

Technology mediated care as infrastructure: the role of social media in supporting international migrants settling in New Zealand small towns

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ABSTRACT

Considerable research has focused on the important role of social media in migrant life. However, there is a lack of knowledge about how remote regional areas shape migrants' use of social media, and whether social media can serve as a viable migrant support infrastructure in such places. We seek to help address this knowledge gap by investigating how social media platforms have enabled algorithmic care for migrants to Oamaru, a small service town on the south-east coast of the South Island of New Zealand. We develop an analytic of technology-mediated care as infrastructure in a tripartite relationship between people, place and platform to guide our examination of the small town migrant support ecosystem. A questionnaire survey of migrants and a community Facebook page have been the source of our data. We observe the important role played by social media platforms through the availability of emotional, informational and material support, and also how, over time, the community Facebook page has evolved into a self-organising and generative care infrastructure. The findings confirm that this form of platformised care is not placeless, but rather contingent on place-specific relations and responsibilities by bringing together migrants, host communities and small town institutions. Social media facilitates the practice of both self-care and caring-with others, enabling migrant and host community interactions and cultural competency building, as well as addressing pre-existing migrant support deficiencies in small towns.

1. Introduction:

Social media platforms have allowed users to deposit, display, circulate and exchange user-generated content through the use of mobile and internet-based applications (Kaplan & Haenlein, 2010; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). A considerable body of scholarship has documented the importance of social media in migration decision-making (Thulin & Vilhelmson, 2014), and in providing informational (Dekker, Engbersen, Klaver, and Vonk, 2018), emotional (Park, Song, & Lee, 2014), settlement (Alencar, 2018), and wellbeing (Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017) support before, during and after migration. Maintenance of transnational family ties (Cabalcanto, 2020) is the most common benefit of social media. The increasing efficiency of platforms has also enabled migrant virtual community building (Komito, 2011). However, despite the recognition of social media benefiting various stages of migration, very little is known about how places, particularly small towns in remote regional areas, influence this form of digital care practice and interact with the actually existing, offline and place-based newcomer support ecosystem.

Given the increasing recognition of the importance of adopting a spirit of 'care' to support communities and their broader well-being (Freeman & Nel, 2024), investigating how new forms of technology can provide care is a valuable line of enquiry.

With the aim of understanding the role that social media plays in supporting small town migrants, we draw on an emerging body of work that aligns with feminist and critical geographical scholarship to investigate how technologies 'enable' (and sometimes 'disable') everyday care for communities in need (Maalsen, 2023; McLean, Southerton, & Lupton, 2023). These technologically mediated care practices have the potential to constitute routines and relationships that communities engage with. As a result, more bottom-up, generative infrastructural capacities (of 'caring-with') can be reproduced in post-welfare cities (Power, 2019) which frequently suffer from a lack of care from traditional channels. In this scholarship, infrastructures are understood as socio-technical and socio-material practices (Amin, 2014; Maalsen, 2023) that 'provision', 'assemble', and 'entangle' 'care as alternate infrastructure' (Alam & Houston, 2020). Using this analytical lens as a starting point, we first investigate how migrants moving to the

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small town of Oamaru, New Zealand, have used social media to obtain various forms of support, ranging from pre-migration decision-making to post-migration settlement. Second, we also examine how care is configured via a key community Facebook platform, demonstrating the ways technologies allow for a more distributed and regenerative socio-technological care infrastructure which complements, supplements and even reconfigures the pre-existing offline migrant support services.

Since the diversification of visa policies in the 1990s, New Zealand's small towns have attracted increasing numbers of non-European migrants of culturally and linguistically diverse backgrounds. These migrants have joined the primary and secondary sectors in small towns, helping to address the labour shortages resulting from depopulation of those areas, particularly in the agricultural sector, while others have helped to fill gaps in the tertiary and quaternary sectors (Alam & Nel, 2023). Access to rural amenities, semi-rural tranquillity and lifestyle, and the housing affordability crisis in large cities have helped to drive this migration (Alam, Nel, Hill, & Bulloch, 2023). During and immediately after the COVID-19 pandemic, many have also moved away from busy metropolises to avoid overcrowding (Halfacree, 2024; Tammaru, Kliimask, & Kalm, 2023). Migrants from big cities have, however, often experienced a sense of isolation due to the small towns' geographical remoteness and quiet atmosphere (Suckling, 2018). Ethnic differences in general are a key driver of loneliness, and those from minority ethnic backgrounds are found to be lonelier than those of European origin (Ministry of Social Development, 2010). Migrant youth, in particular, have struggled to cope with the limited employment and amenity opportunities available to them in small towns. These realities have often turned migrants to virtual space to compensate for the lack of physical connection and support (Borkert, Fisher, & Yafi, 2018; Dekker, Engbersen, Klaver, & Vonk, 2018).

While social media access is not place-bound, it has emerged as an important tool to fill the access, finance and physical gaps in many small towns globally, particularly those places which might otherwise lack the resources to communicate through more tangible means, such as physical connection and published newspapers. Technological and communication advances have facilitated the sharing of local news through electronic media and other outlets (Hess, 2015). Increased connectivity and information exchange in what are often 'peripheral places' with the outside world have helped to overcome barriers of 'space and distance' (Collins & Wellman, 2010, 1344) which are often difficult to achieve, cost-wise, for smaller centres. In this regard Shen and Liu (2018) comment that "social media has transcended the limitations of spatial reality, providing technological support for the expansion of the boundary of space and time" (p. 4). At a more general level, visitor attraction, place branding and tourism promotion are areas where small towns have particularly benefited from the wider use of new, low-cost forms of digital communication (Popova, Korolkova, & Stepanova, 2020; Shen & Wall, 2021). Parallel studies into the use of social media by small businesses in small towns have established that, due to limited forms of mainstream communication and business marketing, social media now plays a key role in forming business links and in daily exchanges (Polat & Yarimoğlu, 2018). In terms of local governance in small towns, social media has increased transparency and citizen engagement (Alam, Meenar, Barraza, Khalil, & Knopp, 2022) in what is seen as 'progressive urbanism in small towns' (Beveridge & Naumann, 2023, p. 61).

The above-mentioned geographical and capacity limitations of small towns to satisfy newcomer migrants with their settlement needs, as well as the unique benefits new technologies provide to overcome such limitations, present small towns as complex landscapes. Compared with larger urban centres where physical amenities, social opportunities and the availability of technologies are abundant, remote and peripheral urban centres facing multiple deprivations present a compelling case for the investigation of access to and use of social media in supporting migrant lives. With this aim for this study, in the following sections we first engage with the literature examining social media use in migrant

lives. Then we trace the theoretical origin of feminist care ethics and care as infrastructure to position how social media, as a technology-mediated care infrastructure, can facilitate migrant support. We then introduce the case study town of Oamaru, in New Zealand's South Island and our research methods. The results section commences with a summary of migrants' utilisation of social media throughout various phases in their migration to Oamaru, as well as the various types of care which they believe social media provided to them. The final section reflects on the results to explore the possibilities of rethinking social media as migrant care infrastructure, as well as what it means in the small town context.

2. Social media and migrants: drawing the connections

Social media platforms are increasingly being seen as integral to migrant lives, as they offer the potential to create new realms of social space online, facilitating both private, group based and real-time communications through the platforms' ever expanding information sharing capabilities (Dekker & Engbersen, 2014). The most widely acknowledged benefit of social media in migrants' lives is the opportunity for maintaining transnational family ties (Dekker & Engbersen, 2014; Dekker, Engbersen, & Faber, 2016; Hiller & Franz, 2004; Ihejirika & Krtalic, 2021; Komito, 2011; Madianou, 2019). These transnational relations are more than just 'virtual intimacies' (Wilding, 2006) and involve critical support networks for family members, friends and communities. Examples include Zimbabwean migrants' food and cash remittance support from Cape Town via the use of mobile based technologies (Sithole, 2023). Filipino workers in Australia have used mobile photography to connect and perform familial roles and responsibilities for those left at home (Cabalquinto, 2020).

