ACADEMIC PAPER

Give where you live: A social network analysis of charitable donations reveals localized prosociality

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Abstract

Millions of charities compete for donations, yet no empirical study has examined patterns of shared giving behavior across the nonprofit sector. To understand which types of charities are more likely to share donors, we conducted a social network analysis using behavioral data from 1,504,848 donors to 52 large charities in Australia. Three hypotheses were tested, which considered how patterns of shared donations may be determined by charity sub-type (e.g., health, social services, religious), type of beneficiaries (i.e., humans, animals, the environment), or geographic focus (i.e., international, national, regional). Overall, results indicate that patterns of shared giving are strongly shaped by geography: international charities typically share donors, as do charities operating in the same local region. Some—albeit inconsistent—evidence also emerged to support the notion that sub-type may be an organizing principle for donation distributions, but little support was found for the idea that beneficiaries influence shared giving patterns. A key managerial implication is that the practice of supporter list swapping may be most beneficial when lists are shared between organizations that both operate in the same geographic region rather than between organizations that both operate as the same sub-type of charity or both share similar beneficiaries.

1 | INTRODUCTION

Each year, Australians donate over $10 billion to charities and non-profits; yet this giving is dispersed among over 59,000 registered charities (ACNC, 2021). This kind of dispersed giving is observed all around the world: for example, there are 168,000 registered charities in the United Kingdom and over 1.5 million in the United States (Charity Commission, 2018; NCCS, 2020). Despite the importance of understanding how donors distribute their charitable dollars across the charity network, only a handful of studies have considered the question of charity section at all and no empirical research has investigated which types of charities are more likely to attract the same donors. For example, do charities share donors in relatively arbitrary ways, or rather are patterns of shared giving behavior explained by charity sub-type, beneficiaries served, or geographic focus? The current study fills this important gap by conducting a social network analysis on transactional data from over 1.5 million donors to examine their patterns of shared giving between 52 large charities.

1.1 | Understanding charity selection

Charitable giving refers to voluntary donations of money that benefit non-kin others (Bekkers & Wiepking, 2011a). Traditionally, scholars of giving have focused primarily on identifying who gives to charity and

why (e.g., Bekkers & Wiepking, 2011b; Konrath & Handy, 2018; Kwak & Kwon, 2016; Wiepking et al., 2012). This approach—focusing on who gives rather than which charities they give to—implies that generosity is to some extent an individual difference. Indeed, over 800 published articles have considered the donor characteristics that are associated with giving in general (Chapman et al., 2022).

If generosity is an individual difference, as the vast literature on donor characteristics implies, then an individual who gives to one charity may be more likely to give to other charities. There is indeed some evidence for such a "giving type" (de Oliveira et al., 2011) or "helpful personality" (Erlandsson et al., 2019), and we consider the possibility of undifferentiated giving in the present research. If shared giving patterns are undifferentiated, we would expect that charities could share donors with any other kind of charity.

Yet emerging evidence on charity selection suggests that donors are not universally generous. Instead, different donors give to different causes (e.g., Casale & Baumann, 2015; Chapman et al., 2018; Neumayr & Handy, 2019; Srnka et al., 2003; Wiepking, 2010), and do so in ways that reflect their identities, values, geography, and personal preferences (Berman et al., 2018; Breeze, 2013; Chapman et al., 2020; Grimson et al., 2020; Sneddon et al., 2020).

This burgeoning field of research on charity selection (summarized in Table 1) has demonstrated the need to understand not only who gives to charity but also which charities donors support. However, this field of enquiry is still in its infancy: Only approximately 20 research studies have considered the question of charity selection (i.e., which charities donors give to), compared to over 800 studies on charitable giving in general (i.e., if people give to any charity, or how much they give to all charities).

These early studies on charity selection have also been limited both in terms of scope and measurement. As we will show, several factors have been considered as explanations for charity preferences, including sub-type, beneficiaries, and geography. Yet these factors are typically studied individually. The current research will expand the scope of research on charity selection by instead considering these three explanations concurrently.

Survey methods have generally been employed and have limited the measurement of charitable giving to self-reports of past giving or low-stakes donations of research participation bonuses. Research has shown that self-reports of giving are affected by a social desirability bias (Lee & Sargeant, 2011). Particular types of charities may therefore be over-disclosed (e.g., child protection) or under-disclosed (e.g., addiction services), depending on the social value ascribed to the cause or beneficiary (see also Chapman et al., 2020). This potential for bias means that actual behavior is a more accurate way to understand giving. There is also evidence that people behave differently with "windfall" funds, such as bonuses received in laboratory contexts, than with money they have earned (Carlsson et al., 2013; Li et al., 2019). Although behavioral measures are becoming more common in charitable giving research, so far only one study on charity selection has examined transactional data to examine people's donations of their own money (see Sargeant et al., 2008). The current research will therefore help to extend understanding of charity

selection by examining actual behavior and considering three possible determinants of charities' shared supporter bases.

1.2 | Potential determinants of giving patterns

There are several possible factors that might influence which charities share more donors. The first possibility is that consumers show no meaningful patterns. As discussed above, some scholarship on charitable giving has considered giving as an individual difference, with some people being more generous than others (e.g., Bekkers & Wiepking, 2011b; de Oliveira et al., 2011). If true, this "generosity trait" could be leveraged by any (or many) charities and we would expect all (or most) charities to share donors equally. The practice of supporter list swapping, where charities swap or sell their donor lists to other charities, is founded on a similar assumption: that donors who already support one charity will be more likely to give to another charity (Abdy & Barclay, 2001). Therefore, we propose the null hypothesis:

> **H0.** *All charities are equally likely to share donors, with no observable patterns of which charities share more donors.*

Alternatively, shared giving patterns may indicate that certain factors shape the combination of charities that consumers support. Patterns of shared donations may be indicated either by clustering of charities that share high numbers of donors or the relative centrality of organizations in the charity network. We consider three possible factors that may explain which charities share more donors: sub-type, beneficiaries, and geography.

As mentioned above, there is an implicit assumption in the literature that charity sub-type is an important organizing factor for consumer decision-making. Sub-types are categories representing the nonprofit's mission or type of work that it does. Sub-type categorization is frequently used both in nonprofit scholarship (see Table 1) and industry practice (e.g., ACNC, 2021). For example, sub-types are often used within the sector to categorize different charities for benchmarking, reporting, and regulation purposes. The sub-types measured are usually bespoke, meaning there is not a consistent inventory of sub-types used across all research in this field. For example, the number of sub-types examined in the studies summarized in Table 1 ranged from 3 to 13.

