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Understanding the Ecosystem of Stakeholder Networks Addressing Loneliness in Six Cities Worldwide

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Abstract

Background: Loneliness is increasingly reported as a growing problem throughout society and is insufficiently addressed through traditional health care systems. Current evidence highlights the physical, emotional, and mental health implications of loneliness. Further, the impact of loneliness as a global public health issue is evidenced by connections to increased obesity, depression, weakened immune systems, and high blood pressure. Interventions aimed at addressing reducing loneliness are being developed and despite their promises, limited evidence of their efficacy exists. In this paper, we look at the cross-sector networks being developed across six cities as a way to develop and implement a specific intervention (Nature Based Social Prescribing) to address social isolation and loneliness.

Methods: A network analysis of participating countries was launched with the goal of knowing more about potential networks in partner cities that the RECETAS consortium could draw on when designing and implementing NBSP interventions. We were able to visualize and measure the existing networks and create a place-based understanding of how NBSP can be promoted and sustained locally.

Results: The social network analysis reveals similarities and differences across six international cities, and their experiences of establishing networks and collaborating between organizations and their perceptions of and responses to nature-based prescribing and outcomes. These maps are indicative of the number and scope of relational networks that exist in each study site. Our analysis shows that the number of members varies greatly by country, but that quite a few have a large number of relationships and activities. All cities reported an active network in these areas. The membership of these networks was expected, although there are members from unusual sectors that are encouraged to participate in order to diversify the networks.

Conclusions: The RECETAS project will use these network data and results to understand how stakeholders across the six cities are working to address mental health, well-being, and loneliness through social prescribing and nature-based activities with the ultimate goal to systematically improve mental health and well-being, reduce loneliness, promote vibrant socially-connected communities, contribute to the sustainability of cities, and reduce health inequities by connecting diverse populations to nature in meaningful ways.

Background

Loneliness is increasingly reported as a growing problem throughout society and is insufficiently addressed through traditional health care systems. Current evidence highlights the physical, emotional, and mental health implications of loneliness. Further, the impact of loneliness as a global public health issue is evidenced by connections to increased obesity, depression, weakened immune systems, and high blood pressure [1]. Interventions aimed at addressing reducing loneliness are being developed and include support groups, social activities, skill development and short courses. Despite their promises, limited evidence of their efficacy exists [2]. However, increasingly approaches that involve increasing

social connections between people, organizations, and resources are developed as a mechanism to strengthen and scale proposed solutions to address the population's health. In this paper, we look at the cross-sector networks being developed across six countries as a way to develop and implement a specific intervention (Nature Based Social Prescribing) to address social isolation and loneliness.

Nature based social prescribing as an intervention to decrease loneliness.

NBSP is access to natural environments and outdoor activities associated with better health and well-being [3]. Living near green and blue areas may encourage physical activity and socialization with friends and neighbors [4]. Accessible solutions to the problem of loneliness are needed within an individual's sociocultural and geographical context. Social prescribing (SP) offers health and social care workers non-medical referral to community-based activities (e.g., arts-based activities, choirs, gardening) which facilitate social connectedness - a key aspect of physical and mental health - and complement rather than replaces medical treatment [5].

NBSP is an attempt to harness both the therapeutic potential of social connections and health benefits of the natural environment. NBSP involves organized social activities connected to the natural environment [6] such as outdoor "green gyms," [4] "park prescriptions," [7], backcountry adventures [8] and farmers market referrals [9]. NBSPs motivate contact with nature and others, therefore supporting connections between wellbeing and the natural world.

Cross-sector community networks as public health interventions to address loneliness.

Given the complex and contextual factors driving loneliness, formulating and implementing effective solutions (such as NBSP) is unlikely to be successful by any one group, organization, or solo effort. While some organizations may not have traditionally seen themselves as part of the solution to ending loneliness, interventions that leverage diverse resources from multiple types of organizations and providers present viable alternatives to the challenges of any one organization solving the issue alone. Not only does this bring additional resources and people together who can help, but it also sparks new ideas and the ability to test a variety of solutions. The benefits of working collaboratively across sectors to address intractable problems can include leveraging resources, sharing knowledge, joint programming, and covering more ground than any one organization can do alone [10]. To successfully implement NBSP at the population level, a multi-level, cross-sector approach can increase knowledge of the approach and elevate feasibility of implementing.

Project Context. RECETAS (Re-imagining Environments for Connection and Engagement: Testing Actions for Social Prescribing in Natural Spaces), a multi-country initiative, was designed and implemented to devise, validate, and exploit solutions that address loneliness through nature-based social prescribing (NBSP) interventions. As part of the RECETAS initiative, a cross-sector interorganizational strategy was planned which builds on existing partnerships in local settings, attempts to identify new partners, and maps points of connection in a collective attempt to implement NBSP as an innovative solution to the problem of loneliness. The assumption is that relationships between providers and outdoor social

programs present a holistic option for addressing persistent health inequities, confronting unmet psychosocial needs, and reducing burden on the health care system [2]. The project began by generating a baseline understanding of local understandings and definitions of loneliness and NBSP, ascertain what connections /networks exist, and identify similar interventions and approaches. This was an important step because recognition of loneliness as a public health issue and NBSP as a potential solution is relatively new [1]. This study presents one of the only comparative, multi-country assessments of interventions happening at scale to address loneliness and isolation as a public health issue.

The RECETAS strategy to increase NBSP in community begins with mapping the ecosystem of organizations related to this strategy, understanding who is connected to whom, and will leverage that information to create, implement, and scale a NBSP intervention as a pathway to reduce social isolation. Cities participating in the project include Marseille (France), Prague (Czech Republic), Helsinki (Finland), Cuenca (Ecuador), Barcelona (Spain), and Melbourne (Australia). For example, in Finland, forest walks have been organized in primary health care to support the treatment of chronic diseases. However, NBSP in some countries such as Prague, Marseille and Ecuador is a very new concept and its practice is recently emerging. See Fig. 1. Figure 1. Participating Sites

Drawing on Network Science to Understand the Ecosystem of Stakeholder Networks

A growing response to address emerging problems such as loneliness are efforts to build partnerships between organizations [11]. While this is an increasingly viable strategy in some countries, others are only starting to think about how building cross-sector relationships can be used to leverage a greater variety of resources and solutions. The development of cross-sector networks to address social issues and deliver programs and services has a long history [12]. Broadly speaking, networks are “structures of interdependence involving multiple organizations or parts thereof, where one unit is not merely the formal subordinate of the others in some larger hierarchical arrangement” [13]. However, bringing together diverse partners from diverse sectors presents many challenges. Organizations have their own missions and priorities and may not have the capacity to create new partnerships. Some have worried that increasing networking among organizations takes time away from providing direct services to people [14]. The newness of NBSP and developing evidence-base means organizations may be reluctant to contribute to the development of a network addressing loneliness.

Previous research on how heterogeneity (organizations from different sectors and fields) influences the outcomes of projects was addressed by Varda and Retrum [15] where they found that “some of this complexity—balancing increased diversity while managing varying missions and expectations—could be managed by appropriately leveraging qualities of network members, such as those with high perceptions of trust and those that have many resources to contribute (647).” When asking organizations to create network strategies to address complex problems like mental health, wellness, and specifically loneliness, it is critical to assess how individual organizations understand the nature of the problem, potential

solutions, and established partnerships, including how they work with existing partners and perceptions of trust and value [16].