Beyond maintaining transnational ties, recent studies have also documented the use of social media for wider support outside family relations. Network and virtual community building via the use of group pages are the most frequently recognised benefit (Dekker et al., 2016; Komito, 2011; Komito & Bates, 2011). These virtual connections were seen to play a crucial role in migrant women's coping mechanisms during the COVID-19 lockdown (Muswede & Sithole, 2022). Young people, particularly international students, have used social media to support psychological well-being through the process of coping with acculturation stress (see Forbush & Foucault-Welles, 2016; Park et al., 2014). In Singapore, social media enabled migrant workers to raise their voice about their labour rights (Aricat, 2015). In other instances, refugees and newcomer women in Canadian cities have used social media to reduce social exclusion through friendship building (Hynie, Crooks, & Barragan, 2011).

The benefits of social media are also temporal. Social media plays a critical role in the migration decision making phase. Komito and Bates (2011) discuss the 'snowball' migration pattern that builds on connections with friends and families abroad. Social media has been an effective means of communication and information acquisition for Syrian asylum seekers (Dekker et al., 2018). Dekker and Engbersen (2014) find that after migrating to a new place, migrants tend to choose to locate close to communities which they have connected with through social media at the pre-migration stage. Thus, social media can contribute to migrants' settlement in the new destination (Cassar, Gauci, & Bacchi, 2016; Kok & Rogers, 2017; Sawyer & Chen, 2012). At the settlement stage, social media platforms are used in various ways for language and cultural acquisition, as well as building social capital (Alencar, 2018). This trend is more pronounced among younger generations who use social media for personal growth, empowerment and evolving identity after migration (Elias & Lemish, 2009).

Despite many benefits, social media can also affect migrants negatively. False information received from a distance can deceive migrants into forming unrealistic expectations about employment prospects, lifestyle opportunities and the destination place itself (Dekker & Engbersen, 2014). Social media may put migrants at increasing risk of

human trafficking, commercial sexual exploitation and fraud; however, in other instances, social networks sites have enabled the tracking of possible cases of human trafficking to protect victims and prosecute traffickers (McGregor & Siegel, 2013). Bullying by racist groups is not uncommon on social media (see Matamoros-Fernández & Farkas, 2021). In other instances, social media usage, particularly Facebook, as measured by time used and active or passive engagement with the medium, was significantly linked to loneliness and psychological distress (Gregory, Dutton, Osuagwu, & Vines, 2023).

Ability to access technology can be an opportunity or a barrier and is key to whether migrants are able to reap the benefit of new communication technologies (Madianou, 2019). Individual migrants' various intersectional factors such as socio-economic status, level of education, urban/rural residency and age can also influence access (Dekker & Engbersen, 2014). Varying levels of technological literacy can widen this digital divide, despite individuals' access to technology (Alam et al., 2022; Alam & Imran, 2015). From a different perspective, Komito and Bates (2011) have argued that passive use of social media, such as scrolling, is increasing and this passive use can reduce the chances for meaningful engagement with other migrants and the (host) society via social media, emphasising the complexity of social media impacts on migrants' lives. This is exactly the reason we have taken the feminist 'care as infrastructure' (Alam & Houston, 2020) lens to understand how and under which conditions social media enabled care for small town migrants in Oamaru.

3. Care, infrastructure and technology mediated migrant support

Having examined the role which social media can play in supporting migrants, we now switch our attention to providing a more nuanced understanding of how the use of social media to support migrants can be understood as a form of technologically mediated care. Feminist geographers have long studied care and care practices. Fisher and Tronto's (1990) articulation of care as activities that "we do to maintain, continue, and repair our world so that we can live in it... The world included our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life sustaining web" (p. 40). This view of care as something that sustains the world, challenges earlier ideas in social science and health research, where care was often just seen as informal, gendered work done in the private sphere. Care work focuses on relational ethics of 'caring with' (Tronto, 2013) as a grounded everyday practice both in private and public spheres (Williams, 2016). Caring with is essentially a disposition from the 'self' to respond to the "the concerns and needs of the other" (Tronto, 1993, p. 205) through a moral extension to the world that involves both humans and (non-human) environments. In this scenario, inter-dependency is a fundamental 'pre-condition' (Puig de la Bellacasa 2012; pp. 198, 199) to understand care needs in each situation.

Acknowledging the theoretical origin of the care concept, our use of care relies heavily on Power's recent conceptualisation of "caring-with" with a hyphen (Power, 2019). According to Power, caring-with does not describe a particular 'category' or 'vision' of caring (as per Tronto, 2013: i.e. caring for, caring about, care giving, care receiving and caring with). Power (2019) describes caring-with as an approach to conceptualise "the relational emergence of care, figuring care as a generative socio-material relation that is productive of and emergent through assemblages of actors" (Power, 2019, p. 766). Hence caring-with, brings feminist care ethics together with assemblage thinking to provide a grounded analytical lens that is sensitive to a multiplicity of relations. Care capacity emerges through "becoming with" an "assemblage of unequal actors," which Alam and Houston (2020) term as "care collectives". Care is not fixed or one-sided; it is a changing process shaped by the people and situations involved within the company and modality of both as a collective that is also situated in its historical, structural and spatial contexts. "Caring-with also demands attention to what is

possible, asking what acts of care might be enabled through care received and resources assembled now" (Power, 2019, p. 768).

At the same time, recent scholarship (Amin, 2014; Bissell, 2014) has begun to see infrastructure as both social and technical—and more than just physical systems. Proponents of this line of reasoning reaffirm infrastructures as ethnographic sites (Star, 1999) which hold and sustain lives made of social relations and practices (Berlant, 2016, pp. 393-4; Latham & Wood, 2015). However, these relations do not necessarily always surface; sometimes, they 'sink' into the background (Star, 1999, p. 380) while continuing to structure social life. As the users start to rely on the relations, set routines and expectations based on the availability of care, these relations start to operate as infrastructures (Simone, 2004). Like care, infrastructures depend on specific places and relationships, "the material and immaterial elements become care infrastructures as they are enrolled into or intervene within practices of care and become foundations that give shape to how care is practiced" (Mitchell, Mee, Power, & Wiesel, 2025, p. 2). They aren't fixed—they can appear or disappear, and they are constantly shaped and reshaped.

In the context of migrant-support, caring-with and alternate infrastructure thinking can be blended to provide an analytical focus on both everyday, self-organised and collectivised practices of migrant support where social media, as an emerging technology, brings individuals and communities together. The care relations that result are socio-materially generated through the use of technology and are performative, experiential, and enabled by the involvement of the technology users who either seek or provide care which is contingent on particular circumstances. For example, video conferencing technologies (such as skype) have enabled the remote care of mothering (Longhurst, 2013, 2015), grand parenting and intergenerational support across transnational spaces in migrant lives (Share, Williams, & Kerrins, 2018) and even more embodied 'audio-synchronous' commercial care (e.g. digital sex work) (Longhurst, 2016). McLean et al. (2023) show how the TikTok platform enables young users to organise self-care as well as care for other users to make an inclusive digital place for all.