Survey research has shown that different types of customers prefer to give to different sub-types of charity (e.g., Bennett, 2003; Chapman et al., 2018; Kolhede & Gomez-Arias, 2021; Kottasz, 2004; Micklewright & Schnepf, 2009; Neumayr & Handy, 2019; Wiepking, 2010). For example, older and religious people are more likely to support faith-based charities, while people from average-to-high socioeconomic groups are more likely to give to culture-focused nonprofits (Wiepking, 2010). Underlying motives for giving also vary as a function of sub-type (Chapman et al., 2020; Robson & Hart, 2020; Sneddon et al., 2020). For example, donors to health and religious charities are more motivated by self-oriented concerns while

TABLE 1 Summary of key literature on charity choices

Article	Country	Sample	Method	Giving variable	Charity grouping variable		
					Sub-type	Beneficiaries	Geography
Bennett (2003)	United Kingdom	250 individuals	Survey (face-to-face)	Hypothetical	*		
Srnka et al. (2003)	Austria	264 individuals	Survey (postal)	Self-reported: value	*		
Kottasz (2004)	United Kingdom	217 individuals	Conjoint survey (paper, online)	Self-reported: ranked charity preferences, frequency of giving, value	*		
Sargeant et al. (2008)	United Kingdom	1255 donors	Survey (postal)	Behavior: number of gifts, total value, last donation value	*		
Micklewright and Schnepf (2009)	United Kingdom	9050 individuals	Survey (face-to-face)	Self-reported: incidence	*		*
Wiepking (2010)	Netherlands	1246 households	Survey (postal)	Self-reported: incidence	*		
Bachke et al. (2014)	Norway	90 students	Dictator games	Behavior: value donated from windfall	*	*	
Hansen et al. (2014)	New Zealand	687 students	Discrete choice experiment (online)	Self-reported: stated preferences with consequences		*	
Casale and Baumann (2015)	United States	3198 households	Survey (telephone)	Self-reported: incidence	*		*
Knowles and Sullivan (2017)	New Zealand	215 individuals	Survey (online)	Behavior: charity selected to receive donation from researchers			*
Chapman et al. (2018)	Australia	1051 donors	Survey (online)	Self-reported: charities supported	*		
Erlandsson et al. (2019)	Sweden	1050 individuals	Survey (online)	Self-reported: incidence		*	
Herzenstein and Posavac (2019)	United States	1801 individuals	Experiments (online)	Behavior: value of windfall payment; charity selected to receive donation from researchers; Hypothetical: value			*
Neumayr and Handy (2019)	Austria	1011 individuals	Survey (face-to-face)	Self-reported: incidence, value	*		
Chapman et al. (2020)	117 countries	1849 individuals	Thematic analysis	Self-reported: preferred charity	*		
Grimson et al. (2020)	New Zealand	280 individuals	Field experiment	Behavior: charity selected to receive donations from researchers			*
Robson and Hart (2020)	United Kingdom	398 individuals	Survey (online)	Self-reported: donation intentions	*		*
Sneddon et al. (2020)	Australia, United States	1318 donors	Survey (online)	Self-reported: incidence	*		
Genç et al. (2021)	New Zealand	1232 individuals	Discrete choice experiment (online)	Self-reported: charity selected to receive share of donation from researchers			*
Kolhede and Gomez-Arias (2021)	United States	680 individuals	Survey (face-to-face, online)	Self-reported: sub-types most likely to support	*		
Robson and Hart (2021)	United Kingdom	1004 individuals	Survey (online)	Self-reported: donation likelihood			*

Note: Articles are listed in chronological order. Incidence refers to whether someone donated or not in the past, while value refers to the amount they donated. Asterisks (*) denote which charity grouping variables were examined in each study.

donors to international, welfare, and animal charities are more motivated by other-oriented concerns (Chapman et al., 2020). Such evidence suggests that sub-type may be an organizing principle for donors when they determine how to spread their donations across different charities. Therefore:

> **H1.** *Shared giving will be observed more commonly among charities of the same sub-type.*

It is also possible that consumers are drawn to support particular beneficiaries over others. For example, Chapman et al. (2020) surveyed donors around the globe and found strong preferences for some types of beneficiaries, notably children, animals, and people overseas (see also Bachke et al., 2014; Body & Breeze, 2016). Preferences for helping some groups, such as children, may be explained by donor preferences for supporting more vulnerable groups or people in countries that are perceived to have greater need (Bachke et al., 2014; Hansen et al., 2014). Whatever the driver, such research indicates that donors may also see the beneficiary group as an important organizing principle in determining their giving choices. Therefore:

> **H2.** *Shared giving will be observed more commonly among charities that serve the same beneficiaries.*

Finally, geography may inform donor decisions. Survey and experimental data suggest donors prefer charities working in their own country compared to charities working in other countries (e.g., Casale & Baumann, 2015; Genç et al., 2021; Knowles & Sullivan, 2017). Looking at the regional level, Grimson et al. (2020) evidenced an extremely strong preference among New Zealanders for giving to charities that were based in each donor's own province: donors residing in the South Island province of Otago were 52 times more likely to select one of the two Otago-based charities to donate to compared to donors who lived in the North Island of New Zealand. Donors may therefore show a preference for giving to more local (vs. more distant) charities (Herzenstein & Posavac, 2019); although Robson and Hart (2021) found that causes with a national focus were preferred over both international and local causes. Nevertheless, geographic focus may also be an organizing principle for donors' charitable giving preferences. Therefore:

> **H3.** *Shared giving will be observed more commonly among charities with the same geographic focus.*

1.3 | The current study

Using behavioral data from over 1.5 million Australian donors, we examine the patterns of shared donations between 52 major charities. Specifically, we ask which charities share greater numbers of donors. The objective of the research is to identify which factors may shape the types of charities that share donors. To this end, we test three hypotheses (outlined above) based on past research that can explain any patterns observed.

Hypotheses 1–3 propose that shared giving will be observed more commonly between charities with the same sub-type, beneficiaries, or geographic focus, respectively. These three factors were chosen both because they have been studied in the fledgling literature and because they are practically feasible to assess using the available data. Shared giving can be demonstrated by (a) occupying a central position in the network graph; (b) occupying the same cluster within the network; or (c) higher network centrality measures (i.e., in-degree and out-degree). Meeting a greater number of these criteria will be taken as stronger evidence for sharing donors.

The three hypotheses are not mutually exclusive. It is possible that all three patterns could be observed, or none of them. Broadly speaking, we present the following analyses as a large-scale, behavioral test of shared giving patterns that can help guide the generation of theory and further empirical research on the important question of charity allocations. A particular strength of the current study is that it examines actual charitable behavior as captured in nonprofit organizations' transactional databases.

The current study extends previous research on charity selection by analyzing shared giving patterns within a network of large charities. The factors that influence the charities that donors choose to support are important to understand because donors must choose how to allocate their donations between vast numbers of registered charities. Yet, as outlined above, research on charity selection is still in its infancy. The current research addresses a question of great theoretical and practical value, which has nevertheless been comparatively neglected to date. We also provide the first empirical test of the *relative* influence of three possible determinants of shared giving behavior that have previously been studied in isolation: sub-type, beneficiaries, and geography. By understanding the factors that most strongly explain which charities share more donors, nonprofit marketers will be better equipped to understand which organizations are most likely to be competitors or potential collaborators. Results can also inform fundraising strategies, such as supporter list swapping.

