Syrian men discuss problems that Syrian refugee communities commonly face. I wrote the scripts in Arabic and hired Syrian voice actors to record the scripts. I developed the content of the vignettes based on more than a year of qualitative fieldwork in Syrian communities in Lebanon, and in conjunction with Syrian, Lebanese, and Jordanian NGO staffers who work with Syrian refugees.

The scenarios capture common collective problems that Syrian refugees face in Lebanon and Jordan pertaining to issues of law and order, freedom of movement, resource redistribution, and the ability to earn a basic livelihood. The full text of the vignettes is available in the appendix and on my website, where the reader will find links to a video that includes the Arabic-language audio of the vignettes with English-language subtitles. Although the community problems have possible collective responses, the vignettes did not impose collective responses upon participants. Responses to the vignettes varied from disinterest to heated debate, and from

atomistic statements to communal responses.

The focus group moderator played the audio vignettes about 90 minutes into focus groups that lasted two hours on average, and the presentation and discussion of all four vignettes lasted about 15 minutes on average. The four public goods vignettes were played in random order in each focus group to eliminate order effects and facilitate consistency of measurement across focus groups.

A strength of the focus group setting is that we observe real groups of Syrians engaging in deliberative responses to realistic social problems. To attain evidentiary validity, vignettes should resonate with participants, which may not happen if the vignettes are designed based on misguided *a priori* conceptions of what community problems Syrians face. Therefore, I sought to achieve three goals in designing the audio vignettes' content. First, I aimed to maximize the realism and salience of scenarios. Second, I designed the audio vignettes to describe problems that were sufficiently general they would resonate with Syrians living in urban, peri-urban, and camp settings in both Lebanon and Jordan. Third, I made the content sufficiently specific to prompt meaningful discussion.

The focus group transcripts demonstrate that the issues raised in the vignettes resonated in a vast majority of focus groups. I coded whether people made statements about the relevance and irrelevance of the vignettes during the focus-group

discussions. In the majority of vignette discussions (79%) there was at least one explicit comment about the vignette's relevance (e.g., "This type of thing happens in our community"), and in only a small share of the vignette discussions (10%) did anyone say anything about its irrelevance (e.g., "This type of thing does *not* happen in our community").

After playing each vignette, the focus group moderator opened the discussion to the participants. Moderators did little to shape participants' responses to the audio vignettes. To help preserve excludability, moderators were not told about the intention of the construction of dense and a diverse groups, and were not told about the hypotheses under investigation.[4] The presentation of the vignettes was not heavily structured and participants were not prompted to respond in any particular way, or even respond at all. I trained moderators to do very little to guide discussion after the vignette audio files were played. At most, if participants asked what they were supposed to do, the moderators were trained to say something minimal like, "What would you do?" or "Can you do anything in this situation?" but explain no more and never express expectations that people work together.

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[4] Moderators did know that the groups were either people who mostly knew each other, or mostly did not know each other, which was necessary for practical reasons of getting participants into the right room.

4.2   Estimation

To estimate the effect of sitting in a discussion group with one's network or with a random sample of community members I present difference-in-means estimates for metrics of group deliberation in response to the public goods vignettes. I present with robust standard errors clustered at the focus-group level and randomization-inference p values calculated based on randomization at the focus-group level blocked by country, site, and gender.[5]

4.3   Randomization Check

I check randomization by testing for the observable similarity of randomly sampled participants across treatment arms, which includes all control-group participants and treatment-group seeds, and excludes treatment-group referral recruits. Because all participants in the diverse groups were randomly sampled from the census, we can treat all diverse group participants interchangeably as seeds, and therefore increase power in the randomization check. As we would expect under random assignment, participant questionnaire data shows that measured pre-treatment covariates of randomly sampled units are balanced across the two experimental conditions. I discuss

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[5] Although errors are likely correlated within regions as well as within focus groups, standard errors are clustered by focus group because it was the level of random assignment.

the randomization check in greater detail in the appendix.