Beyond the familial and small-scale group-based care relations and practices, technologies have mediated more public forms of caring-with. For example, communities have engaged with caring for their everyday urban environment through generating air pollution data (Gabrys, Pritchard, & Barratt, 2016). In other instances, citizens have maintained and communicated with (in fact, emailed to) neighbourhood trees through smart visual platforms which in turn have reciprocated care for the residents themselves (Prebble, McLean, & Houston, 2021). Facebook is being increasingly used for virtual community making and community engagements to ensure care and maintenance of housing estates and local government infrastructures (Alam et al., 2022; Witten, Kearns, O'pit, & Fergusson, 2020).

While we aim to situate care as a practice, technique, politics and ethics that is bound up in our encounters with algorithmic technologies (McLean et al, 2023; Maalsen, 2023), thinking infrastructurally about care practice may point to some limitation of care as inadequate and harmful. For example, Hjorth et al. (2020) point to the situation of 'over-caring' or 'negative care' because increasing surveillance can induce a perception of an intrusive and interrogative atmosphere for users (p. 72). At the other end of the spectrum, individuals may feel uncared for, as they perceive they are de-humanised as online subscribers because of interactions through AI processed texts and virtual assistants (Seitz, 2024). Within the spectrum, there are also experiences of harassment, intimidation, humiliation and cyberbullying, as technology enables people to remain anonymous (Upadhyay et al., 2023). Akin to traditional 'infrastructural harm' (Amin, 2014) produced through historical and structural inequalities, technology and platforms may also perpetuate bias and explicitly and implicitly harm racial groups and lead to forms of discrimination (Turner Lee, 2018).

Combining the notion of caring-with and technology as infrastructures, we conceptualise technology-mediated care for migrants within a tripartite relationship of place, platform and people. As

visualised in Fig. 1, the interaction of three domains creates emergent capacities of caring or (uncaring). Care is successful when care receivers acknowledge that care has been useful. Successful care is contingent on migrants' accessibility to platforms, which is determined by 'place' conditions, such as technological connectivity and culture of technology use. Technology mediated care forms through 'people' coming together, and the temporality of this care for migrants is that it can take place whenever they need support. In addition, care is non-linear and 'platforms' offer the advantage of depositing, displaying and sharing content, which follows the ways that social media content is arranged and shared to support those who need it. Individuals and groups, through exchanging information, assembling or enrolling in virtual groups, are able to reproduce forms of sociality which can be likened to the "practices of commoning" (Waliuzzaman & Alam, 2022) at different scales, from one-to-one interactions to more private, semi-public or public group interactions. Access, use, benefit, care, ownership and responsibility of the online resources can be negotiated by those involved within those relations and situations. We note these do not necessarily replace the physical or more formal support mechanisms but rather augment those pre-existing physical ones.

4. Case study: Oamaru, New Zealand

Oamaru, the focus of this study, is a small regional service town situated on the south-east coast of New Zealand's South Island (Fig. 2). The town serves as the primary service and administrative centre for the Waitaki District which stretches inland from Oamaru along the Waitaki river valley, which is hemmed in by mountain chains (Waitaki District Council, 2023). The district and the town's economy are dominated by farming and agricultural processing centred on dairy, beef and sheep, with the town's two biggest industries being a meatworks and a dairy processing plant. Tourism is an important secondary industry both in the town and the district, while service and retail are important mainstays of the local economy.

Oamaru's population in 2018 was 13,150 according to the last available census (StatsNZ, 2022). As noted above, rural and small town New Zealand have experienced population loss over the last 30 or so years as a result of population ageing, a falling birth rate and out-migration. In 1981 the town's population was 14,664, falling to 12,250 in 2001, but recovering since to the 2018 figure of 13,150. As argued

previously (Alam & Nel, 2023) in demographic terms, many rural parts of the South Island have experienced population regrowth as a direct result of in-migration. In the Waitaki District, new arrivals from Asia and countries in the Pacific led to a direct population increase of approximately 1,700 people in the period from 1996 to 2018, and in 2018 came to constitute 10% of the population, up from 3% (StatsNZ, 2022).

In the case of Oamaru and its hinterland, new overseas workers have helped to fill critical skills gaps, particularly on dairy farms, and in the town's two main industries — the meatworks and dairy plant — and in the health sector. This has both stabilised the population and economy of the town and its hinterland and ensured continued service provision (Key Informant 1, 2023; Key Informant 2, 2023; Key Informant 3, 2023). While foreign-born migrants clearly now play key roles in the local economy, it does leave open the question of who supports new migrants in the settlement process and to what degree must they rely on their own resources or community support systems? Oamaru does have local government and community-based support for migrants through the Stronger Waitaki agency, the Newcomers Network and the Multicultural Council, and there are also ethnic and faith based self-organised community groups that provide additional layers of support, the most well known being the Pacific Island Community Group (Key Informant 1, 2023; Key Informant 2, 2023; Key Informant 3, 2023). While these groups do provide valuable support to residents, those coming from abroad must look elsewhere for pre-arrival guidance and support, while for those already in the town, the support centres cannot meet all current needs. It is in this space, we argue, that social media helps to bridge the gap in terms of advice, support and networking.

5. Methods and data

The study was part of the larger mixed method study¹ investigating migrant retention capacities in small towns in New Zealand. With a focus on the role of social media platforms in shaping migrant settlement experiences, this article relied on the data collected through a questionnaire survey as the first stage. The survey aimed at understanding the participating migrants' intersectional attributes (e.g., age, ethnicity, visa status, etc.), their personal experiences of access, preferences, and the use of social media before, during and after migration to small towns and the nature of care received via social media engagement. In the second stage, we analysed the content of a community Facebook page² to understand migrants' virtual interaction with other migrants and the wider community of Oamaru and how and if such engagement generated more public forms of care.

The questionnaire survey was conducted during December 2023 and January 2024. The questionnaire was circulated within the community through the local community Facebook page and by the local government's community support provider's office. The conceptual framework presented in Fig. 1 guided the questionnaire design in several thematic areas which required significant time commitment from participants to respond to a mixture of closed and open-ended questions. As a result, although 44 participants attempted the survey, a total of 24 participants completed the whole questionnaire. Each respondent spent an average of 24 min and 43 seconds in undertaking the questionnaire. All participants identified themselves as immigrants to New Zealand, all were aged 18+ and were living in Oamaru/Waitaki District during the time of the survey.

The questionnaire data went through descriptive and thematic analysis in line with the conceptual framework presented in Fig. 1. The demographic information (Table 1) suggests the diversity of respondent profiles: 75% of the respondents were from non-European backgrounds,

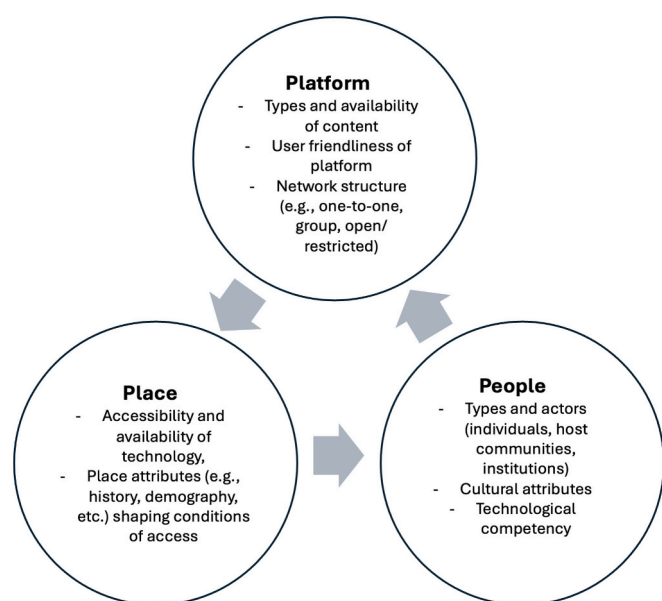


Fig. 1. Conceptual framework for technology mediated care as infrastructure
Source: The authors.