A revised model of network effectiveness (measured as perceptions of network success) based on an analysis of 98 interorganizational cross-sector networks was developed by Varda and Retrum [15], see Fig. 2. In contrast to the original model which links trust, value, resources, and diversity to perceptions of success, the revised model emphasizes two factors - an increased number of resource contributions and greater diversity among organizational types. Varda and Retrum [15] found that increased contributions from individual organizations and greater diversity within the network resulted in more disagreement over whether a networked approach to a specified problem was successful. “[O]n average, higher perceptions of network success are reported by networks that have members with higher perceived trust toward their partners and also have more resources to contribute” [15].

The RECETAS initiative proposed that organizations in communities across six cities around the world collaborate across diverse sectors to address loneliness using NBSP. A key objective is the development of supportive infrastructure and tailoring of NBSP to local contexts through the leveraging of existing assets and resources, and identification of opportunities to develop and expand strategic partnerships. Specifically, we addressed the following questions:

1. What is the current knowledge of stakeholders on the subject of loneliness, social isolation, and/or NBSP?
2. Who is working on issues related to loneliness, social isolation, and/or NBSP in each city?
3. What activities do organizations engage in? Which population groups do they work with? How do they discuss the issue of loneliness, social isolation, and/or NBSP?
4. What connections exist between organizations working within similar areas? What are the outcomes of those connections?
5. What are the characteristics and nature of these relationships? How do stakeholders currently work together?
6. How did COVID-19 impact these efforts?

Methods

A network analysis of participating countries was launched with the goal of knowing more about potential networks in partner cities that the RECETAS consortium could draw on when designing and implementing NBSP interventions. Using network analysis, we were able to visualize and measure the existing networks and create a place-based understanding of how NBSP can be promoted and sustained locally.

In collaboration with local research teams in each of the six pilot study sites: Helsinki, Melbourne, Cuenca, Barcelona, Marseille and Prague, Visible Network Labs (VNL) conducted a cross-sector interorganizational social network analysis. VNL is a social enterprise committed to helping people,

organizations, and communities use network science to increase their capacity to engage in collaborative innovation. Social Network Analysis (SNA) is a method that looks at who is connected to whom and how those connections vary and change [17]. SNA often looks for patterns in those connections to understand things like outcomes or perceptions of network interventions. The goal of the social network analysis was to better understand how stakeholders within individual study sites were working to facilitate social connections and improve mental health and well-being using either social prescribing and / or nature-based activities.

To begin, the teams modified the PARTNER CPRM™ Community Network Survey (www.partnertoo.net) and included additional questions ranging from which populations the stakeholder organizations serve to the extent to which they are familiar with the term “nature-based social prescribing”. The PARTNER Community Network survey was first published in 2008 and has been used in hundreds of communities to understand the relationships, resources, and outcomes of cross-sector network strategies. Measures included in the survey include who is working with whom, the activities they engage in, the outcomes of those relationships, and perceptions of value and trust among partners. It also can measure attribution of system building to certain interventions and provides a resource inventory to not only see who has what resources, but how they are connected (or not) to each other. Most of these measures were first published by the authors of the survey in 2008 [18].

The PARTNER survey includes validated dimensions to determine the overall quality of relationships among organizations in each city based on aspects of value and trust. Four dimensions were used in this study. These include power and influence, level of involvement, resource contributions, and support of mission (see definitions below in Fig. 3). Survey participants assessed each of their reported relationships on these four dimensions according to a 4-point scale, with 1 = Not at all, 2 = A Small Amount, 3 = A Fair Amount, and 4 = A great deal. Scores over 3 are considered the most positive. Understanding network relationships is important in leveraging the different ways in which members contribute to the network.

A unique component of the survey is that respondents are asked to share which organizations with whom they currently have a working relationship around addressing mental health, well-being and loneliness. In subsequent questions they are asked to describe their relationship with each of the partners they identified. In this network analysis, respondents were asked to select everyone with whom they have an established working relationship around addressing mental health, well-being and loneliness (See Image 6). In subsequent questions, respondents are asked to describe their relationship with each of the partners they selected. These questions cover topics such as what kind of relationship you have with these partners or what is the outcome or intensity of your relationship.

Developing the list of stakeholders who would receive the survey in each of the six cities involved exploratory work and collaboration across all pilot study sites. All sites agreed to include organizations that fell into four different types of categories, which included some boundaries and definitions of who might be included in this type of work:

1. Organizations Committed to the Mission of Nature-based Solutions and Mental Health: *Organizations whose work focuses on this mission in some way.*
2. VIP Organizations: *VIPs have power and influence in the community and/or the ecosystem around nature-based solutions and mental health. They are important power brokers and are strategically beneficial to the mission of the network.*
3. Not the Usual Suspects: *Organizations that have a stake in the ecosystem mission and may facilitate out-of-the box thinking.*
4. Voices Representing the Lived Experience: *Organizations or individuals that can speak to the lived experience of the social problem or solution the ecosystem is trying to address.*

The PARTNER survey was customized for this project and shared with all project leads in each study site. In countries where English is not predominantly used, the survey was translated into native languages. Local research teams were encouraged to adjust language to ensure the survey was culturally sensitive and appropriate to the local context.

Data Collection. In October and November 2021, 253 organizations across five cities (Melbourne, Australia; Helsinki, Finland; Barcelona, Spain; Prague, Czech Republic; and Cuenca, Ecuador) were invited to participate in the survey using VNL's PARTNER platform (www.partnertool.net) to record their current organizational partnerships as part of the RECETAS research project. Within each of the survey email invitations was a link to a RECETAS infographic (which was also translated into local languages) which contained further information about the project. The timing of each survey launch varied across study sites, with various country holidays taken into consideration. The Helsinki, Cuenca, Barcelona, and Melbourne surveys launched in October of 2021 and the Marseille and Czech surveys launched in November of 2021. Of these, 160 organizations responded to the survey, for a 63% response rate.

Another Social Network Analysis was carried out in Marseille, France using a different survey distribution method because Marseille survey respondents were recruited differently than other survey respondents. Due to privacy concerns, a generic (rather than personalized) survey link was distributed to identified stakeholder organizations, who then forwarded the survey on to additional stakeholders unknown to the research team in a snowball sample design. A total of 66 organizations responded to the survey, and through their survey responses, 392 organizations were identified as working in Marseille to address loneliness, mental health, and well-being.

For response rates specific to each city please refer to Fig. 4.

Summary of Data Collection Methods:

- Social Network Analysis using PARTNER (www.partnertool.net) launched in October and November 2021 across 6 cities.

- 253 organizations across five cities (Melbourne, Australia; Helsinki, Finland; Barcelona, Spain; Prague, Czech Republic; and Cuenca, Ecuador) invited to participate.
- 63% response rate with 160 organizations completing the survey.

In addition, another Social Network Analysis was carried out in Marseille, France using a different survey distribution method. A total of 66 organizations responded to the survey, and through their survey responses, 392 organizations were identified as working in Marseille to address loneliness, mental health, and well-being.

Results

Composition & Structure of Stakeholder Networks. The goal of this part of the analysis was to map (visualize) the local landscape and identify who is currently working to address mental health, well-being, and loneliness through social prescribing and nature-based activities, along with where and how stakeholders worked together. By identifying the structure of how these organizations are connected, we can focus on key members (e.g., those with a lot of connections, or those with positions that can act as bridging connections). The network maps below (Fig. 5) provide a visual representation of these partnerships and provides a baseline understanding of these relationships to help us to better understand how organizations work together, including what they do and the outcomes of that work.

Network maps show each organization represented as a circle, or a node (the network science term). Lines between nodes represent all relationships reported by survey respondents within study sites. Nodes are sized by the number of connections they have with one another; larger nodes have more connections. The larger the node, the more connections an organization has. The Helsinki, Cuenca, and Melbourne network maps show a core periphery structure, with more connected organizations located at the center of each network, whereas in the Barcelona, Prague, and Marseille networks, there are no dominant organizations based on number of connections.