4.4   Manipulation Check

I present the formalization of the manipulation checks and the detailed results in the appendix. First, as a basic test of design, I test whether referral groups had higher focus group density, defined as the share of realized ties to possible ties in focus group i, for example, if everyone knows everyone else in a group, the density is 1. If half of the possible dyadic relationships in a group are realized, the density of the group is 0.5 As shown in the appendix, across multiple metrics of participant connections the density of dense groups was much higher than that of diverse groups. The data clearly demonstrates that the groups assigned to the 'dense' condition are in fact more dense.

I also present manipulation checks for diversity in the appendix. Compared to dense (referral sampled) groups, diverse (randomly sampled) groups exhibit higher variance in terms of a number of ascriptive and descriptive characteristics including age range, marital status, household size, and number of days worked in the past month. These differences are not statistically significant, possibly due to the small sample size (that is, 56 focus groups). As discussed at length in the appendix, empirical measurement of diversity is more nuanced than density because direct mea-

surement of the network characteristics we care about to study information diversity is difficult.

5   Data

Measuring group deliberation allows for direct observation of information flow. Although information flow is not tangible, it is not a rarefied or abstract process. Information flows through networks through interpersonal communication in the form of the spoken and written word. Group discussion of how to respond to a problem and statements about which resources will be helpful are not just observable implications of information flow, but are in fact instances of information flow.

Data includes metrics of deliberation and cooperation in the focus groups capturing how focus group participants responded to the vignettes. I coded responses to the vignettes based on the transcripts. I was blind to treatment status while developing the vignette coding guide and while coding vignettes. I only merged treatment status with other covariates after I completed coding. Coding was not automated or predictive; I read and hand-coded all focus group transcripts using the qualitative data analysis software Dedoose, which then output the results in a spreadsheet for statistical analysis. Details of the coding guide and coding process are available in the appendix.

Two experienced focus group moderators conducted 56 focus groups, comprising 489 individuals and 223 vignettes (rather than 224, due to a focus group moderator error in presenting the vignettes). The average focus group had 8.7 participants, ranging in size from 6 to 10 participants. Attendance rates were balanced across treatment and control arms. Focus groups were either all-male or all-female, with no mixed-gender focus groups. All data collection was conducted in Levantine Arabic and all documents read to or distributed to participants were in formal Arabic. I speak the dialect fluently and all recruiters and focus group moderators were native speakers. I explained the content of the documents to participants in Levantine Arabic to ensure comprehension. I monitored all aspects of the study including recruitment, data collection, and focus group transcription. Recruiters read all people contacted a consent script approved by the Yale Human Subjects Committee under protocol HSC #1603017430. Focus group moderators read another consent script to participants before focus groups began. I discuss more details of study conduct and quality checks in the appendix.

I ran the focus groups in Lebanon in May and June 2016, and in Jordan in June and July 2016. Due to delays with obtaining permits for research in Zaʿatari camp, I ran the focus groups there in September 2016. I conducted pilot focus groups in Lebanon in May 2016 to improve the public goods vignettes, discussion

guide, and framing of the study. I present additional information in the appendix about site selection, blocking, assignment of moderators to focus groups, recruitment procedures, and focus group participant descriptives.

5.1   Participant Protection in Humanitarian Crises

Recruiting and conducting research with participants from a vulnerable population requires great care to minimize potential for harm. To decrease the transparency of recruitment identifiers I utilized the fact that a majority of Syrian adults have a nickname. During recruitment and focus group conduct the research team referred to participants by their nickname whenever possible. The widespread nickname system is based on the name of someone's eldest son or eldest daughter (if they have no son). For example, Um Ali (meaning Ali's mom) is the nickname for a woman whose eldest son is named Ali. Abu Muhammed (meaning Muhammed's dad) is the nickname for a man whose eldest son is named Muhammed. Sometimes a man without children uses a similar nickname, but replaces the name of a child with the name of his father, implying that when he has a son, he will name the son after his father, although it is also widespread among young men and men to use their father's name even if they do not plan to name their child after the father. Women who do not have children less frequently adopt such nicknames, although some adopted them during the early

days of the uprising to protect their identities.

Files including recruitment information and transcripts are password-protected and encrypted. People's responses are further protected by the fact that their statements and real names never appear in the same document. In the audio files of the focus group discussions, moderators referred to people by their nickname (which was written on a placard in front of each person at the beginning of the focus group to help the moderator with the nicknames), and the transcripts identify participants by their nickname.