¹ Beyond the Metropolis: Immigration to small and mid-sized cities in comparative perspective.

² We do not reveal the title of the Facebook page to retain participant anonymity.

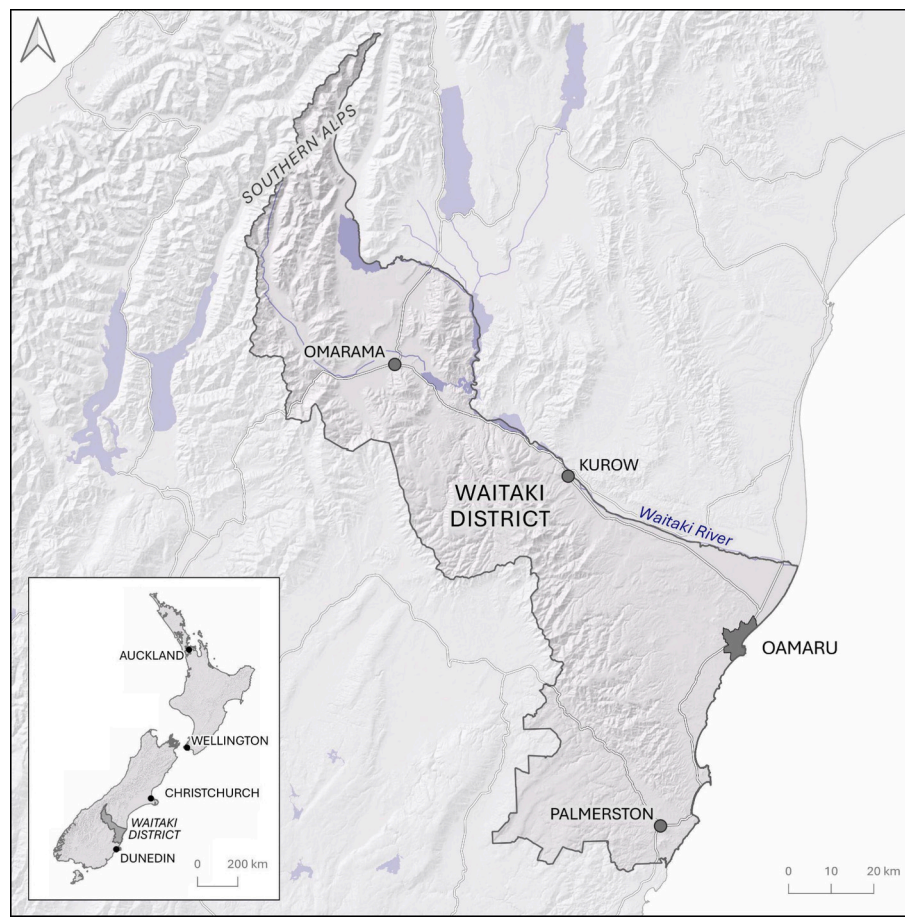


Fig. 2. Oamaru in the Waitaki District
Source: The authors

primarily from Asia, Latin America and Pacific Islands. Nearly three quarters were female, and 75% of respondents were living within the urban boundary. The majority (70%) were on work visas and 95% were within the first ten years of their migration to Oamaru. An overwhelming majority of the respondents have university degrees (80%) and have access to smartphones (90%) and the internet via home wifi (95%) which has potentially enabled greater social media competency and access. The survey identified Facebook as the most used social media platform by migrants (88%).

In May 2025, the community Facebook page had approximately 21,000 members. It is designated as a public group, meaning that anyone can see who is in the group and what they post; however, for posting content on the page requires approval by the page administrator, who screens the content for abusive language and inappropriate content (e.g. sales promotion). We spent two days (Aug 31 – Sept 1, 2024) manually screening the posts that appeared since the commencement of the group page in February 2022. A total of 67 posts were identified that contained discussion about migrant and newcomer support. The texts and images of the original post and related comment thread were extracted in the form of screenshots and underwent thematic content analysis. Reactions to each post were registered to understand the level of passive attention to the matter raised. This secondary data furthered our understanding of the nature of platform interactions and care and supported our analysis of questionnaire findings. To contextualise the social media interactions, we also selectively used data gathered from other fieldwork components in our larger research project: (i) three focus groups with migrant support providers, business owners and employers, and migrant leaders and (ii) twenty face-to-face interviews with migrant individuals.

6. Results

In the questionnaire, we asked participants several questions about the usefulness of social media in their migration journey to Oamaru. These questions focused on the role of social media in providing emotional, informational, and material support across three stages: pre-migration; the first three months after arrival; and three months or more post-migration.

The various supports (Fig. 3) confirm that the platform engagement was able to mediate care and care was successful through migrants acknowledging receiving care: 75% of the respondents identified its usefulness before migration, which increased to 85% -90% in the post migration stage (Fig. 3). Social media was continually valued for providing emotional and informational support during the migrant settlement period. We assume this could be because in a small town, emotional and informational disconnects experienced by migrants were possibly mitigated by social media. Our assumption was further reinforced by the responses to the open-ended questions, which showed that participants valued the presence of social media in migrant life in general and in their experience of migration to a small town in particular.

Respondents identified a total of 19 broad social media content types which they had engaged in, either through creation of their own content and/or sharing or by engaging with content created by others. Looking at the range of content gave a sense of the nature of social media use by participants, from sharing of personal information, discussing feelings, travel behaviour and lifestyle, to engagement with content shared by others. The diverse range of activities are ingrained in participants' lives and the questionnaire provided an opportunity for them to reflect on these activities in relation to their circumstances of migration. The most

Table 1
Respondent profiles

Demographic characteristics		N=24 (%)
Age	18-29	20.80%
	30-39	50%
	40-49	26%
	50-59	4.20%
Gender	Male	29%
	Female	71%
Education	Secondary school	8.50%
	Vocational	8.50%
	University degree	83%
Employment	Full-time	58%
	Casual/part-time	29.50%
	Unemployed	12.50%
	NZ Citizen	8.40%
Residency status	NZ Permanent Resident	20.80%
	On visa (work, student, family, visitor)	70.80%
	European	25%
Origin	Pacific Islands	8.40%
	Asian	37.40%
	Latin American	4.20%
	North American	20.80%
	Other	4.20%
	Work	58.40%
The primary reason for migration To Oamaru/Waitaki*	Enhance the quality of life	20.80%
	Family reunion	45.70%
	Education	4.20%
	Other	4.20%
	Less than 12 months	20%
Years in Oamaru	1-3 years	30%
	4-6 years	35%
	7-10 years	10%
	More than 10 years	5%
Place of residency	Within the Oamaru urban boundary	75%
	Within the district	25%
	Own house	20.80%
Accommodation	Rented, shared rental	75%
	Employer-provided accommodation	4.20%
Device*	Smartphone	91.70%
	Laptop	41.70%
	Tablet	25%
	Desktop computer	12.50%
	Others (eg., smart tv)	29.20%
	Home wifi	95.80%
Internet access*	Workplace wifi	50%
	Public wifi	41.70%
	Cellular data	37.50%
	Other (e.g., library, cafe, gym)	66.80%
	Facebook	87.50%
	Facebook Messenger	83.30%
Platform association*	Youtube	70.80%
	Instagram	62.50%
	WhatsApp	37.50%
	iMessage	33.30%
	Tik Tok	29.20%
	Reddit	20.80%
	Twitter	20.80%
	LinkedIn	16.70%
	Pinterest	16.70%
	Snapchat	8.30%

Source: Questionnaire Survey

* Participants could choose multiple options

commonly shared aspects were personal updates, travel and exploration, successes, and details of family and relationships, with over 50% of our participants sharing this type of content. More than 40% of participants also indicated that inspiration and motivation, education and career, and food and cuisine, were among the commonly shared content topics on their social media. In the following subsections we probe further to see how the engagement is perceived as support types in the course of

their migration.