2 | METHOD

2.1 | Sample

Secondary data from a national benchmarking project were shared with the researchers free of charge for scholarly purposes. The researchers received no payment for their work with these data. Fifty-two large Australian charities gave permission for their de-identified data to be shared. Transactional giving data were included from 1,504,848 active donors in Australia in 2015. This represents about 10% of all Australian donors that year (Giving Australia, 2016). The benchmarking agency provided these data with donors pre-matched on name and address across all charities. However, no identifying information was provided: donors were identified in the data file only by a reference number. Information on donor status (whether each donor had made any donation to each charity in the year) was provided in the data. This information was based on actual transactions and thus represents donor behavior. Using these

TABLE 2 Descriptives for charities (including centrality measures) within the directed networks based on 1%, 5%, and 10% of donors shared

Charity	Sub-type	Number of donors	Size	Geographic focus	Beneficiaries	1% shared donors		5% shared donors		10% shared donors	
						In-degree	Out-degree	In-degree	Out-degree	In-degree	Out-degree
31	Health	72,322	L	National	Humans: sick people	51	45	40	17	26	6
10	Research	88,798	L	National	Humans: sick people	51	41	36	8	22	1
9	Health	123,196	L	International	Humans: sick people	51	36	41	5	19	0
13	Social services	44,937	M	National	Humans: people with disabilities	49	46	32	19	16	8
16	Social services	58,528	M	National	Humans: people with disabilities	50	43	29	11	14	2
28	Mixed	58,315	M	National	Humans: children	49	41	29	12	12	1
44	Social services	30,030	S	National	Humans: people with disabilities, children	47	46	27	20	11	11
45	Mixed	30,446	M	National	Humans: children	47	45	23	18	6	9
30	Social services	34,262	S	National	Humans: people with disabilities	47	43	21	14	6	8
14	Research	92,213	L	Regional	Humans: sick people	37	26	15	1	6	0
26	Environment	44,060	M	National	Environment	50	45	23	12	5	1
43	Mixed	28,997	M	National	Humans: sick people	47	46	22	16	3	8
41	Health	17,754	M	Regional	Humans: sick people	28	33	5	14	3	5
32	Research	26,417	L	Regional	Humans: sick people	26	28	5	9	3	3
18	Animal	32,523	M	Regional	Animals	27	26	4	4	3	0
11	Education	80,013	L	National	Humans: children	51	36	23	5	2	0
42	Health	22,398	M	Regional	Humans: sick people	29	32	8	16	2	5
17	Sports	43,431	M	National	Humans: children	49	39	15	8	1	0
8	Mixed	52,888	M	National	Humans: children	45	33	15	6	1	0
40	Social services	20,041	S	National	Humans: children	28	32	10	17	1	10
25	Health	21,047	L	National	Humans: sick people	26	34	4	9	1	0
19	Animal	21,513	M	Regional	Animals	29	34	3	5	1	0
47	Health	15,387	S	Regional	Humans: sick people	27	34	3	15	1	3
34	Social services	23,015	M	Regional	Humans: people with disabilities	19	26	1	4	1	0
49	Mixed	3721	M	Regional	Humans: sick people, people with disabilities	13	35	1	23	1	13
51	Health	4753	S	Regional	Humans: sick people	9	33	1	16	1	7
3	Mixed	320,877	L	International	Humans: children, people overseas, families	51	8	25	0	0	0
2	Mixed	147,244	L	International	Humans: people overseas	51	18	16	2	0	0
46	Research	30,808	S	National	Humans: women	43	40	11	12	0	2
15	International	89,178	L	International	Humans: poor people	51	23	9	3	0	0
38	Social services	13,148	S	National	Humans: children	31	38	8	24	0	14
5	Social services	79,927	L	International	Humans: children	51	24	6	2	0	0
35	Animal	13,635	M	Regional	Animals	20	32	4	10	0	1
6	Environment	43,510	M	National	Environment	42	26	3	4	0	0
48	Mixed	31,559	S	National	Humans: sick people, families, children	23	23	3	0	0	0
7	Environment	64,532	M	International	Environment	34	14	2	0	0	0
20	International	26,071	M	International	Humans: people overseas	42	40	1	8	0	1
39	Emergency	12,674	S	International	Humans: people overseas	37	46	1	17	0	4

TABLE 2 (Continued)

Charity	Sub-type	Number of donors	Size	Geographic focus	Beneficiaries	1% shared donors		5% shared donors		10% shared donors	
						In-degree	Out-degree	In-degree	Out-degree	In-degree	Out-degree
4	Animal	11,053	S	Regional	Animals	34	44	1	24	0	11
22	Social services	9048	S	National	Humans: people with disabilities	28	38	1	20	0	7
24	Environment	36,834	M	National	Environment	27	19	1	4	0	0
33	Social services	10,777	S	Regional	Humans: children, families, people with mental illness	15	29	1	6	0	2
1	Mixed	61,020	L	International	Humans: children	46	22	0	0	0	0
27	Health	11,720	M	National	Humans: children	35	46	0	20	0	8
23	Religious	32,950	M	International	Humans: children	34	27	0	3	0	0
29	Health	12,010	S	National	Humans: people with mental illness	25	42	0	10	0	1
52	Religious	6198	S	Regional	Humans: poor people, homeless people	19	36	0	23	0	9
12	Health	5280	S	National	Humans: sick people	11	34	0	13	0	4
36	Environment	5846	S	Regional	Environment	10	33	0	10	0	1
21	International	8103	S	International	Humans: people overseas	4	32	0	5	0	0
50	Health	5974	L	National	Humans: sick people	3	35	0	5	0	2
37	Mixed	2546	M	International	Humans: people overseas, poor people	0	22	0	0	0	0

Note: S, small; M, medium; L, large; Charities 14 and 32 are regional operations of the same national charity brand, as are charities 41 and 42 and charities 47, and 18 and 35. Charity 16 is a sub-brand of charity 13, and charity 51 is a regional operation of the national charity 50. Charities are presented in descending order of in-degree centrality, sorted based on the 10% then 5% then 1% networks.

data, we extracted a matrix indicating how many donors were shared between each of the 52 charities, and what percentage of each organization's donor base was shared with each other charity.

2.2 | Pre-testing

Geographic focus was determined based on information from the charities' websites. However, to categorize the charities into sub-types and beneficiaries, we conducted a pre-test with a community sample recruited through posts on social media and participating charities' social network pages ($N = 457$). Pre-testing ensured that we classified charity sub-types and beneficiaries according to public perceptions; important given our interest in inferring donor psychology from the patterns observed and because donors may mentally categorize charities in different ways than charities do (Body & Breeze, 2016). Further, pre-testing was necessary to identify discrete sub-type categories because the national charity registry allows charities to nominate multiple sub-types. Details of the pre-testing sample and method are available on the Open Science Framework: https://osf.io/9fbqd/.