Network Composition- Sector & Industry. Across all 6 cities, the majority of stakeholders working in the areas of mental health, well-being and loneliness were associated with the fields of environment/ecology, social services, health care, and public health sectors (see Fig. 6).

Quality of Relationships. Understanding network relationships is important in leveraging the different ways in which members contribute to the network. As mentioned above, four dimensions of relationship quality were captured in the survey. The column chart below depicts the average relationship scores within the network (Fig. 7).

We found similar variation amongst these relationships, with some of the highest scores reported on mission congruence. Interestingly, Marseille has one of the biggest differences between perceptions of respondent organizations as having power and influence, and mission congruence, which could be due to the different approach used to recruit respondents.

Relationship Outcomes. Respondents reported that 36% of their network relationships involved an exchange of resources, 30% contributed to an increased public awareness and understanding of mental health and well-being, and collaboration resulted in a 26% improvement in organizational capacity (see Fig. 8).

Nature Based Solutions Used. Survey respondents were also asked whether they used nature-based solutions to address mental health, well-being and loneliness and indicate the nature of these activities their organization uses to address mental health, well-being and loneliness. The most used nature-based solutions were green space (47%), outdoor recreation (45%), and nature walks and/or cycling (39%). Less commonly used solutions were Built environments, Pet Meetings, and Farmers Markets (see Fig. 9).

Familiarity with Nature-based Social Prescribing & Solutions. Survey respondents were also asked about their familiarity with some of the terms and words used within the project. In this case we asked people To what extent are you aware of the term “nature-based social prescribing”? As many as 46% of respondents indicate they were either “somewhat” or “very” aware of the term “nature-based social prescribing.” Fig. 10 illustrates the average understanding across all sites at the top of the image and then outlines the awareness for individual cities. We found significant variation in understanding between study sites. For instance, 64% of respondents in Helsinki were somewhat aware of the term natural-based social prescribing, whereas in Cuenca 44% of respondents, were very aware of the term (*note: the profile of Cuenca respondents was related to educational sector (professors and researchers), who tend to be more aware of NBSP more than others*). Marseille respondents were the least familiar with the term nature-based social prescribing, with 66% of respondents answering, “Not at all aware”.

Community Impact. Perceptions of Success. Respondents across all sites thought their cities were effective at increasing green space and green infrastructure; and increasing public awareness of problems with mental health, well-being, or loneliness. Respondents likewise expressed the most certainty when sharing their opinion on increased green space and green infrastructure, with as few as 9% reporting “not sure.” See Fig. 12.

Impact of Covid-19. As this study was conducted during the COVID-19 Pandemic, we asked how the pandemic impacted the problem mental health, well-being, and loneliness. Most respondents believe that the COVID-19 pandemic increased public awareness of the problem. Respondents were evenly split on how the pandemic effected funding, and significantly uncertain on both the question of funding (41%) and the number of people receiving services and treatment (46%) (see Fig. 13).

Discussion

The social network analysis reveals similarities and differences across six international cities, and their experiences of establishing networks and collaborating between organizations and their perceptions of and responses to nature-based prescribing and outcomes. Figure 2 highlights distinct differences in the shape and size of the network in each city. Most have the expected core/periphery structure of most networks, with a large number of organizations linked together at the center and fewer at the edges (e.g.,

Barcelona and Marseille). However, others demonstrate very decentralized structures (e.g., Helsinki and Prague), and still others show a more centralized structure (e.g., Melbourne and Cuenca). Much of these structural differences could be indicative of variations in response rates, and in one case (Marseille), approach to data collection. However, these maps are indicative of the number and scope of relational networks that exist in each study site. What we learned here is that the number of members varies greatly by country, but that quite a few have a large number of relationships and activities. All cities reported an active network in these areas. The membership of these networks was expected, although there are members from unusual sectors that are encouraged to participate in order to diversify the networks.

Increasing the diversity of networks is considered a strength of a network, which leads to both hard work for the RECETAS project, but also quite a bit of room for improvement. We learned that most organizations identify with the Environment, Ecology or Sustainability sectors or industries, followed by Social Services, Health care, Public Health and Education. We see far fewer organizations that identify with sectors like Technology, Economic Development and Landscape design. This data demonstrates sectors/industries where the network might be interested in growing the presence of these industries in this type of work. To encourage additional cross-sector collaboration, RECETAS may want to consider recruiting network members and building relationships from these less represented industries and sectors to diversify partners involved in this work. And a limitation to note is that many of the local RECETAS consortium partners, who come from a scientific background, could not be completely aware or updated about the presence of these industries at the start of the study.

In terms of outcomes, it was not surprising that most organizations said that working in partnership leads to an exchange of resources. Many respondents felt that partnerships contributed to greater public awareness and understanding of the issue of loneliness, social isolation, and/or NBSP. In contrast, respondents within most study sites did not feel as strongly about the efficacy of their relationships in reducing city-wide health disparities or contributed to systems change. Overall, some commonality exists across all of the different cities on what respondents felt were the most common results of these relationships and this gives us a baseline for understanding where we can target interventions and identify areas to focus on and increase awareness of the issue of loneliness and potential of NBSP as a possible solution .

At the beginning of the project, it was unclear to what degree networks of organizations in each study site shared a common nomenclature and understanding of many topics informing RECETAS, which SNA suggests are impactful ways to increase effectiveness of interventions. Significant variation was found in people's understanding and use of these terms across the different cities. This is also a challenging and urgent task for the project - getting people to understand and adopt a common language about the problem and how to solve it.

Similar to the familiarity of the term nature-based social prescribing, there was significant variation in perceptions of the way NBSP was used to address loneliness between cities. In Prague, Helsinki and Melbourne 50% or more of respondents selected "a great deal" or a "fair amount", whereas in Marseille

80% of respondents selected “not at all”. This may be representative of which cities have embraced more of this type of work and provides a baseline of where each city is at the start of this project in terms of their understanding of the term nature-based social prescribing and their adoption of this practice to address mental health, well-being, or loneliness.

In terms of community impact, the survey asked respondents whether public health interventions within their city successfully addressed mental health, well-being and loneliness. Systems level change such as increasing green space and green infrastructure and increasing public awareness of problems with mental health, well-being, or loneliness were felt to be more successful. Individual-level treatments like improving access to mental health services or increasing the number of people in hard-to-reach populations who receive treatment were considered less successful. Interestingly, this finding indicates consensus across the cities in the belief that system level work and programs are succeeding but more work is needed to increase access to individual-level programs. This could present an opportunity to see where specific interventions could make an impact in increasing success in delivering individual-level services to people in these cities.

Finally, as this project was launched during the COVID-19 pandemic, it was an opportunity to better understand how the impact of Covid-19 affected their community's progress in addressing mental health, well-being and loneliness. Most respondents believed that Covid-19 pandemic increased public awareness of the problem of mental health, well-being, and loneliness. Less consensus was found amongst responses to the question whether Covid-19 increased funding to address mental health, well-being and loneliness. In fact, respondents' answers were split when it came to funding to address the problem and 41% of respondents were unsure. In addition, almost half of respondents were unsure about whether the Covid-19 pandemic had impacted the number of people receiving services and treatment for mental health, well-being, or loneliness. Overall, public awareness and collaboration has increased as a result of the Covid-19 pandemic, however, direct services being delivered to the community such as the number of people receiving services and treatment for the problem might not have changed.