6.1. Emotional support

As shown in Fig. 4, social media engagement contributed to emotional well-being even before migrants' arrival. Nearly 60% of participants reported that social media provided positive feelings about Oamaru through the opportunity to access knowledge and build networks. Almost 41% of our participants agreed that social media had encouraged their locational choices. Similar positive responses were associated with migrants' use of social media in mitigating migration-related anxiety.

In response to a general question about whether social media was useful as emotional support, 53% were positive about the support but 47% also disagreed. This high percentage of disagreement does not necessarily negate the viability of social media for emotional support, but highlights the complexities associated with people's emotional satisfaction, which depend on a range of variables, such as dedicated time on social media, the nature of the interactions, and the demographic attributes of users (Shensa, Sidani, Lin, Bowman, & Primack, 2016). As mentioned in the quote below, engagement with social media was perceived to provide emotional support, as was frequently noted in focus groups and interviews. This role was enhanced by the fact that small towns offer limited amenity provisions after hours, in particular for young people, which often impacted their wellbeing. In this context social media had a key role to play:

“(Social media) helps alleviate loneliness and boredom as Oamaru has not much to do or see and meet new people” [F/30s/Philippines]

Emotional support was derived from migrants' ability to build ties locally (66%-72%) and with their home countries (75%) via the use of various platforms. The finding aligns with previous studies in Europe (Dekker et al., 2016; Dekker & Engbersen, 2014; Komito, 2011; Madianou, 2019), North America (Hiller & Franz, 2004), and New Zealand (Ihejirika & Krtalic, 2021) which found social media helps individuals cushion their anxieties associated with migration. These local connections were built with fellow nationals as well as with host community members, and these findings align with the studies by Borkert et al (Suckling (2018) and other scholars (Cassar et al., 2016; Kok & Rogers, 2017; Sawyer & Chen, 2012).

Two thirds (66.7%) of the respondents indicated that social media platforms enabled them to make 'friendship' and 'meaningful community connections' through joining yoga clubs, dance clubs, church groups, book reading clubs, badminton clubs, soccer team, ballet classes and so forth. Evidence from the community Facebook page also suggests that newcomers often took the 'baby step' to introduce themselves, even before their arrival to Oamaru and pitched their aspirations to join in activities of interest. Some comments³ are included below to show the diverse range of support sought.

“Hey there, I will soon move to Oamaru and as a soon to be a mum I would love to know if there are any support groups for expectant mums or for mummies and babies 🤰”

[F/CFP1/2024]

“We have recently arrived in Oamaru (Hooray!🎉), and need to get our kids active again. Our daughter loves XXX lessons and our son would love to play XXX... It'd be really nice to get them into something social where they have the chance to connect with others. We're usually a laid-back and fun group to be around, so... “ [F/CFP1/2023]

³ Although we revised the comments used from the community Facebook page to anonymise the individual, we took the utmost care to retain the essence of the communication.

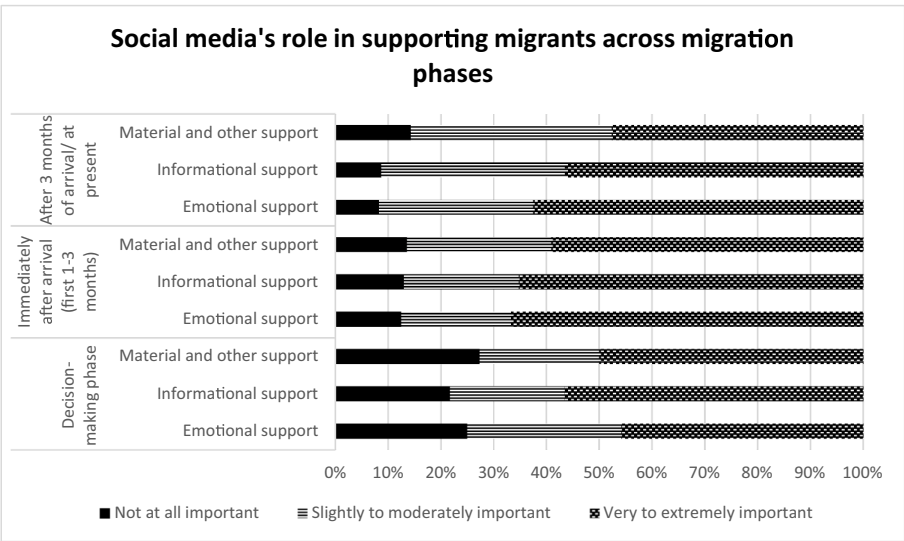


Fig. 3. Social media support across phases of migration
Source: The authors

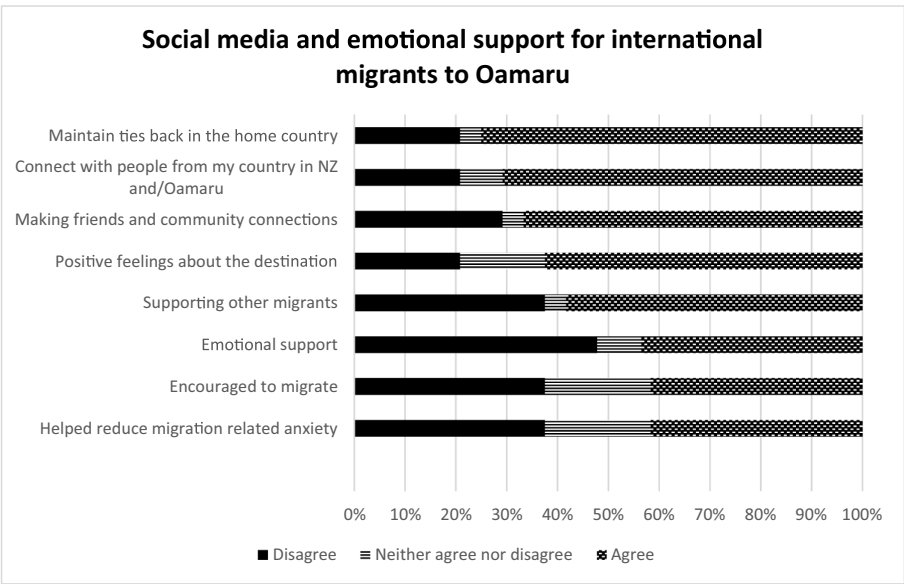


Fig. 4. Emotional support
Source: The authors

“Hi 😊, I am XXX, a XXX instructor... very recently moved here. Now that I’m starting to feel more at home in Oamaru, I’m keen to meet some new people. I’ve got a few interests and would love to find out if there are any groups, events, or classes where I could connect with others who enjoy the same things!”

[F/CFP1/ 2022]

The posts received lots of suggestions and invitations. As an indication of the level of response received, the three posts above received 40, 41 and 47 responses respectively. We assume that this response aspect is crucial to reinforce that social media has enabled a sense of reciprocity and care. This is reinforced by the questionnaire data as 41.7% felt a sense of satisfaction as they were able to support other migrants because of their platform engagement. The level of response noted above potentially also suggests that receptivity of the host community to newcomers and, by implication, that small towns need to have higher levels of community engagement than larger cities do (Harris, 2000).