In order to effectively anonymize focus group data while maintaining the ability to link respondent comments to respondent characteristics, focus group moderators consistently referred to participants in the focus group discussions by their nickname, and were trained to never refer to people in the focus group's by their real name. The post-focus group questionnaires recorded each participant's nickname and not their real name. With participant's nicknames recorded in the audio recordings, focus group transcripts, and post-focus group questionnaires, I can link focus group data to questionnaire data while maintaining participant anonymization.

5.2   Coding and Tagging

I tagged the transcripts according to a coding guide that I developed in partnership with three researchers who were not otherwise involved in the project. We each read a random sample of vignettes to define codes that capture salient dynamics in the discussions. The process was iterative. In the first stage, one outside researcher and I each read a random sample of transcripts, and documented the salient themes that we each found in the discussions. We met to consolidate our respective themes and collaboratively define coding rules for each thematic tag. Next, a second outside researcher read a random sample of focus group transcripts, and then read the draft of the coding guide, offering comments on existing themes and coding rules, and suggesting additional themes and coding rules. Third, a third outside researcher conducted the same procedure as the second. After all this feedback, I finalized the coding guide.[6]

The researchers who developed the coding guide and I were blind to treatment status while developing the coding guide and I was blind to treatment status while coding the transcripts. There is little information in the transcripts that would reliably reveal the treatment status of a group to a reader.

I randomized the order that I read the focus groups and the order of the vignettes

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[6]The coding guide is available on my website.

within each focus group. I coded the transcripts according to the coding guide and made no modifications to the coding guide after I began coding.

6   Results: How Does Group Structure Affect Group Cooperation?

To explore how group structure affects cooperation around public goods problems in refugee communities, I employ several statistical analyses to test my hypotheses. First, I present the experimental results for the effect of sitting in a dense group compared to a diverse group on behavioral metrics of cooperation and resource access drawn from transcripts of vignette discussions to test Hypotheses 1 and 2, about network density and the flow of information. In the next section, I present experimental tests of alternative explanations for the link between between group structure and cooperation that do not rely on information flow. In the online appendix I present comparative case studies of how two camps' collective responses to the Lebanese trash collection crisis in order to demonstrate how density and diversity affect responses to collective problems in a real-life setting.

6.1   Information Flow

The flow of information through networks may facilitate punishment of free-riders in dense networks and facilitate the spread of external information and resources in diverse networks. These propositions lead to two hypotheses. First, (H1) treatment (being placed in a dense group) increases internal information flow, which disincentivizes free-riding and incentivizes cooperation. An observable implication of this in the context of a focus group discussion is that treatment will increase engagement around discussion of public goods problem. Second, (H2) treatment (being placed in a dense group) decreases external information flow. An observable implication of this in the context of a focus group discussion is that treatment groups will be less likely to draw on diverse resources in response to public goods problems.

To test the first hypothesis, I proxy for a group's engagement in response to collective problems by examining the treatment effect on the amount of interpersonal discussion about the public goods problems. For each public goods vignette, I examine the number of comments where participants were actively discussing the issue on the table with other participants. Dialogue is coded as comments about the problem that either responded to a previous comment or prompted a direct response from another participant.