Conclusion

The RECETAS project will use these network survey data to better understand how stakeholders across the six cities are working to address mental health, well-being, and loneliness through social prescribing and nature-based activities with the ultimate goal to systematically improve mental health and well-being, reduce loneliness, promote vibrant socially-connected communities, contribute to the sustainability of cities, and reduce health inequities by connecting diverse populations to nature in meaningful ways. These data will also be used to help inform the community building and intervention work of upcoming work packages that are part of the RECETAS research project [19].

Implications for Research, Practice, and Policy. A big question that remains is how these networks will change over time as the project continues. Given the effort to coordinate the remaining work of the project and implement and test solutions, we would expect to see the networks grow and strengthen.

While network science tells us that more is not always better, at the start of a movement (or network intervention) there is a certain amount of growing and changing that must occur. As the networks become clearer on the definition of nature-based prescribing, evidence of success becomes apparent, and instances of loneliness decrease, more partners (and potentially funders) will want to be involved. Ideally, we will see network members develop more integrated relationships made up of increased programming, client sharing, and knowledge transfer. The research draws which relationships they have as a network, but RECETAS is not working on making this network grow and strengthen but these results are the basis for the cocreation process at the local level to implement the intervention.

Abbreviations

NBSP - Nature Based Social Prescribing

PARTNER - Program to Analyze, Record, and Track Networks to Enhance Relationships

SNA - Social Network Analysis

RECETAS - Re-imagining Environments for Connection and Engagement: Testing Actions for Social Prescribing in Natural Spaces

Declarations

Ethics approval and consent to participate: The research was considered exempt under 45 CFR § 46.104(d)(2) by WCG IRB #1-488713-1.

Consent for publication: Not Applicable

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available due to multi-country permissions required, but may be available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions:

- DV: Made substantial contributions to conception, design, data acquisition and analysis, data interpretation.
- JL: DV: Made substantial contributions to conception, design, data acquisition and analysis, data interpretation.
- KB: DV: Made substantial contributions to conception, design, data acquisition and analysis, data interpretation.
- AS: DV: Made substantial contributions to conception, design, data acquisition and analysis, data interpretation.
- All other authors made significant contributions through the acquisition and interpretation of data, review of the work.

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References

1. United States. Public Health Service. Office of the Surgeon General. May). Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community. Washington, DC: Department of Health and Human Services; 2023.
2. Helen J, Chatterjee PM, Camic BL, Linda JM, Thomson. Non-clinical community interventions: a systematised review of social prescribing schemes. *Arts & Health*. 2018;10(2):97–123. 10.1080/17533015.2017.1334002.
3. Astell-Burt T, Hartig T, Putra IGNE, Walsan R, Dendup T, Feng X. Green space and loneliness: A systematic review with theoretical and methodological guidance for future research. *Sci Total Environ*. 2022;847:157521. 10.1016/j.scitotenv.2022.157521. Epub 2022 Jul 22. PMID: 35878853.
4. Smyth N, Thorn L, Wood C, Hall D, Lister C. Increased Wellbeing following Engagement in a Group Nature-Based Programme: The Green Gym Programme Delivered by the Conservation Volunteers. *Healthcare*. 2022;10(6):978. <https://doi.org/10.3390/healthcare10060978>.
5. Bickerdike L, Booth A, Wilson PM, et al. Social prescribing: less rhetoric and more reality. *Syst Rev evidenceBMJ Open*. 2017;7:e013384. 10.1136/bmjopen-2016-013384.
6. Leavell MA, Leiferman JA, Gascon M, et al. Nature-Based Social Prescribing in Urban Settings to Improve Social Connectedness and Mental Well-being: a Review. *Curr Envir Health Rpt*. 2019;6:297–308. <https://doi.org/10.1007/s40572-019-00251-7>.
7. James J, Joy RW, Christiana, Rebecca A, Battista. A historical and critical analysis of park prescriptions. *J Leisure Res*. 2019;50(4):311–29. 10.1080/00222216.2019.1617647.
8. Anderson CL, Monroy M, Keltner. Dacher. Awe in nature heals: Evidence from military veterans, at-risk youth, and college students *Emotion* Vol. 18, Iss. 8Dec, (2018): 1195–1202. 10.1037/emo0000442.

9. Saxe-Custack A, Sadler R, LaChance J, Hanna-Attisha M, Ceja T. Participation in a Fruit and Vegetable Prescription Program for Pediatric Patients is Positively Associated with Farmers' Market Shopping. *Int J Environ Res Public Health*. 2020;17(12):4202. <https://doi.org/10.3390/ijerph17124202>.
10. Hogg R, Varda D. Insights Into Collaborative Networks of Nonprofit, Private, and Public Organizations That Address Complex Health Issues. *Health Aff*. 2016;35(11):2014–9.
11. Mays GP, Mamaril CB, Timsina LR. Preventable Death Rates Fell Where Communities Expanded Population Health Activities Through Multisector Networks. *Health Aff*. 2016;35(11):2005–13.
12. Provan K, Milward HB. A Preliminary Theory of Interorganizational Network Effectiveness: A Comparative Study of Four Community Mental Health Networks. *Adm Sci Q*. 1995;40(1):1–33.
13. O'Toole LJ. Treating networks seriously: Practical and research-based agendas in public administration. *Public Adm Rev*. 1997;57(1):45–52.
14. Varda DM, Edwards K, Ely T, Hogg Graham R. Community Carrying Capacity to Address Health System Referrals: A Networked Approach. *J Health Human Serv Adm*. 2020;43(2):154–77. <https://doi.org/10.37808/jhhsa.43.2.5>.
15. Varda D, Retrum JH. Collaborative Performance as a Function of Network Members' Perceptions of Success. *Public Perform Manage Rev*. 2015;38(4):632–53.
16. Litt J, Varda D, Reed H, Retrum J, Tabak R, Gustat J, Tompkins N. How to Identify Success Among Networks that Promote Active Living. *Am J Public Health*. 2015;105(11):2298–305.
17. Wasserman S, Faust K. *Social network analysis: Methods and applications*. Cambridge University Press; 1994. <https://doi.org/10.1017/CBO9780511815478>.
18. Varda DM, Chandra A, Stern S, and N Lurie. Core Dimensions of Connectivity in Public Health Collaboratives. *J Public Health Manage Pract*. 2008;14(5):E1–E7.
19. Hidalgo CS-TL, Jimenez-Arenas P, Casajuana C, Domènech S, Ballester-Lledó A, Litt J, Sachs A, Garcia G. Sergi Blancafort-Alias, Co-Creating a Nature-Based Social Prescription Intervention in Urban Socioeconomically Deprived Neighborhoods: A Case Study from RECETAS Project in Barcelona, Spain, *Health & Social Care in the Community*, vol. 2023, Article ID 6616991, 16 pages, 2023. <https://doi.org/10.1155/2023/6616991>.