Participants were randomly allocated to view five of the 52 non-profits' mission statements. For each, participants were asked: "What category best describes the work of this organization?" Participants were presented 15 possible response options, based on the United Nations nonprofit reporting guidelines (UN Statistics Division, 2003). The sub-types included in the analyses below were those that were

selected by a majority of participants. The sample of charities consisted of 11 health, 10 social service, 5 environmental, 4 research, 4 animal protection, 3 international, and 2 religious charities. There was also one charity each focused on sport/recreation, education, and emergencies plus 10 with a mixed focus.

Participants also responded to a question about beneficiaries: "Which of the following beneficiary groups do you think the organization serves?" There were 13 different response options: children and youth, animals, people overseas, sick people, poor people, women and girls, people with mental illness, people with disabilities, the environment, families, homeless people, elderly people, other. Due to a restricted sample size (52 charities), we needed to limit the number of different beneficiary categories being considered to maximize power to detect effects in the data, if they were present (see Brooks & Johanson, 2011). We therefore categorized beneficiaries into three higher-order beneficiary groupings—animal (charities benefiting "animals"), environment (charities benefiting "the environment"), and human (all other beneficiary categories)—for the purpose of analyses. More granular beneficiary detail is also provided in the results section.

2.3 | Analyses

Social network analyses were conducted using the igraph package for R (Csardi & Nepusz, 2006) and UCINET (Borgatti et al., 2002). First, we represent the network of 52 charities based on the total number
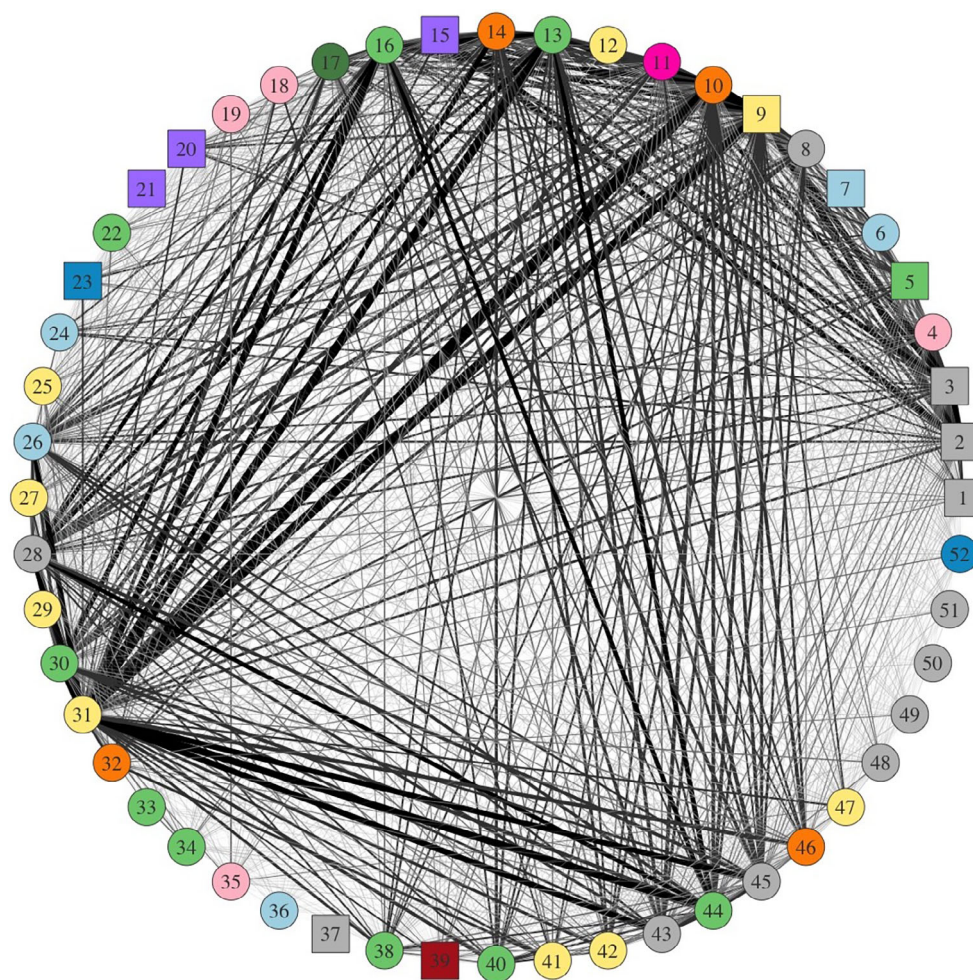
FIGURE 1 Graph of undirected charity network. Nodes are charities, edges are weighted based on number of shared donors. Node shape indicates scope of operations: Circle = national or regional; square = international. Node color indicates charity sub-type: Yellow = health; green = social services; orange = research; light blue = environment; purple = international; light pink = animal; dark blue = religious; red = emergency; dark green = sports and recreation; bright pink = education; gray = mixed sub-type. [Colour figure can be viewed at wileyonlinelibrary.com]

of shared donors between each charity to understand the components of the network. We also ran clustering analysis on the charity network, considered as undirected (i.e., if two charities share any donors, they have a reciprocal tie). Second, we graphically represent the charity network based on the percentage of an organization's donors that also gave to each of the other charities, and vice versa. Finally, we used organizational characteristics to predict their centrality in the networks based on the percentages of donors shared using Analysis of Variance (ANOVA) with UCINET.

## 3 | RESULTS

3.1 | Describing the network

Fifty-two nonprofits are included in the analyses (see Table 2). In the first instance, we conducted a charity network analysis based on the number of shared donors. The network visualization of the relationships between all 52 charities in our sample is reported in Figure 1. The charities form the network *nodes*, while the *edges* (i.e., lines connecting nodes) depict shared donors. This first network is undirected

and binary because we were simply interested in understanding which pairs of charities shared *any* donors.

As can be seen, almost all nonprofits shared donors with all other nonprofits. The network was almost complete (density = 0.99), meaning 99% of all possible edges were present. Since we treated this network as undirected—concerned just with the question of whether any donors were shared rather than the direction or extent of sharing—we considered degree (i.e., the number of ties each nodes has) as the key centrality measure that indicates the extent to which a charity is considered central in the charity network because it attracts and shares many donors with other charities. Three-quarters ($n = 38$) of the nonprofits had a degree centrality score of 51, indicating that they shared donors with all other nonprofits in the sample. However, the number of shared donors (represented in Figure 1 by weighted edges) varied considerably ($M = 983$, $SD = 1395$, $range = 0$–13,545).