To test Hypothesis 2, I measure a group's access to diverse resources by looking
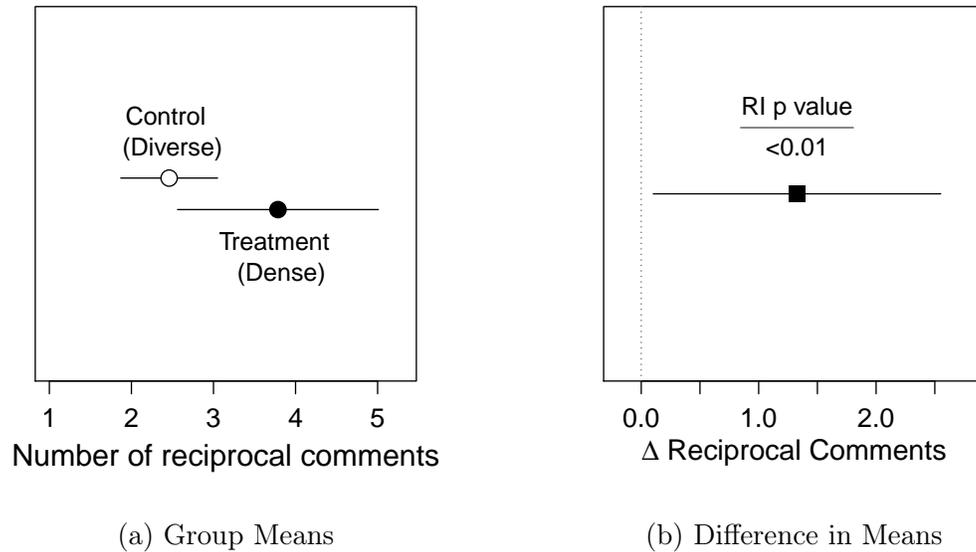
(a) Group Means

(b) Difference in Means

Figure 1: Internal Information Flow

at whether participants said that Syrians could turn to an outside party in response to the problem being discussed. Outcomes include a speaker saying that, in response to the public goods problem on the table, Syrians (a specific Syrian including the speaker, or Syrians in general) could turn to some resource outside the focus group members. I test for results across all resources that were discussed in any focus group. The resources discussed included Syrian leaders, brokers between the Syrian and the host community, traditional dispute resolution involving sheikhs (*sulha*), the host community, NGOs, and the national government.

HC2 robust standard errors are clustered at the focus group level. Also, we can

Table 1: Community-Problem Responses

	Dialogue	Leaders	Brokers	Sulha	Host	NGOs	Gov	Police
Control mean	2.46	0.1	0.17	0.14	0.2	0.05	0.39	0.07
$\hat{\beta}$	1.33	-0.06	-0.09	-0.08	-0.08	-0.04	-0.04	0.04
	(0.62)	(0.03)	(0.04)	(0.03)	(0.04)	(0.02)	(0.06)	(0.04)
RI p-value	<0.01	0.03	0.02	0.02	0.06	0.01	0.49	0.35

Notes: $n = 223$. $\hat{\beta}$ denotes difference-in-means estimate. HC2 robust standard errors, clustered at the focus-group level, are reported in parentheses. Randomization inference performed with 10,000 simulated randomized treatment assignment vectors, clustered at the focus-group level and blocked by country, site, and gender. Results are robust to adjustment.

see the randomization inference p value, which I calculate by randomly permuting the treatment assignment labels of the groups, following the blocking structure that was used for actual randomization.

In Table 1 the unit of analysis is the focus-group vignette. The outcome for the Dialogue column is a continuous measure of the number of reciprocal comments between two participants discussing the community problem. The mean number of comments per focus-group vignette (including moderator comments) was 14.01 (max: 63, min: 1). We can see a large increase in how much dense group participants engaged with each other in response to the community problems. The control mean shows that in diverse groups 2.46 comments were dialogue per vignette discussion,

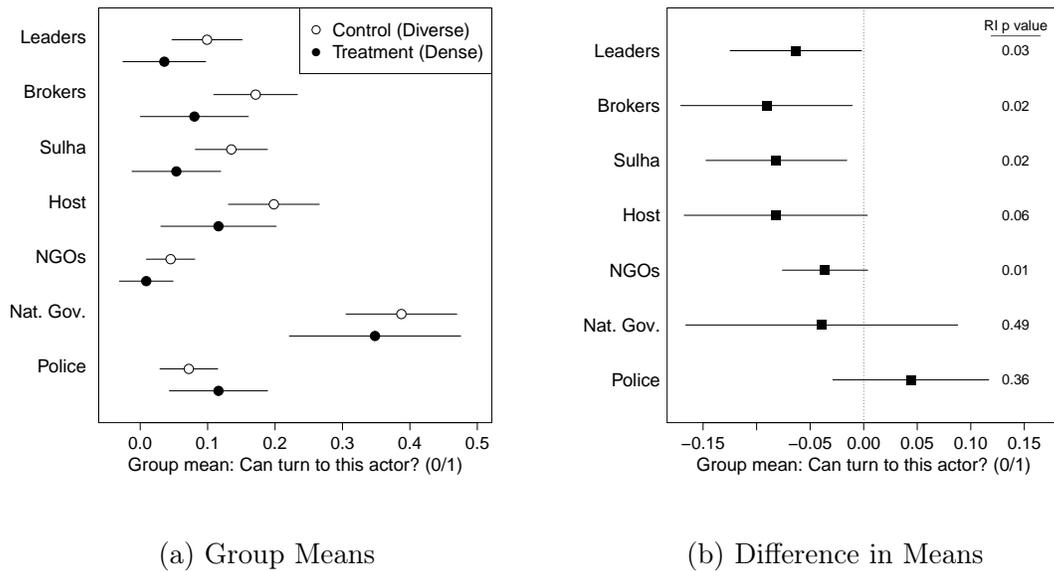(a) Group Means   (b) Difference in Means