Figures



Figure 1

Participating Sites



Figure 2

Revised Model of Perceptions of Network Success

	<p>Power & Influence: The organization holds a prominent position in the community because of its financial resources or policy-making authority, and/or because it has displayed leadership and success as a change agent.</p>
	<p>Level of Involvement: The organization is strongly committed and active in this work, and gets things done.</p>
	<p>Resource Contribution: The organization brings resources to the work like funding, staff time, and information.</p>
	<p>In support of Mission: The organization shares a common vision of the end goal of what working together should accomplish.</p>

Figure 3

Four Dimensions of Perception of Trust/Value Used in the Survey



Helsinki

*Launched October 2021
Response Rate: 64%
Members Invited: 22
Members Responded: 14*



Cuenca

*Launched October 2021
Response Rate: 56%
Members Invited: 34
Members Responded: 19*



Melbourne

*Launched November 2021
Response Rate: 71%
Members Invited: 24
Members Responded: 17*



Barcelona

*Launched November 2021
Response Rate: 62%
Members Invited: 131
Members Responded: 81*



Prague

*Launched November 2021
Response Rate: 71%
Members Invited: 42
Members Responded: 29*

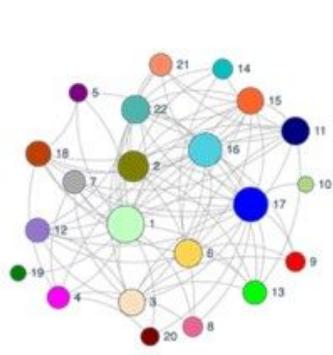


Marseille

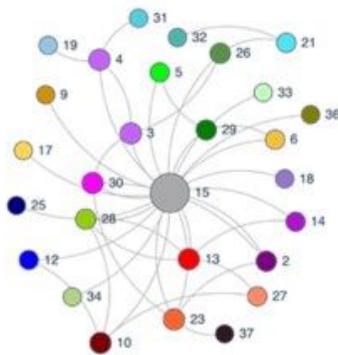
*Launched November 2021
Sixty-six organizations
responded to the survey.*

Figure 4

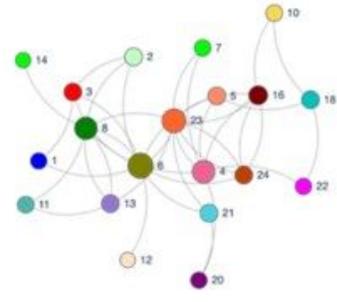
Site Descriptions, Including Response Rates