6.2. Informational support

In this section we show how the social media engagement of newcomers, host community members and small town institutions has enabled a collectivised information support infrastructure. Overall, social media platforms were perceived as useful information repositories by our participants, with agreement percentages ranging from 56% to 87% (Fig. 5). Participants were provided with information on local events (73.9 %), Kiwi⁴ lifestyle (78.3 %), local knowledge (73.9 %), experiences of other migrants (nearly 70%), laws and regulations (56.5%), migration and settlement (60%) and local shopping deals (40%). The most common responses to the open question in the survey were related to the informational use of social media, as indicated in the

⁴ The nickname Kiwi comes from the iconic flightless bird native to New Zealand and is colloquially used to denote New Zealanders.

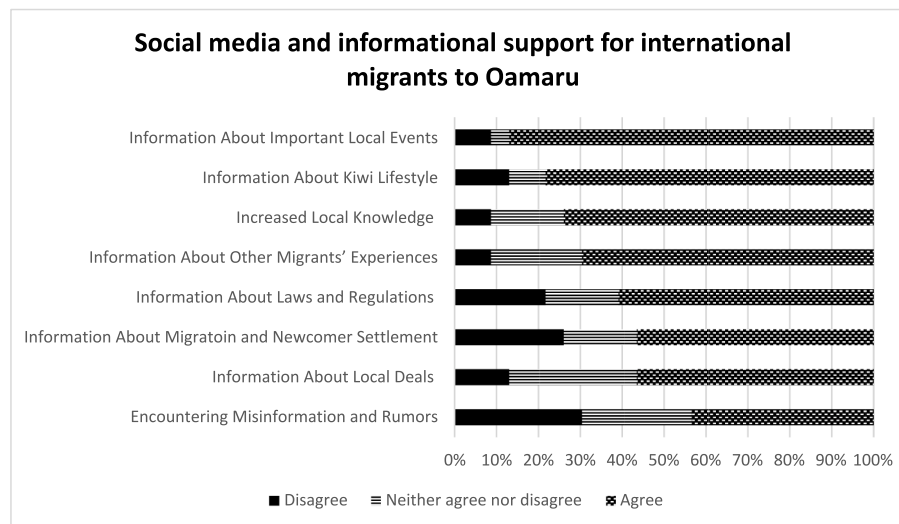


Fig. 5. Informational support
Source: The authors

response to the open question below:

“(Social media) helps you connect and be informed with what’s happening in the community.” [F/30s/Philippines]

“...To know local news and upcoming events around Oamaru, I often check Facebook.” [F/30s/Japan]

“It (social media) keeps you connected and updated on what’s happening in the community.” [F/30s/Philippines]

“People are very aware of local identities and many social events are conducted informally through Facebook messenger.” [M/20s/UK]

The migrant experience is not however always positive, according to literature, information channelled via social media can sometimes mislead international migrants and even put them in danger by promoting unrealistic opportunities (Dekker & Engbersen, 2014), exposing them to cyberbullying (Matamoros-Fernández & Farkas, 2021), and making them potential victims of human trafficking (McGregor & Siegel, 2013). When participants were asked whether they encountered similar experiences, 43.6% agreed that they were sometimes misled by the information presented, causing a mismatch of expectations versus realities, however, no extreme cases like those identified in the literature were recorded.

Overall, the findings echo previous research about social media that it facilitates information exchange among users (Kaplan & Haenlein, 2010), such as for Syrian asylum seekers in the Netherlands (Dekker et al., 2018), Filipino and Polish migrants in Ireland (Komito, 2011), and international migrants in Nigeria (Akanle, Fayehun, & Oyelakin, 2021). In addition, what we also observe here by looking at the engagements in the comment thread over time is that the platform is enabling the co-creation of a shared information repository that stays on the platform to help future migrants. We also envisage that the informational exchanges potentially reinforce emotional wellbeing through creating opportunities for socialisation as the newcomer information seeker sometimes received open invitations for in person meetings in the comment thread.

In response to posts from newcomers seeking information, other migrants who arrived before and host community members were seen to voluntarily offer a range of responses on the comment thread. Given the public nature of the group page, other users were also able to endorse a piece of information via the comment thread. Often these comments discussed the positive and negative sides of a piece of information at length. It can be argued that the platform offered trust-worthy and generative care for migrants when they maintained important page rules, such as restricting any promotional sales, and screening abuse or unsocial exchanges. We envisage that the small town scale has played a

crucial role as the flow of information was not overwhelming and it is fair to assume that as ‘named’ people were providing the information, they may have known each other in ‘real life’.

We also observed that organisations like Waitaki Multicultural Council⁵ and Shama⁶, which are the dedicated support groups for migrants in Oamaru, use the platform to provide information on courses and workshops for newcomers on a regular basis. A range of promotions of free courses regarding health and well-being, active lifestyle, parenting and children’s well-being, sexual abuse and personal safety were observed. Events like “migrant meet and share” or “pathways to success: working and living in Oamaru” have potentially translated into in-person migrant to migrant and migrant-host community exchanges.

6.3. Material and other support

Seventy-six percent of our participants view social media as a useful tool for engaging in activities outside their own community and for being introduced to new communities (Fig. 6). Social media is seen as useful to enable migrants to celebrate their culture (71%). Social media was also instrumental in showcasing their success as migrants (66.7%). An example is presented in the quote below, where ethnic businesses, including the migrant chef’s success were celebrated. Research has shown the importance of food and food-related activities in migrant lives as a vehicle for creating a sense of home and social capital (Johnston & Longhurst, 2012). In the case of Oamaru, information about food was circulated to initiate economic opportunities but this also would translate into material space for cultural appreciation and socialisation for both host and migrant communities.

“Lovely to welcome new [country of origin, e.g., Vietnamese] Cook [name] to Oamaru. They’ve introduced some tasty new dishes and XYZ organisation was pleased to share their delicious samosa at the recent Migrants Meet & Share potluck dinner [XYZ organisation⁷/CFP1/2024]

Many of our participants pointed out the usefulness of Facebook Marketplace in economic support, for selling and buying pre-loved furniture and accessories, and offering services (e.g. gardening,

⁵ A not-for-profit organisation to provide settlement support for migrants and newcomers in the Waitaki Region.

⁶ The ethnic women’s trust based in Oamaru.

⁷ The organisation’s name was anonymised.

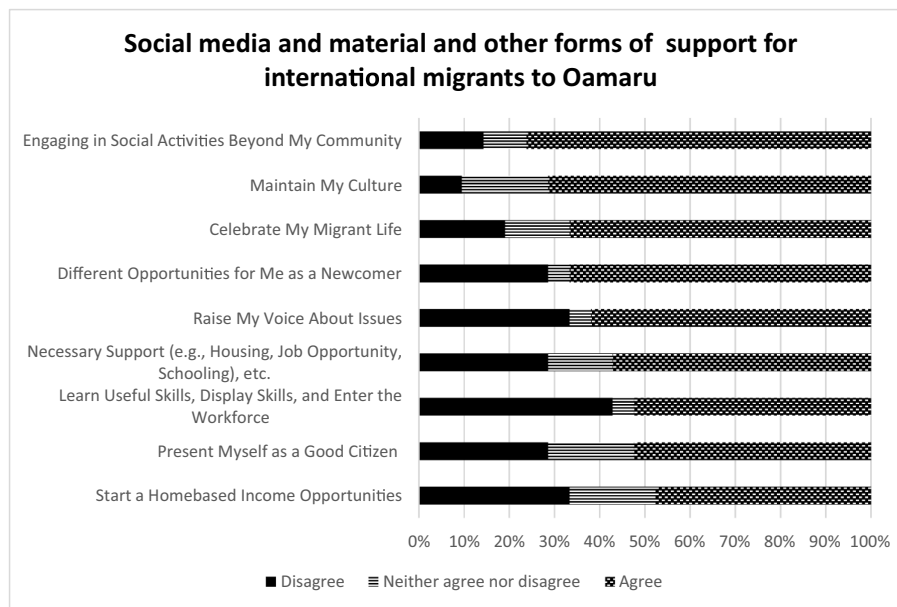


Fig. 6. Material and other support
Source: The authors

clothing alterations). For around half of the respondents, social media played a role in finding jobs and starting home-based income generation (e.g. homecooked meal delivery). Additionally, half of our participants stated that they use social media as a platform to present themselves as good citizens. Many have sought help regarding driving lessons, lawn mowing, advice on waste disposal etc., which are essential to help newcomers settle in and present as good citizens.