Figure 2: External Information Flow

whereas the dense groups made 3.79 dialogue comments on average. This constitutes

a 54 percent increase from baseline in the number of dialogue statements, and a 12

percentage point increase in the share of comments that were dialogue, from roughly

22% of comments being dialogue in control to roughly 34% of comments in treatment.

And there were about 14.01 comments per vignette-focus group pair, which means

that the magnitude of this effect is a 10 percentage point increase in the share of

comments that are dialogue, rather than stand-alone comments.

The other outcomes in Table 1 are binary variables, and each indicates whether

at least one respondent stated that Syrians can turn to each actor in response to

the community problem. We see that across a range of actors, dense groups are consistently *less* likely to say that they could draw on these resources. Almost all results align with theoretical predictions. Point estimates are negative and the difference in means is statistically significant for all variables except the national government and police.

Across the different external resources, the diverse groups – the groups comprising a random sample from the community – more often made statements indicating belief that they or Syrians could turn to this resource to help mitigate the problem under discussion. That is, the treatment (dense) groups had a lower rate of saying that Syrians could turn to external resources like leaders to help mitigate the collective problem under discussion. This means the speakers both know about the existence of the resource and its usefulness, and believe there is some chance of accessing and mobilizing the resource.

Turning to results for the national government and the police, the findings are not what I expected from my theory. We see wide confidence intervals, and although the point estimate for the outcome of relying on the national government is negative, which aligns with theory, the sign of the point estimate for relying on the police is in fact positive. Very few groups discussed turning to the police as useful for mitigating their community problems. And the experimental null result suggests that network

structure does not change their accessibility. In contrast, the baseline rate of turning to the national government is quite high, but there is no strong evidence that social connections change accessibility.

Although I am hesitant to engage in post hoc theorizing (and another study would be necessary the test any refined hypotheses), I see these null results as suggestive evidence that there are bounds on what network ties can facilitate in collective problem solving. Social ties may not be a panacea for resources access. In this case, bureaucratic or threatening organizations may require more than just information about their existence for groups to benefit from them.

Next, I test for a treatment effect on explicit statements about *not* being able to rely on outside resources, which allows us to refine the interpretation of the treatment effect. The results presented in Table 1 in the previous section are based on statements like "We can turn to brokers in response to the problem." The treatment effect on negative statements, like "We *cannot* turn to the police in response to the problem," is a separate empirical question. I coded transcripts for both positive and negative comments about whether each type of outside resource would or would not be helpful. This analysis allows us to further test my argument by exploring alternative explanations for the link between group structure and group behavior. If we were to observe that diverse (control) groups make both more positive and more

negative comments about outside resources, it would suggest that diverse groups discuss outside resources more, and possibly are more aware of their existence, but the conclusion would be unclear as to whether diverse groups are better able to access external resources. However, if diverse groups are better able to access resources, we would expect to see a negative treatment effect on positive statements about outside resources, as we saw above in Table 1, and we would expect to see a null or positive treatment effect on negative comments.