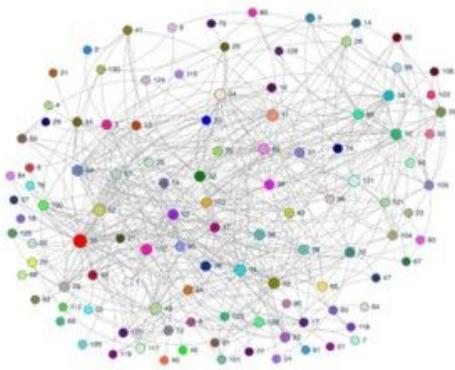
Helsinki



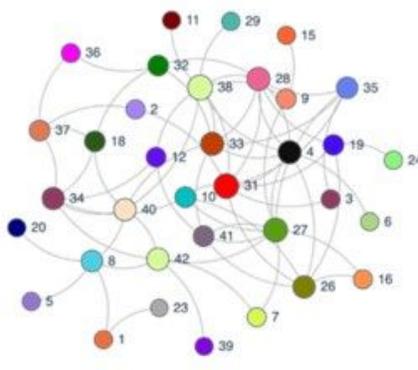
Cuenca



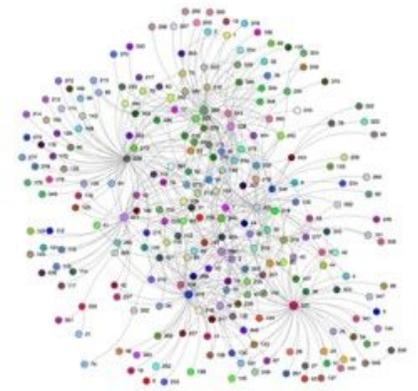
Melbourne



Barcelona



Prague



Marseille

Figure 5

Network Maps

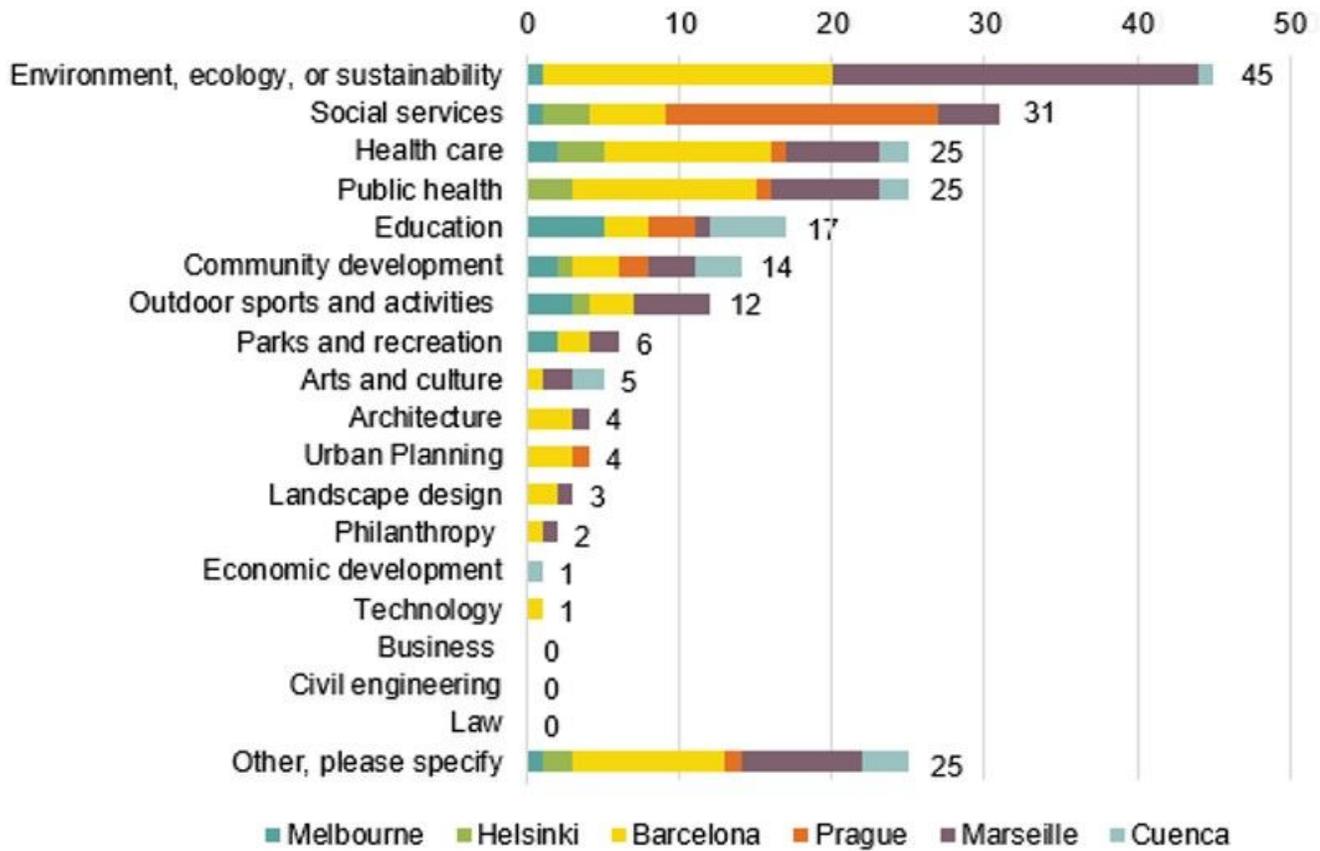


Figure 6