Social media also played an important role in helping newcomers secure accommodation. The community Facebook page was frequently used by newcomers to express their housing needs, which many looked for even before their arrival. Often the families introduced themselves, explained their household size, needs (e.g., schooling, special needs, etc.) and presented themselves as good [religious] families. For some, virtual house inspection was done via Facebook messenger. The interviews with migrants suggested that having a 'decent' Facebook profile also helped successful rental applications as real estate agents or house owners often asked for their Facebook profiles. Host communities also advertised short-term and long-term rentals on the platforms. Often these rental advertisements came with a few amateur photographs of the property or the natural setting and included information on the household and even pets so that incoming tenants had a sense of authenticity and expectation. For many migrants, short-term rentals or house sitting offers on social media helped them with initial onboarding to the town.

In addition to positive profile building on social media as a key tactic for migrants to present themselves as desirable tenants or citizens, participants also used social media to share their negative experience to raise awareness among migrants and host communities (62%). These participants found the social media platform instrumental for them to feel empowered. They could raise their voice in the virtual space, but could not do so in the physical space due to language barriers or feeling introverted. Posting concerns as an 'anonymous participant' was seen as a common strategy to enable them to reach out to the community without revealing themselves. Also, as people are often known to each other in a small town, such posts anonymise the vendor or the person they are showing concern about. An example of this is copied below. This quote could also be seen as evidence that the migrant member sees herself as part of a community with whom you can share feelings.

"Someone selling shit wood in the community. Because my husband isn't good at English, didn't say anything to your face, does not make you drop off shit to us. You ruined people's trust." [F/CFP1/2024]

6.4. The role and place of small town in social media engagement

Beyond the various supports social media provides to migrants, we were particularly interested to understand how the small town itself has shaped their social media engagement. Clearly, access to home wifi connections (95.8%) and smartphones (91.7%) have facilitated their social media presence. We particularly asked our participants how useful their presence on social media was for them as migrants in a small town. The results show that social media played a crucial role in their resettlement to Oamaru. Half of our respondents considered it highly important, 38.9% moderately important and only 11 percent found it slightly important. After analysing the responses to the open-ended questions, we identified six key aspects of small towns that influenced their social media engagement (Table 2).

Migrants in our study celebrated their engagement with Oamaru's natural landscape on social media, which we assume may both reinforce their connection with the place and demonstrate satisfaction with their migration to Oamaru. Migrant generated content presents Oamaru to future migrants as a much-desired place, with its rural idyll and nature-oriented lifestyle. Our assumption is supported by the evidence provided by Alam et al. (2023) in a neighbouring region in the South Island, where Malay migrants were drawn to small towns because of the landscape value and lifestyle promise associated with it.

Furthermore, our participants have identified the usefulness of social media in bridging relationships with the host community, including previously settled migrant members and support institutions. The nature and scale of interactions on the community Facebook page led us to believe that the page has played a key role in developing a virtual 'care collective' (Alam & Houston, 2020). Some of the comments (in Table 2) reinforce how social media was perceived to have induced greater social cohesion and a sense of community for the participants. The finding echoes recent research (Witten et al., 2020) that small scale online networking initiatives, through the maintenance of a Facebook page that is tied to the small town of Oamaru, is conducive to providing a soft infrastructural base for community formation and development of new residents' sense of security and attachment to the newly arrived place.

The other broad area of support to note is that these virtual connections have provided migrants with a diverse range of information regarding everyday issues such as current affairs and events in the town, housing, weather conditions, roadwork related disruptions, rental

Table 2

Small town topics

Topic of engagement	Social media engagement involved:
Small town landscape	"Pictures of local parks and coastline" [M/30s/US] "Sharing beautiful sceneries here in Oamaru and even outside Oamaru, through pictures and videos" [F/30s/Philippines] "There are many groups dedicated to environmental protection and advocacy and work in this space is always respected" [M/20s/UK] "Sharing photos of the landscape and connection to land" [F/20s/US] "Beauty of the district" [F/40s/UK]
Social cohesion and a sense of community	"Cultural and community events (parades, NYE, celebrations, etc)" [F/30s/Philippines] "There is a strong and welcoming Waitaki Multicultural group where we can communicate through Facebook" [F/30s/Czech Repub] "I'm part of different fb groups, and it keeps me updated and connected" [F/30s/Philippines] "I feel more connected online than I do in person" [F/20s/US] "Can see different people from different cultures" [F/30s/Philippines]
Housing issues	"Community events" [F/30s/Philippines] "Looking for rental places, high rental rates, lack of rental/accommodations for migrant workers" [F/30s/Philippines] "I tried to find a place to live through the local Facebook page" [F/30s/Czech Repub] "There is no housing. We are in such a shortage that people are always looking for an affordable place to live and there are none. I do talk about housing security issues on social media" [F/20s/US] "mentioning and photos of the process of building a house" [M/40s/Germany]
Amenities, services and infrastructures	"Hospital and doctors availability, public transport, shops and other services available hours" [F/30s/Philippines] "Limited public transport, road constructions, hospital and doctors availability and low manpower" [F/30s/Philippines] "If services are unavailable/available" [F/40s/UK] "Photo of the place, weather, road construction" [F/30s/Philippines] "talked about visits to the library, swimming pool, art gallery, museum etc." [M/40s/Germany] "Weather, landscapes and tourists attractions" [F/30s/Philippines] "can see new business" [F/30s/Philippines]
Economic opportunities and/or challenges	"Taxes, low salary, house ownership issues" [F/30s/Philippines] "Social media helps me with finding information for free and good opportunities." [F/30s/Philippines] "Shops close early. Working people who finish work at 5pm have limited places to go" [F/30s/Philippines] "There are few jobs in the area, made worse by the housing crisis. However, I very rarely talk about economic things on social media" [F/20s/US]
Positive and/or negative perception of town	"Positive - good community" [F/30s/Philippines] "Negative - limited public transport" [F/30s/Philippines] "Negative - public healthcare and public transportation" [F/30s/Philippines] "A small but beautiful and active town" [F/30s/Philippines] "I try to stay positive and post cosy videos about living rural" [F/20s/US] "few house rentals and expensive." (M,30s, Philippines). "know current issues or local updates. Not much going on the newspaper" [F/30s/Philippines]

Source: Questionnaire survey

advertisements and an employment circular. As explained in one quote, in many ways social media has filled the 'information gap' left by more traditional small town media (e.g. radio, the local (physical) newspaper), with most having lost their relevance in the digital age. The day-to-day information exchanged on the community Facebook page is akin to a community noticeboard infrastructure and could therefore be mobilised more effectively to serve the role small town dailies once played. Similar to [Simone's \(2004\)](#) and [Ruming and Melo Zurita's \(2024\)](#) findings in different contexts, in Oamaru, the social media platform has enabled everyday practice of care as infrastructure for migrants and the wider community through exchanges of information and the creation of routines, expectations, reliability, responsibility and reciprocity. The platform holds the generative infrastructural capacities of caring-with ([Power, 2019](#)), as care work is not bound in time. Through users creating and retaining content on the platform, there is continuity of care both for the already enrolled and for new incoming migrants.