The regression results are presented in Table 2. If having a greater amount of non-redundant information about outside resources in a group increases the group's ability to utilize those resources, we would expect to observe a negative treatment effect on statements about not being able to turn to outside resources. In keeping with the second interpretation, we find little evidence of a treatment effect on negative statements about the helpfulness of outside resources. First, no one made statements that Syrian leaders, brokers, traditional dispute resolution, or the police would *not* be helpful, so we see in columns 1-3 that the control-group mean and the treatment effect estimates are both 0. The one metric where we observe a statistically significant treatment effect in Table 2 is an increase in the number of vignette discussions where someone discussed not being able to turn to the national government, from 0 of 111 control-group discussions to 5 of 112 treatment-group discussions. It is worth noting

that if even one control-group discussion had mentioned not being able to turn to the national government, this result would go away. Nonetheless, the lack of a treatment effect on negative statements obtains across all variables except respondents' views about being able to turn to the national government.

Table 2: Not Able to Rely on Resources

	Not Leaders	Not Brokers	Not Sulha	Not Host	Not NGOs	Not Gov	Not Police
Control mean	0	0	0	0.23	0.03	0	0.25
$\hat{\beta}$	0	0	0	-0.04	0.02	0.04	-0.02
	(0)	(0)	(0)	(0.05)	(0.02)	(0.02)	(0.07)
RI p-value	1	1	1	0.42	0.5	0.02	0.75

Notes: $n = 223$. $\hat{\beta}$ denotes difference-in-means estimate. HC2 robust standard errors, clustered at the focus-group level, are reported in parentheses. Randomization inference performed with 10,000 simulated randomized treatment assignment vectors, clustered at the focus-group level and blocked by country, site, and gender. Results are robust to adjustment for observed covariates.

In summary, the social-network experiment provides supportive evidence for Hypotheses 1 and 2. The experimental results based on the focus group transcripts show robust differences in how dense groups respond to public goods problems relative to diverse groups. First, dense groups were more likely to engage in dialogue with each other, responding directly to one another's comments, as opposed to mak-

ing stand-alone statements. Second, dense groups were less likely to discuss turning to outside resources — including NGOs, leaders, brokers, and host community — in response to public goods problems. They were less likely to say that they would turn to leaders, brokers, dispute resolution mediated by elders (*sulha*), NGOs, the national government, and the host community. The estimated treatment effects on all proxies for access to information and resources are statistically distinguishable from zero, except for turning to the national government and police.

The experimental finding that treatment (being placed in dense group) increases engagement in response to collective problems supports Hypothesis 1 and aligns with the large body of existing evidence that dense groups have an informational advantage in monitoring and punishing free-riders. We also find supportive evidence for Hypothesis 2 that treatment (being placed in a dense group) decreases information about and access to diverse resources that support cooperation. As shown in the appendix, results are robust to covariate adjustment.

An anecdote from the conduct of the study highlights the importance of information and resources for refugees to confront their problems. Participants in the focus groups were given my contact information (my WhatsApp number for free texts and calls) as part of the informed consent form. In the year after the study was conducted, I received messages from and corresponded with dozens of participants.

Far and away, the most common general category of messages was requests for information, such as filing a claim for a service from the UN or an INGO, registering someone with UNHCR, or gaining access to medical services. The important point is that all the information is publicly available and has been promoted through UN and INGO information dissemination campaigns. Nonetheless, only once these participants were provided with a bridging tie to someone who had the information — in this case, me — were they able to get information that the UN and INGOs have been actively trying to deliver to them. Furthermore, the majority of these participants subsequently benefited from the information and services they had inquired about, ruling out the possibility that they had not received the information because they were ineligible for the services.

6.2   Alternative Explanations

6.2.1   Normative obligations and preferences

A number of explanations in the literature for the observed correlation between group density and cooperation do not rely on information flow. First, people in dense groups may cooperate more because they care about about each other's welfare, prefer working with each other, or share a sense of normative obligation (Putnam, 2000; Alesina and La Ferrara, 2005; Wood, 2003). People interacting with a group

of close acquaintances may be more likely to attend to the needs of others, thereby promoting cooperative behavior. Participants in dense groups, sitting with people whom they know and relate with, may more easily think of problems and responses as collective issues, or they may more readily feel the trust that is necessary for people to contribute to public goods (Kahan, 2003).