Network Members Sector/Industries



Figure 7

Results of Value/Trust Dimensions

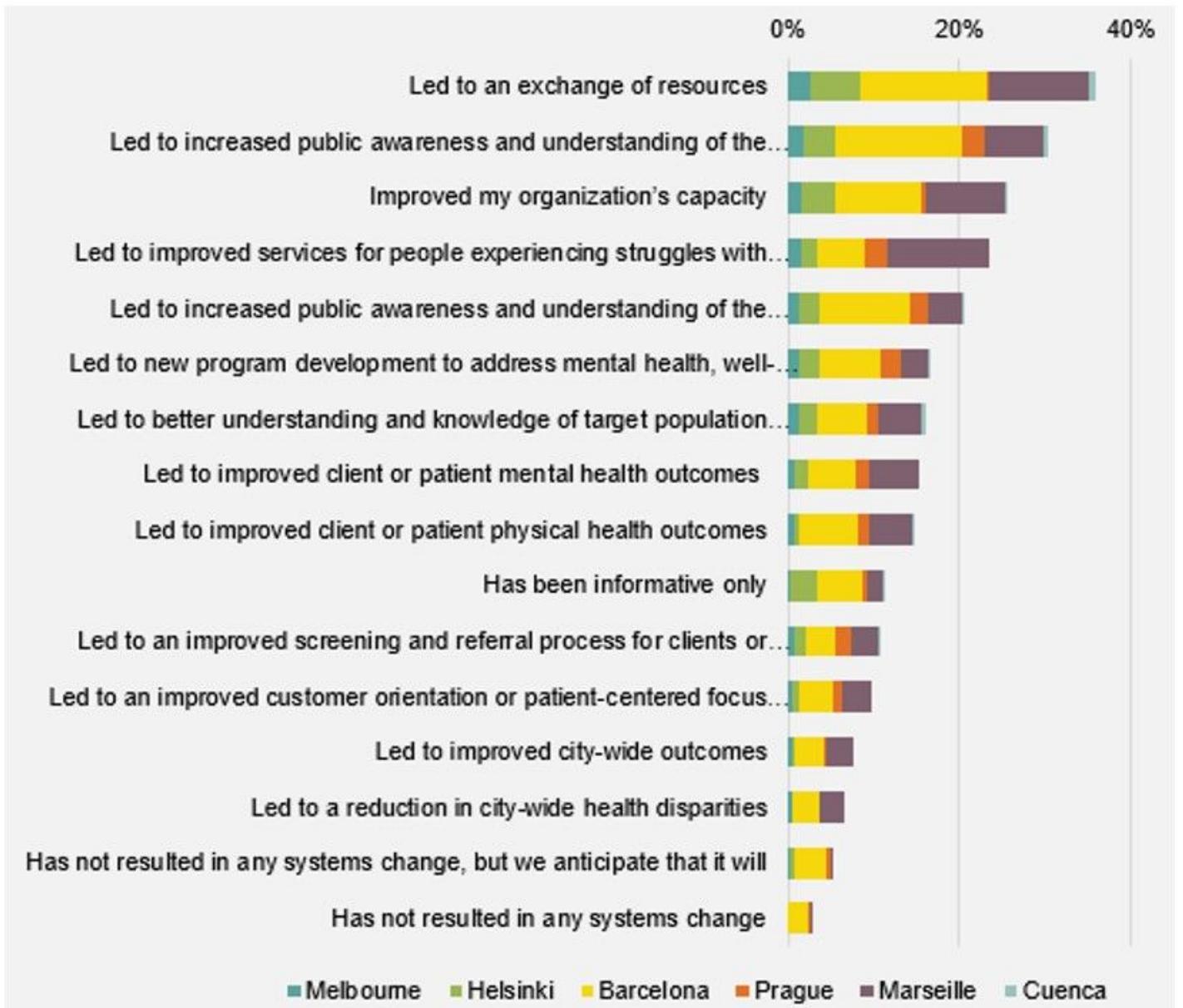


Figure 8

Outcomes Attributed to Network Relationships

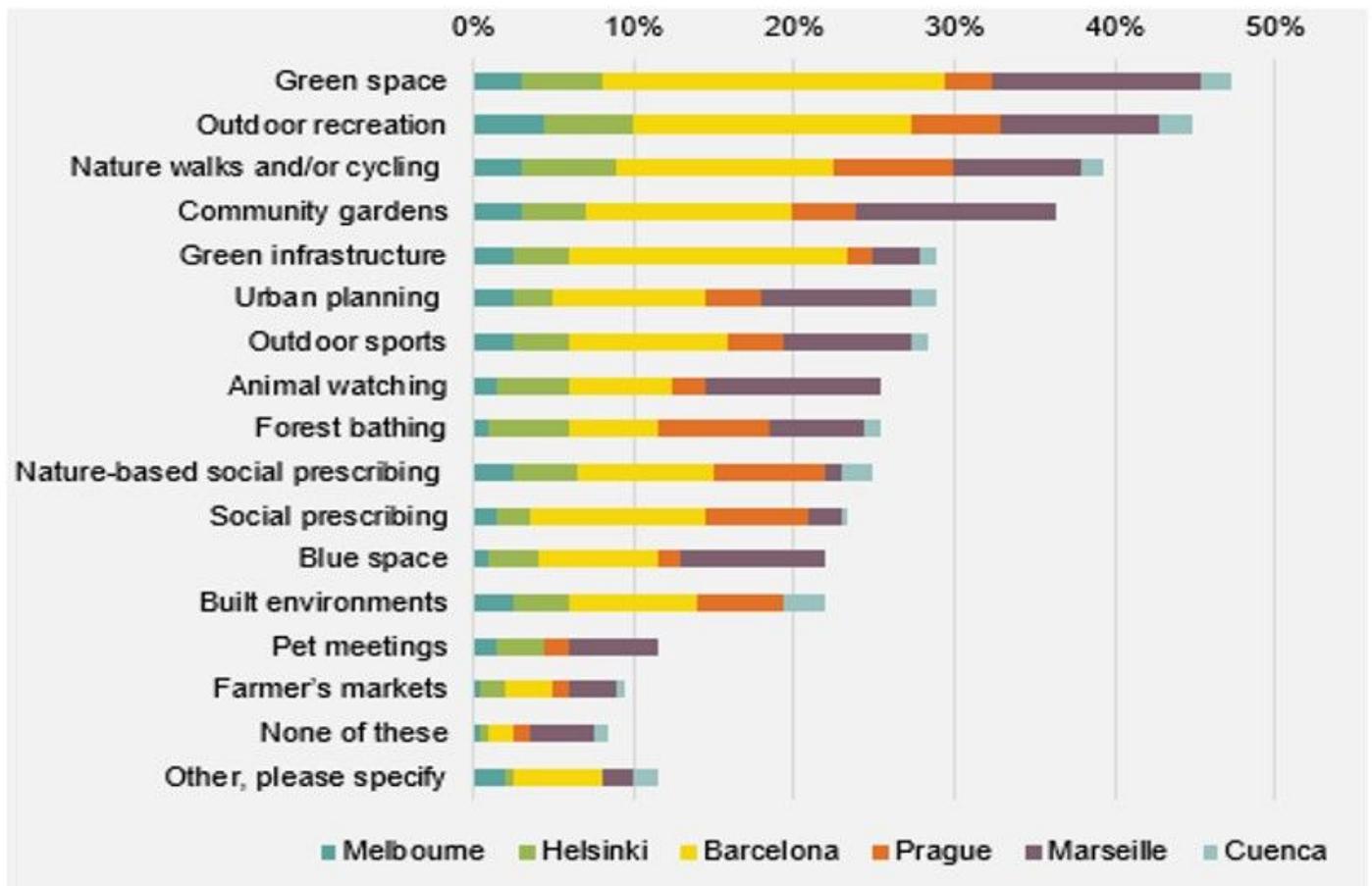


Figure 9

Nature-Based Solutions

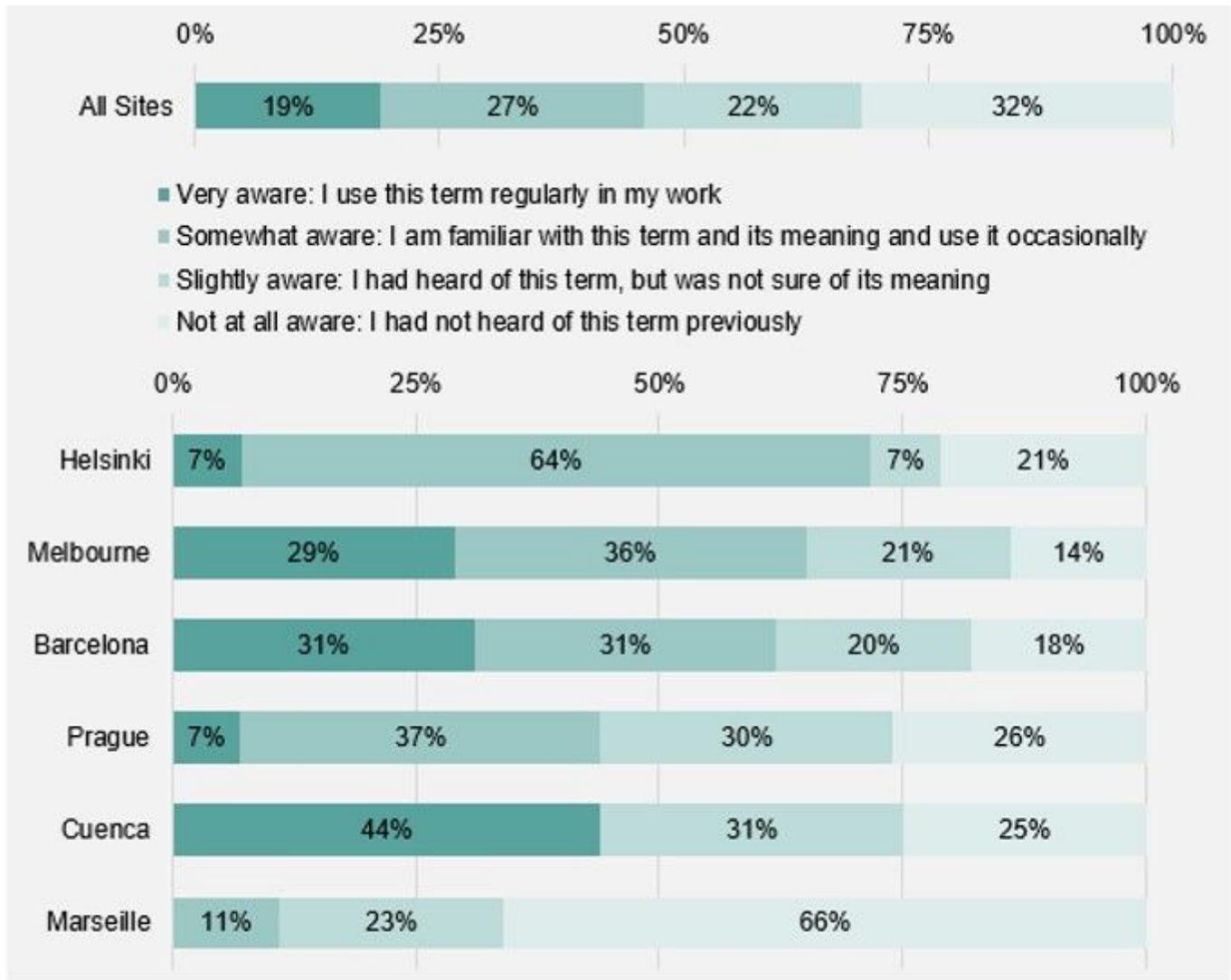