Because the network is so dense, with most charities sharing donors with most other charities, it does not tell us much about the relative importance of the different charities. Furthermore, because the charities range in size, the absolute number of donors shared is less informative than relative measures. For example, two nonprofits may share 300 donors, but this information may have different

FIGURE 2 Directed network graphs showing the percentage of each charity's donors giving to other charities, for charities sharing at least 1% of donors. Nodes are charities, edges are weighted based on percentage of shared donors. Node shape indicates scope of operations: Circle = national or regional; square = international. Node color indicates charity sub-type: Yellow = health; green = social services; orange = research; light blue = environment; purple = international; light pink = animal; dark blue = religious; red = emergency; dark green = sports and recreation; bright pink = education; gray = mixed sub-type. [Colour figure can be viewed at wileyonlinelibrary.com]
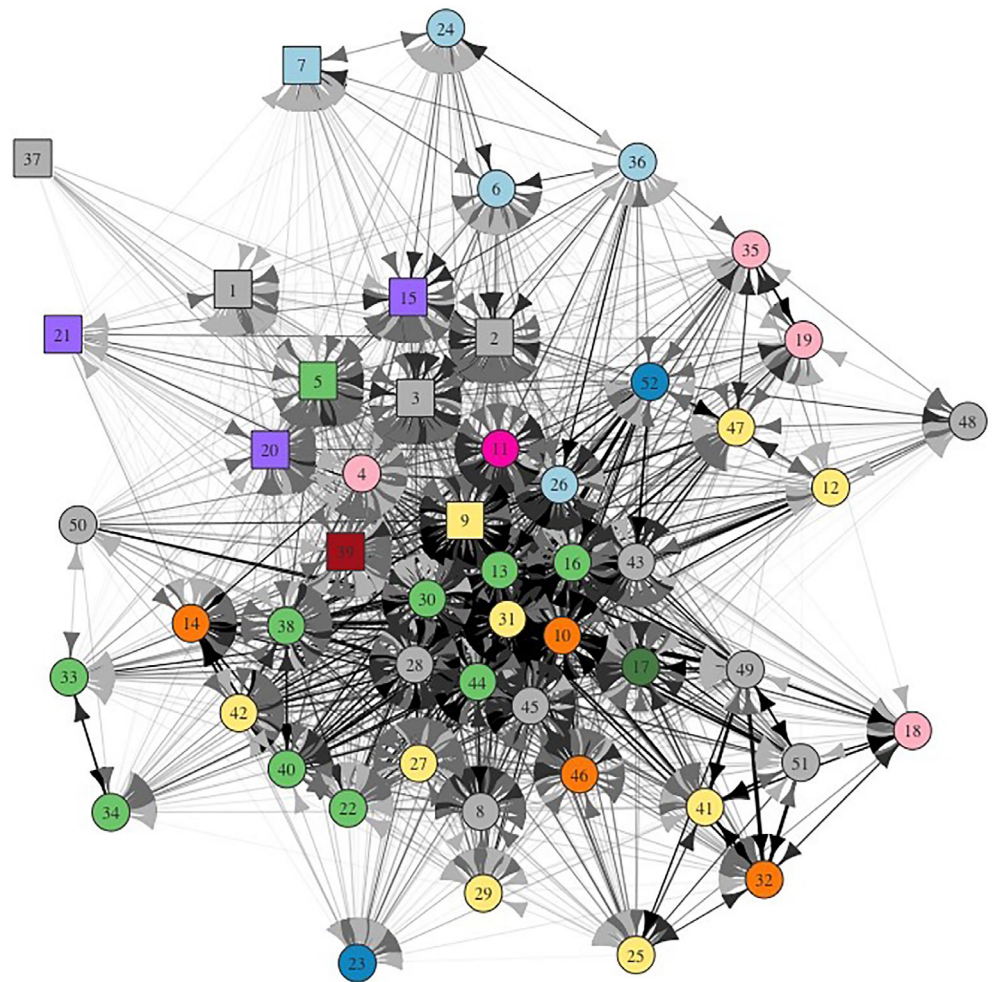
implications for each party. If Charity A has only 1000 donors in total, then having 300 donors shared with Charity B will be significant and they may pay special attention to Charity B's fundraising efforts. However, if Charity B has 100,000 donors, then the same cohort of shared donors will be insignificant for them, and they will not be paying attention to Charity A as a potential collaborator or competitor. For this reason, we consider the percentage of shared donors relative to each charity's donor base size. Percentage of donors shared was calculated by dividing the number of shared donors by the total number of donors. Thus, in the fictional example above, although Charity A and B have 300 donors in common, Charity A shares 30% of their donors with Charity B while Charity B only shares 0.3% of their donors with Charity A.

We found that the percentage of donors that each organization shared with others ranged from 0 to 34% ($M = 4.73$, $SD = 5.06$). For these reasons, we also constructed networks based on the charities for which each organization shares at least 1%, 5%, or 10% of their donor base (see Figures 2, 3, and 4, respectively). By using the percentages, resulting networks are valued and directed. Outbound edges (i.e., lines with arrows pointing away from the charity node) exist where 1/5/10% of the charity's donors also give to other organizations; inbound edges (i.e., lines with arrows pointed toward the

charity node) exist where 1/5/10% of other charities' donors also give to the charity. Edges are weighted based on the percentage of donors. In the graphical network representations, heavier and darker lines indicate that a larger percentage of donors are shared.