I test whether psychological mechanisms are at play in the observed differences between the dense and diverse groups using two metrics. First, if sitting in a dense groups causes people have exhibit more sociotropic preferences, participants in the dense experimental groups may express greater concern or recognition of the issue as one that affects the well-being of other people in the community, not just themselves. Therefore, I coded whether speakers in focus groups expressed concern or recognition of the problem as one that affects the well-being of people other than themselves and their family. This included statements that were either self-inclusive (e.g., "this affects us") or self-exclusive (e.g., "this affects many other people in the community, although not me"). In a second coding, I applied a higher standard of sociotropic preferences. I coded whether statements discussed the impact of the problem in the vignette on people excluding the speaker or their family members. Last, I coded whether comments stated that people should work together to mitigate the community problem.

As the experimental results in the appendix show, I find no detectable treatment effect on whether groups discussed the need for collective action, and no detectable effect on whether groups viewed the problems from a more collective or sociotropic perspective. The lack of evidence of psychological mechanisms aligns with existing studies, including Habyarimana et al. (2009), who find that people do not exhibit greater concern for their in-group peers' welfare and do not prefer working with in-group members over out-group members.

6.2.2 Network Location

Another alternative explanation is that dense groups may include participants who have different network locations in their real-world community. Even among similarly dense networks, the network location of key actors may have important effects on outcomes. Recent work in political science argues that different node location will produce different outcomes even when holding density constant, and that peripheral network locations may be more important for initiating and mobilizing high-risk collective action than central members (Larson and Lewis, 2016; Steinert-Threlkeld, 2017; Hassanpour, 2017; Larson, 2017*a*).

In the appendix, I present results for tests of whether dense groups are more central in real-world networks than diverse groups. Although we find no differences

between experimental subjects assigned to one condition or another in their network, we do find that the non-experimental participants in dense groups know more people in the community than those in the diverse groups. This means that the referral recruited participants are more central to the network, but as we saw in section 6.1, they still talk less about external resources. The results in section 6.1 about deliberation and access to diverse resources, with the treatment group turning to outside resources less in discussing their community problems. The fact that the diverse groups, even though they are less network central, still discuss a wider range of external resources, provides further evidence of the importance of diversity in facilitating access to non-redundant information.

7   Conclusion

The dominant explanation in political science for the correlation between group density and public goods provision is that group density facilitates the flow of information about members' actions and thereby support in-group sanctioning of free-riding. I have argued that the flow of information through networks also facilitates cooperation by affecting what external information and resources people are aware of and know how to access.

Overall, the results in the essay largely align with predictions from the density-

diversity trade-off, that dense groups have higher flow of internal information, and that diverse groups will have higher flow of external information. My metric for engagement – dialogue – was much higher among people assigned to dense groups, in line with the expectation from the theory that higher internal information flow within densely connected groups will produce higher engagement. I also see that the people assigned to dense groups exhibit less external information flow, and a way that we can see this, is that people assigned to dense groups less frequently talked about turning to useful external resources. Overall, the people assigned to dense groups exhibit a higher level of internal information flow and those in the diverse groups exhibit a higher level of external information flow. The data does not support alternative explanations for the correlation between network density and cooperation that do not rely on information flow.

What does this project suggest for policy design in humanitarian interventions? The experimental results in this article speak directly to policy makers' choices about who to bring into refugee community-driven and community-capacity-building programs. The underlying assumption of community programming is that beneficiary communities often have internal collaborative capacities to help themselves that aid agencies fail to recognize. My findings show that this approach will often not be the right answer. If refugee groups do not have the internal resources necessary

to mitigate their problems, NGO community-driven programming that attempts to leverage a group's ability to solve problems internally may be promoting precisely the wrong capacities. Rather than a group solving its own problems internally, it may be optimal for a group to go to outsiders for help. In refugee communities, program design may be more effective if NGOs support refugees in asking who they can go to for help, rather than asking how they solve a problem themselves. In communities where trust or reciprocity is the binding constraint for effective cooperation, building social ties and systems of accountability within the community can help. In communities where resource access is the problem, linking refugees to local authorities, service providers and surrounding neighborhoods, in ways that are sensitive to the dynamic vulnerabilities the refugees face vis-a-vis these actors, may be an effective way to facilitate access to resources necessary to meaningfully mitigate problems.

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