Figure 10

Familiarity of NBS Term

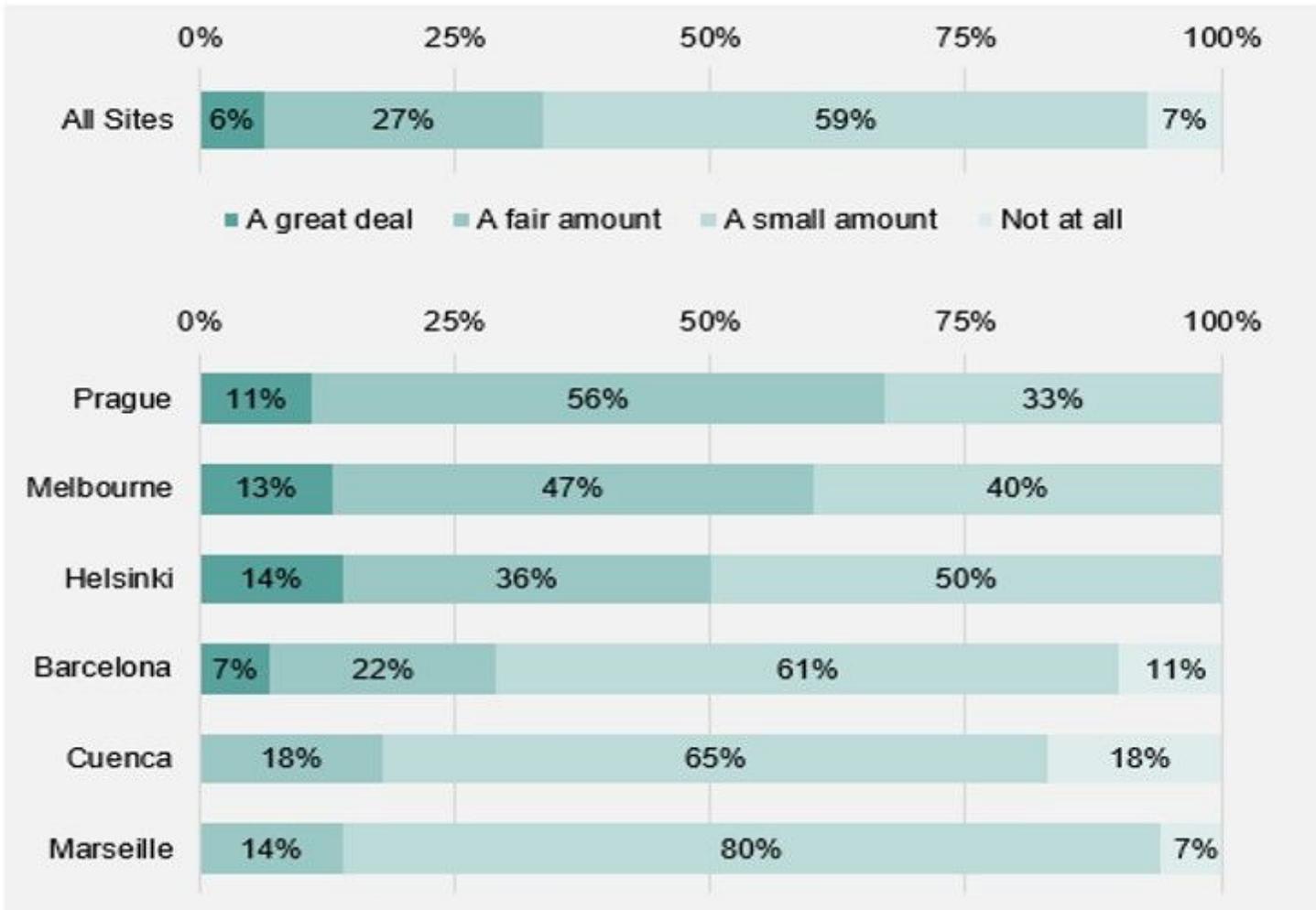


Figure 11

Extent of NBSP Adoption

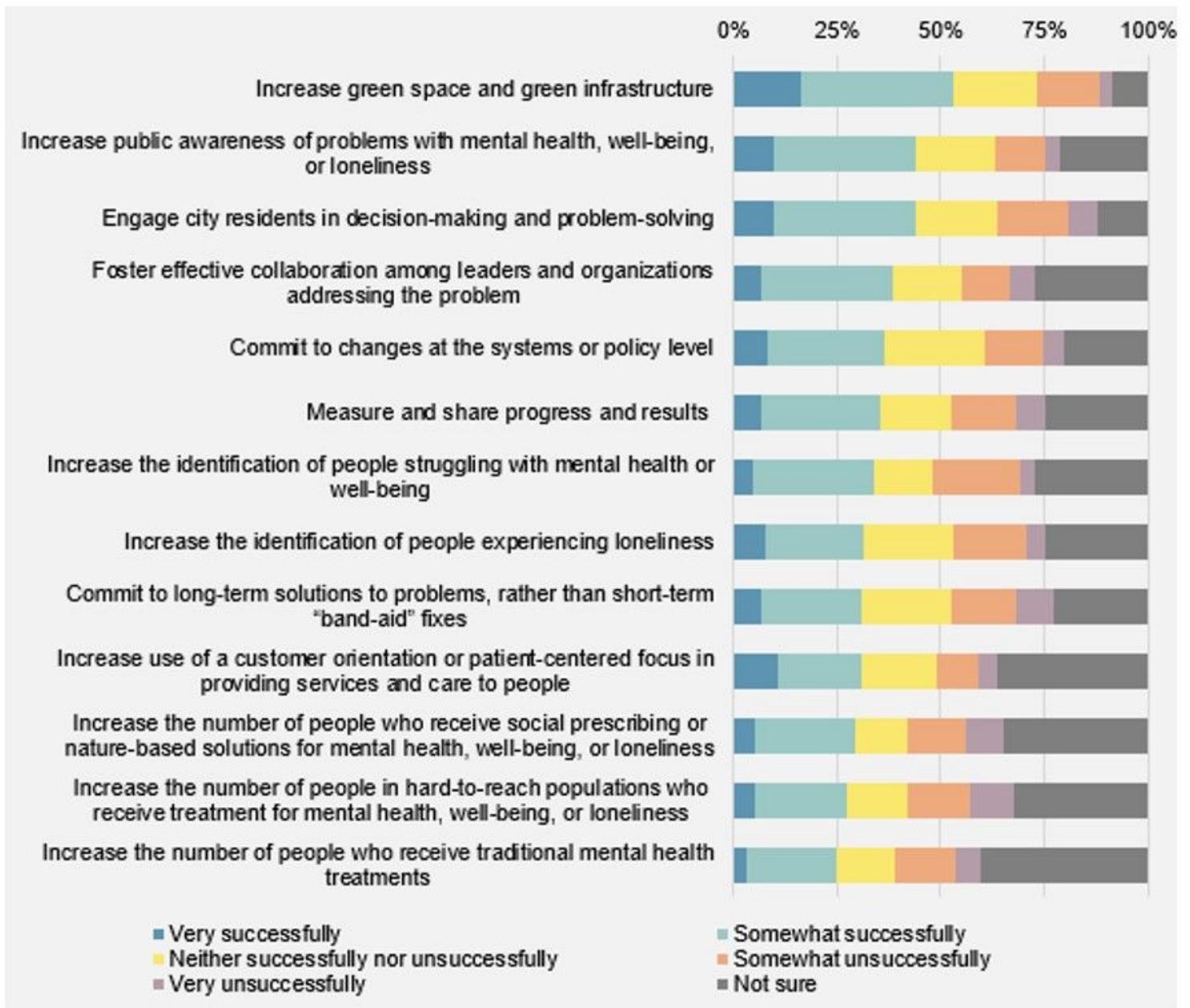


Figure 12

Perceptions of Success in Achieving Objectives

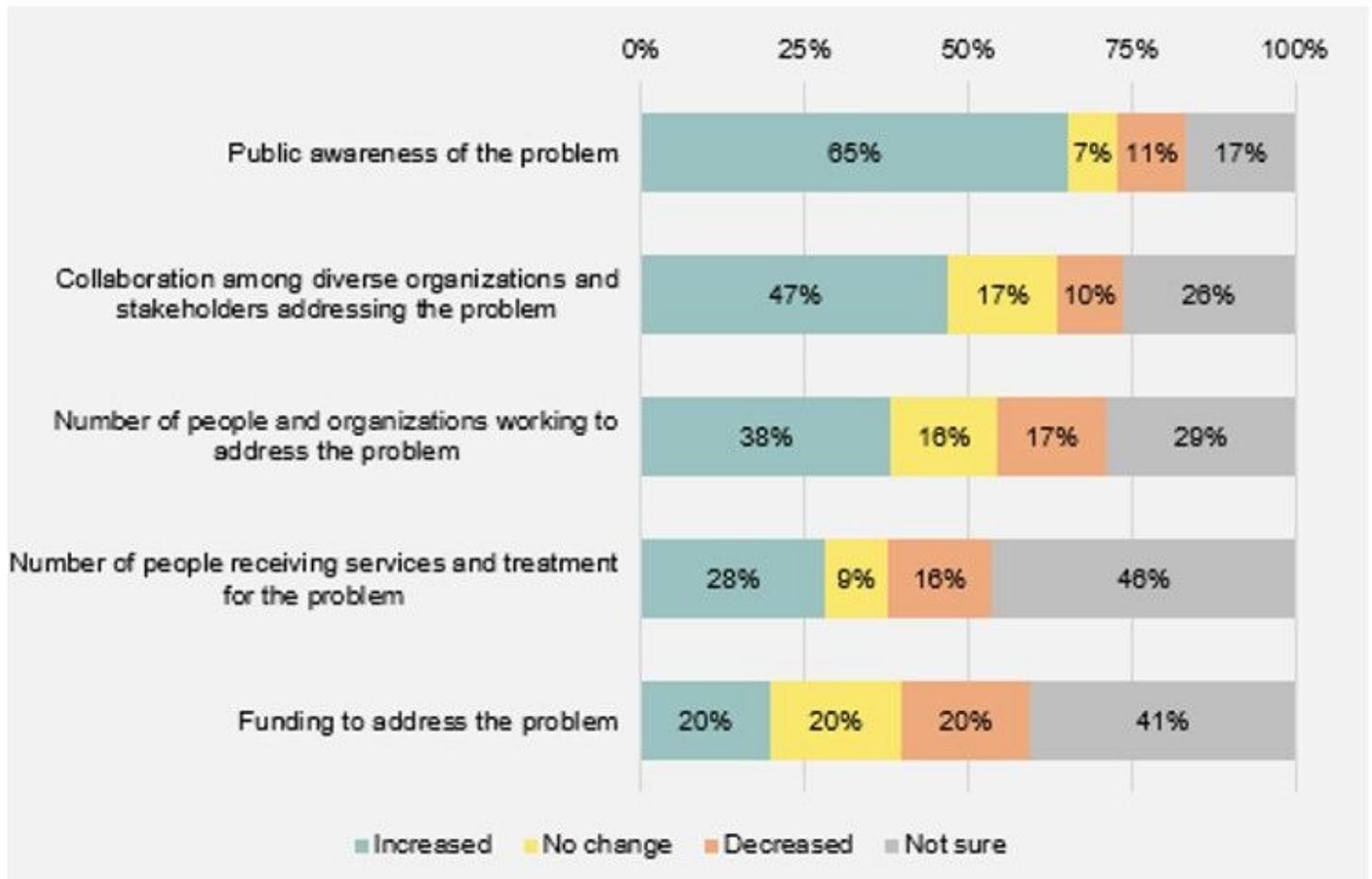


Figure 13

Impact of Covid-19