3.2 | Visual inspection of the graphs

The igraph program automatically visualizes the network so that the nodes (i.e., charities) that are most connected (i.e., share more donors) and therefore most central in the network are presented toward the middle of the graph, while the nodes that are less connected are presented toward the periphery. Visual inspection of Figures 2, 3, and 4 revealed two key findings. First, social service charities (colored green) appear to be relatively central and connected. Second, international charities (purple and/or shaped square), animal charities (pale pink), and environmental charities (light blue) all appear to be more peripheral in the network. We speculate that a charity's position in the network can be interpreted in two ways. On one hand, peripheral location may indicate fundraising weakness because more peripheral charities have access to fewer donors from other organizations. On the other hand, peripheral charities may actually be those that are best at monopolizing
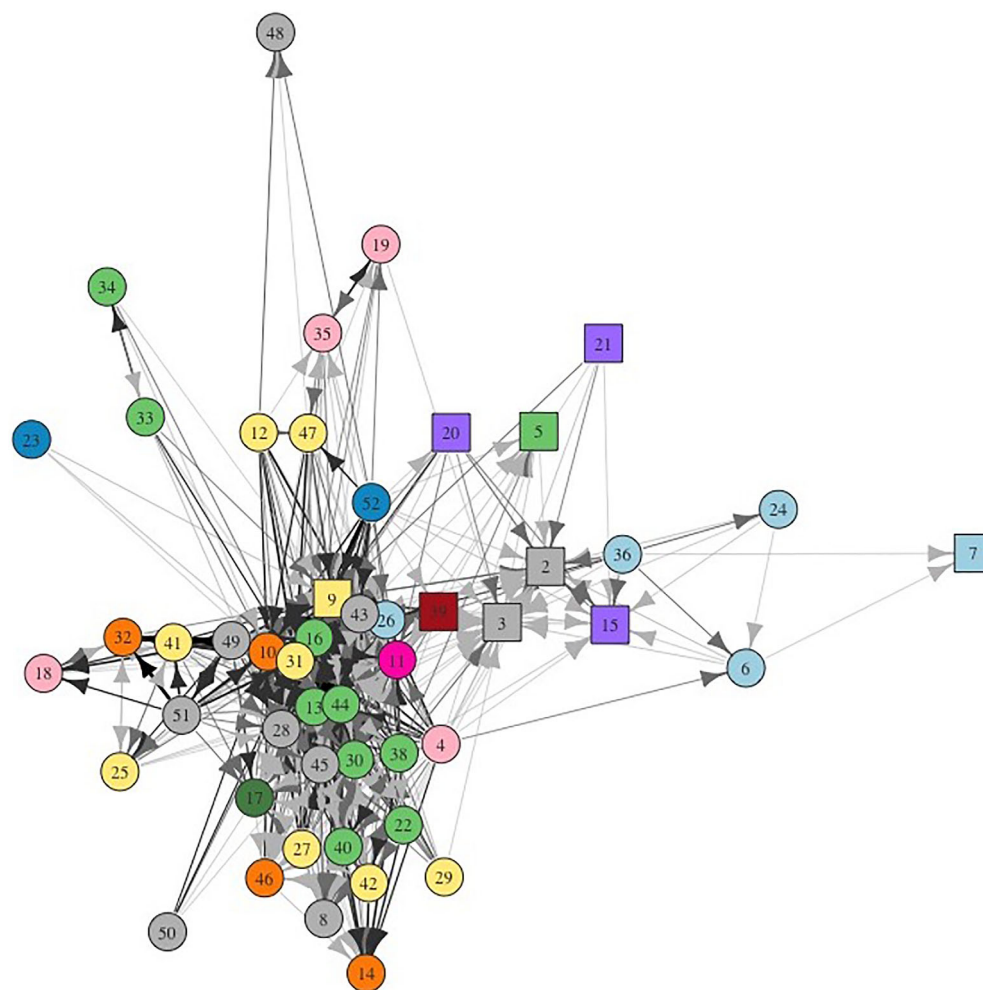
FIGURE 3 Directed network graphs showing the percentage of each charity's donors giving to other charities, for charities sharing at least 5% of donors. Nodes are charities, edges are weighted based on percentage of shared donors. Node shape indicates scope of operations: Circle = national or regional; square = international. Node color indicates charity sub-type: Yellow = health; green = social services; orange = research; light blue = environment; purple = international; light pink = animal; dark blue = religious; red = emergency; dark green = sports and recreation; bright pink = education; gray = mixed sub-type. [Colour figure can be viewed at wileyonlinelibrary.com]

a niche in the market or guarding their donors from other organizations. Future research may wish to test these ideas. In either case, Figure 2 suggests that sub-type (H1) and geography (H3) may both have some influence on consumer preferences. To test this empirically, we considered results of clustering analysis and the ANOVA tests using organizational attributes to predict node centrality.

3.3 | Clustering

Next, we ran analyses on the undirected graph to identify clusters of charities. Clusters were generated using the springlass community detection method in igraph (Csardi & Nepusz, 2006). Clusters represent cohesive subgroups or communities of nodes (i.e., charities) that are highly connected (i.e., share more donors) with each other but less connected with nodes in other clusters (Newman, 2006; Reichardt & Bornholdt, 2006). In our case, this analysis tells us which charities share donors with one another at higher rates. We are interested in whether charities that cluster together are more likely to be of the same sub-type, serve the same beneficiaries, or focus on the same geographies.

Analysis returned five clusters (see Table 3). Cluster 1 contained mostly larger, well-known charities, most of which operate on an international scale. Cluster 2 was dominated by charities operating in one large Australian state (Victoria). Cluster 3 consisted primarily of charities with primary operations in another large Australian state (Queensland). Cluster 4 was charities with a predominantly national focus or that operate in other Australian states. Most were charities that served humans. The animal charity in Cluster 4 is a zoo, which also benefits families; and the environmental charity is one with a specific emphasis on the Australian national environment. Finally, Cluster 5 contained just one charity, an international development agency with ties to a specific religious group.

Sub-type: None of the clusters appeared to be organized around sub-type. Thus, cluster analyses provided no support for H1.

Beneficiaries: Cluster 4 may be partially organized around charities that benefit humans, however there is no other evidence from the cluster analyses that beneficiaries are influencing charity preferences (weak support for H2).

Geography: Clusters 1–4 all seemed to be scoped around geographic focus, whether international (Cluster 1), regional (Clusters 2 and 3), or national (Cluster 4). Thus, cluster analysis provides support for H3.

FIGURE 4 Directed network graphs showing the percentage of each charity's donors giving to other charities, for charities sharing at least 10% of donors. Nodes are charities, edges are weighted based on percentage of shared donors. Node shape indicates scope of operations: Circle = national or regional; square = international. Node color indicates charity sub-type: Yellow = health; green = social services; orange = research; light blue = environment; purple = international; light pink = animal; dark blue = religious; red = emergency; dark green = sports and recreation; bright pink = education; gray = mixed sub-type. [Colour figure can be viewed at wileyonlinelibrary.com]
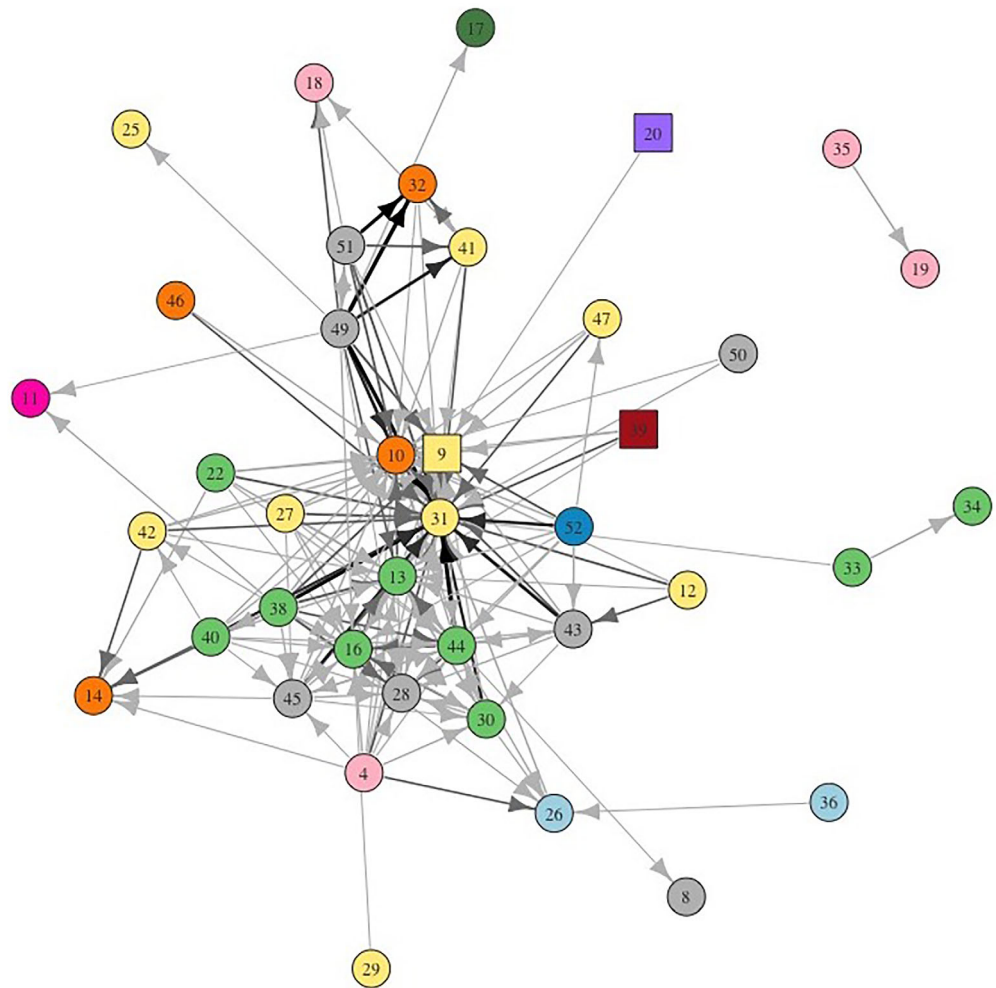
3.4 | Predicting network centrality

Next, we considered which factors may be associated with the centrality measures (reported in Table 2). After dichotomizing the matrix, we focused on two measures of centrality: in-degree (the number of organizations for whom at least 1% of their supporter base also give to this organization) and out-degree (the number of organizations that at least 1% of this organization's supporter base also give to). These centrality measures are the most appropriate to answer our research questions about which charities share more donors. In-degree can be interpreted as an indication of a charity's importance in the network. Higher in-degree scores indicate that donors from many other charities also give to the charity in question and therefore that more charities will be paying attention to the charity as a potential collaborator or competitor. Out-degree can be interpreted as the level of overture and wide-spreading of a charity's donors base. ANOVAs were conducted in UCINET using 30,000 permutations to account for the dependence of network data.

Sub-type: One-way ANOVAs revealed no significant difference across charity sub-types for in-degree, $F(10,41) = 0.88$, $p = .56$, or out-degree, $F(10,41) = 0.84$, $p = .59$.[1] Quantitative results thus provided no support for H1.

Beneficiary: No significant differences were found based on the beneficiaries of the charity's work (i.e., humans, animal, or the environment) on in-degree, $F(2,49) = 0.38$, $p = .69$, or out-degree, $F(2,49) = 1.32$, $p = .28$. Thus, quantitative results showed no support for H2.

Geography: There was a significant difference in in-degree based on geographic scope, $F(2,49) = 6.73$, $p < .01$, $\eta^2 = .22$. Regional charities had lower in-degree scores ($M = 22.80$, $SD = 8.55$) than national ($M = 38.20$, $SD = 13.60$), $p = .001$. However, there was no significant difference between national and international charities ($M = 36.83$, $SD = 18.24$), $p = .168$. Thus, fewer other charities shared at least 1% of their donors with regional charities.

There was also a significant different in out-degree based on geographic focus, $F(2,49) = 10.53$, $p < .001$, $\eta^2 = .30$. International charities had lower out-degree scores ($M = 26.00$,

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[1]With only 52 charities in the sample, we had limited power to detect effects when all 11 sub-types were included in the analyses. Thus, null effects for sub-type may be attributable to Type II error (insufficient power to detect effects that actually exist). We therefore re-ran the analyses in two other ways: where only sub-types with either 4+ or 10+ charities were included as distinct options and all other sub-types grouped under an "Other" category. These methods resulted in seven and five categories, respectively. ANOVAs using these categories (and hence with enhanced power) were also non-significant for both in-degree and out-degree, $ps > .189$.

TABLE 3 Results of cluster analyses

Charity	Sub-type	Beneficiaries	Geographic focus	Size
Cluster 1				
1	Mixed	Humans: children	International	L
2	Mixed	Humans: people overseas	International	L
3	Mixed	Humans: children, people overseas, families	International	L
5	Social services	Humans: children	International	L
6	Environment	Environment	National	M
7	Environment	Environment	International	M
9	Health	Humans: sick people	International	L
11	Education	Humans: children	National	L
15	International	Humans: poor people	International	L
20	International	Humans: people overseas	International	M
21	International	Humans: people overseas	International	S
23	Religious	Humans: children	International	M
24	Environment	Environment	National	M
36	Environment	Environment	Regional	S
Cluster 2				
12	Health	Humans: sick people	National	S
19	Animal	Animals	Regional	M
35	Animal	Animals	Regional	M
47	Health	Humans: sick people	Regional	S
48	Mixed	Humans: sick people, families, children	National	S
52	Religious	Humans: poor people, homeless people	Regional	S
Cluster 3				
17	Sports	Humans: children	National	M
18	Animal	Animals	Regional	M
25	Health	Humans: sick people	National	L
32	Research	Humans: sick people	Regional	L
41	Health	Humans: sick people	Regional	M
49	Mixed	Humans: sick people, people with disabilities	Regional	M
51	Health	Humans: sick people	Regional	S
Cluster 4				
4	Animal	Animals	Regional	S
8	Mixed	Humans: children	National	M
10	Research	Humans: sick people	National	L
13	Social services	Humans: people with disabilities	National	M
14	Research	Humans: sick people	Regional	L
16	Social services	Humans: people with disabilities	National	M
22	Social services	Humans: people with disabilities	National	S
26	Environment	Environment	National	M
27	Health	Humans: children	National	M
28	Mixed	Humans: children	National	M
29	Health	Humans: people with mental illness	National	S
30	Social services	Humans: people with disabilities	National	S
31	Health	Humans: sick people	National	L
33	Social services	Humans: children, families, people with mental illness	Regional	S
34	Social services	Humans: people with disabilities	Regional	M

TABLE 3   (Continued)

Charity	Sub-type	Beneficiaries	Geographic focus	Size
38	Social services	Humans: children	National	S
39	Emergency	Humans: people overseas	International	S
40	Social services	Humans: children	National	S
42	Health	Humans: sick people	Regional	M
43	Mixed	Humans: sick people	National	M
44	Social services	Humans: people with disabilities, children	National	S
45	Mixed	Humans: children	National	M
46	Research	Humans: women	National	S
50	Health	Humans: sick people	National	L
Cluster 5				
37	Mixed	Humans: people overseas, poor people	International	M

Note: S, small; M, medium; L, large; Charities 14 and 32 are regional operations of the same national charity brand, as are charities 41 and 42 and charities 47, and 18 and 35. Charity 16 is a sub-brand of charity 13, and charity 51 is a regional operation of the national charity 50.

$SD = 10.91$) than national charities ($M = 38.24$, $SD = 1.43$), $p < .001$. However, out-degree scores did not vary between national and regional charities ($M = 32.07$, $SD = 4.73$), $p = .983$. Thus, international charities were less likely to have at least 1% of their donors also giving to other charities. Combined, quantitative results supported H3 by indicating that geography influences charitable giving patterns.

3.5 | Summary of results

We have considered support for our hypotheses in three ways: visual inspection of the graphs, clustering analysis, and quantitative analyses predicting centrality in the network. Sub-types appeared to be an organizing factor for giving patterns when visually inspecting the network, but this notion was not clearly supported by clustering or quantitative analyses. Overall, we found only weak support for H1. Across all three methods, little support was found for H2: charities who serve the same beneficiaries do not seem to share greater numbers of donors that charities serving different beneficiaries. Strongest support was found for H3. Geographic concerns appeared to be influencing donors' shared giving patterns, as determined by visual inspection of the networks, results of clustering analyses, and the quantitative analyses predicting network centrality.

4 | DISCUSSION

We analyzed a network of 52 large nonprofits in Australia to identify patterns of shared giving behavior exhibited by over 1.5 million donors. Most charities share donors with all other charities in the network. However, the extent of shared giving varies substantially between different nonprofits. We find five key clusters of charities that share large numbers of donors within each cluster. The make-up of these clusters suggests that charities' abilities to attract supporters may be especially influenced by geography. When we used organizational characteristics to predict the charity's centrality (i.e., importance and overture) in the overall network, we again found evidence that geography was an organizing factor. Taken together, results suggest that geography may have a strong influence on which charities share more donors (support for H3). Some—albeit inconsistent—evidence also emerged to support the notion that sub-type may be an organizing principle for donors (H1). However, little support was found that beneficiaries influence shared giving patterns (H2). The implications of each of these findings are elaborated below.

The strongest patterns observed in the data suggest that geography influences the combination of charities that donors give to. Charities with similar geographic foci shared more donors. This lends weight to experimental evidence showing people prefer to donate locally: whether nationally (vs. internationally) or regionally (Grimson et al., 2020; Knowles & Sullivan, 2017). Shared identities—where the charity or beneficiary somehow shares an identity with the donor—have been shown to promote giving (James & Zagefka, 2017). This is one potential mechanism through which geography could be influencing charity selection: donors may give more to causes that share a geographic identity with them (see also Charnysh et al., 2015; James & Zagefka, 2017; Levine & Thompson, 2004). However, it is also possible that these geographic patterns are influenced by more pragmatic concerns. Solicitation—or being asked to give—is a key driver of charitable giving (Bekkers & Wiepking, 2011a; Chapman et al., 2019). It may simply be that donors are asked more frequently by charities that are geographically proximate and therefore may give to more charities operating in their region; though we note that even the international charities all had fundraising offices based within Australia. Future research may wish to test the potential mechanisms of identity and solicitation as explanations for the localized prosociality evidenced here.

Results also suggest that at least some donors are more likely to share their donations among international charities. Previous research

has identified that religious people and those who are politically liberal (Chapman et al., 2018; Rajan et al., 2009; Wiepking, 2010) are more likely to give internationally. The popular "effective altruism" movement also encourages proponents to prioritize giving to international causes fighting diseases associated with extreme poverty (Effective Altruism, 2021). Future research may therefore wish to consider possible moderators of the giving patterns observed here: different types of people may spread their donations in different ways (as per Baek et al., 2019).

The network visualization suggested some sub-types (i.e., social services) may be more central than others (i.e., international, animal, and environmental), and therefore sub-type may be one determinant of shared giving patterns. However, clustering analyses and centrality statistics within the network did not support this notion. Thus, no strong patterns emerged around sub-type. It is possible that the sub-type groupings used by the sector (such as the United Nations reporting guidelines included in the current study) do not meaningfully align with the way donors themselves classify charities. For example, people often talk about giving to "cancer charities" (see Chapman et al., 2020), which are not directly represented in the United Nations sub-types. This potential discrepancy between how donors categorize charities and how charities do may explain the relative lack of influence exerted by sub-types in the current study. Future research should build on Body and Breeze's (2016) research and try to better understand the way donors actually think about and mentally group charities.

We found very little evidence that beneficiary characteristics influence patterns of giving because charities with the same beneficiaries did not share greater numbers of donors. Past research has shown that characteristics of beneficiaries can influence whether or not someone gives and are sometimes used to explain charity preferences (e.g., Chapman et al., 2020; Small & Verrochi, 2009; Zemack-Rugar & Klucarova-Travani, 2018). However, in the current study beneficiary type did not explain a more prominent network centrality position of charities or emerge strongly in the clusters. It is nevertheless possible that beneficiaries have a more indirect influence on patterns of giving: at least some donors may prioritize helping beneficiaries that share an important identity with them, such as nationality, regional identity, or even human identity (e.g., Chapman et al., 2020; Charnysh et al., 2015; Levine & Thompson, 2004). Future research could test this idea using choice modeling or experimental approaches (see Haruvy et al., 2020 for an overview).

4.1 | Strengths and limitations

Analyzing transactional data brings inherent strengths and limitations. On one hand, we analyzed actual giving behavior from roughly 10% of all active Australians donors in a single year. The scale of this sample is a clear strength of the current analysis because we can infer a degree of generalizability due to the size and nature of the sampling. On the other hand, we were limited to the nonprofits who shared their data, and to the information available in their databases and supplementary public information. With just 52 charities, we also had

limited statistical power to evaluate quantitatively the predictors of centrality and null results must therefore be interpreted with caution. Future research may wish to sample and map a complete charity network by using free-recall questions to construct donor-level or sector-level maps of charity support. In the current study, we infer donors' motives from their observed behavior. Future research may also wish to study factors motivating charity portfolio decisions more explicitly. Given our research question focused on the charities, we analyzed the data as a one-mode network. In the future, it would be interesting to explore determinants of preferences from the donor perspective, and also how donor and charity characteristics may interact to inform donation allocations (see also Chapman et al., 2022). Finally, we have considered the incidence of shared giving. It would be valuable for future research to also consider the value of donations to each cause.

5 | PRACTICAL IMPLICATIONS

We analyzed the shared giving patterns of 1.5 million donors across 52 large nonprofits and found clusters of giving determined by geographic concerns—both regional and international. This suggests that donors do not give to charity indiscriminately but rather prefer to give to multiple charities that have the same geographic focus (whether local or international). One implication is that supporter list swapping—a practice that is common in some nonprofit markets—may be most beneficial when lists are shared between organizations that both operate in the same geographic region rather than between organizations that both operate as the same sub-type of charity (e.g., health, religion) or both share similar beneficiaries (e.g., homeless people, animals).

CONFLICT OF INTEREST
The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from IVE and their charity clients. Restrictions apply to the availability of these data, which were made available to the authors for scholarly purposes. The data are not publicly available due to commercial restrictions.

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