7. Discussion: Technology mediated care as migrant support infrastructures in small towns

Our study was specific in that at the time of interview, the majority of survey respondents were women (71%), non-European (75%), and held a university degree (81%). Given the nature of the online survey, we acknowledge that we may not have captured the whole spectrum of migrant population experiences in Oamaru, particularly of those who may lack internet or social media access and competency. Nevertheless, our study was able to capture how migrants with access to social media perceived its role in supporting them in their landing places. A high number of female responses is also consistent with high female user visibility on the community Facebook page that we observed. We could interpret this as a sign that migrant women tend to seek more support than their male counterparts in online space, or simply that they have invested more time on social media, something their male counterparts may not have managed as effectively, perhaps due to work commitments. The study by [Chib, Wilkin, and Hua \(2013\)](#) suggests that socially defined norms lead to differential experiences of support among men and women of the same ethnic background. This is an important reminder that migrants are not a homogeneous group, and this warrants future research to examine how gender shapes platform interactions and the algorithmic care landscape. Despite this key nuance, our findings are consistent with our literature review on social media, which indicated the degree to which access to social media can provide emotional, informational and material support to migrants. Migrants acknowledge the importance of social media during their pre-migration period and even beyond the initial onboarding phase. For the rest of this discussion section, we adopt an interpretative approach to foster critical reflection on our findings.

Migrants seek support via social media at three levels: Triangulation of questionnaire responses and community page content informed our analysis of migrants' engagement with social media at three levels ([Fig. 7](#)). Their engagement presented as socio-technical infrastructure that creates an evolving support landscape, both personal and communal. First, migrants make one-to-one connections, relying on Facebook and other platforms, which enable them to reciprocate intimate care and maintain transnational and local, familial and social ties. Second, migrants enrolled in semi-private groups (via Facebook, WhatsApp, or Snapchat) that enable circulation of care within their own small networks. At the third level, migrants engaged with larger, more public-facing networks (e.g. the community page), which enabled broader interactions with other migrants, host communities, and existing formal support groups. In certain instances, pre-existing groups extended invitations to new migrants. In other cases, as opportunities were presented through the availability of skill sets and interests, and when there was a critical mass gathered on social media, either migrants themselves or migrant and host community members collectively

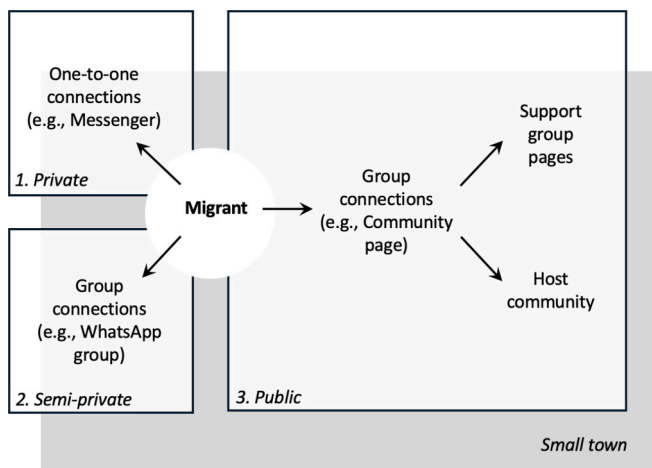


Fig. 7. Migrant support landscape on social media
Source: The authors

initiated an online group, such as the mums' club, the ballet group, the reading group, or the yoga group. The evidence indicates that even where group construction was based on specific interests, these online group enrolments aided migrants in establishing enduring social capital that provided necessary support in other aspects of their lives later on.

Place based non-institutionalised support: Our findings reinforce the argument that social media is not really placeless infrastructure but is anchored in particular relations and responsibilities of place-based actors and institutions via the use of the community Facebook page. Social media shapes both the virtual and physical reconfiguration of relations, with the curation of content on the Facebook page specific to Oamaru reinforcing the place element. Content that emphasises integration into local life, small towns, and the Kiwi lifestyle are crucial because small towns often have unique local norms which migrants must adapt to in order to project a positive image (see Alam et al., 2023 for examples). For some migrants who thought there was not much on offer in the actual physical space, social media has helped them "snowball" (Komito & Bates, 2011), find their community, and establish real-life connections. At times, we observed migrants vocalising their concerns about specific mistreatment. This could indicate that by communicating on a page with a local audience, migrants are able to assert their "membership" within the community (Witten et al., 2020). Thus, the place itself serves as a crucial catalyst, drawing migrants to social media for emotional support, with frequent exchanges and ongoing dialogue suggesting that everyday infrastructures were facilitating technology mediated care. The strong, place-focused, accessible, inclusive, and centralised page has been observed to circulate a range of exchanges among migrants themselves, between migrants and host communities, and local migrant support groups. These exchanges have opened up opportunities for self-organised events. Social media thus empowered migrants and host communities in specific ways, enhancing intercultural interactions and compensating for the lack of physical support by providing tailored support. Here, we observe a robust 'scale' dynamic: by maintaining the page's connection to small-town content, migrants can obtain dependable and trustworthy support. The element of place is important in social media. The concept of caring-with is ultimately embedded in place (Power, 2019) and social media can be mobilised to support and provide care for migrants in their arrival and transition to their new place.

The platform's particular role in small towns: Studies underscore the constraints faced by remote and regional small towns due to uneven resource distribution caused by regional politics, which can lead to a loss of state support (Nel, Connelly, & Stevenson, 2019; Nel & Stevenson, 2019). This, in turn, can occasionally impact the sustainability of physical support infrastructures. Research has demonstrated that, even

in the presence of resources, the absence of individuals possessing the necessary cultural competency to effectively interact with migrants and understand their needs can lead to a deficiency in support. Moreover, migrants often struggle to locate available physical supports after relocating to a new location. We argue that social media platforms could eliminate some of these shortcomings, while also providing technologically mediated care and support. We observe that the community page serves as an important technology-mediated collectivised infrastructure, accumulating information and resources over time without requiring significant investment in physical infrastructure. The page serves as a crucial tool for the host community and local institutions to monitor migrant needs, tailor support and care, and foster their cultural competence, which is crucial as until recently, New Zealand's small towns have had little experience of receiving non-European migrants (Alam, Nel, & Bergen, 2024). In fact, this is helpful for both migrants and institutions to reach each other, so, in a way, strong place-focused social media platforms could play a matchmaking role to help migrants identify people and support. As we observed, the high levels of support required at different stages of migration, particularly before migrants arrive at these locations, highlights the important role platforms can play in providing off-site support that would otherwise be impossible. A lack of this kind of support would force migrants to rely on unsolicited sources, potentially exposing them to 'algorithmic harm' (Maalsen, 2023) and 'harmful care' (Ruming & Melo Zurita, 2024) through disinformation and exploitation.

8. Conclusion

In conclusion, this article has shown that social media, particularly place-focused community pages, enables diverse practices of care and reciprocity by functioning as a socio-technical infrastructure of support. These platforms are not placeless; rather, they are shaped by local relations and responsibilities and play a significant role in creating connections between migrants, host communities, and institutions. Especially in small-town contexts, where formal support can be limited, social media helps migrants access emotional, informational and practical support, both before and after arrival. As with physical spaces, the presence of key individuals who are willing to contribute time and effort remains essential. Given the inextricably relational nature of care, the emergence and endurance of inclusive community pages relies on the willingness of some individuals to reach out to others, and the receptivity of those involved in such initiatives. While social media cannot replace physical support systems, in small towns it can complement them by offering a flexible, accessible and evolving layer of support. In the context of modern life, we argue that through the use of social media, technologically mediated care becomes embedded in the everyday infrastructure of small town life to provide key support and care for migrants, to foster settlement and build social capital. If we reflect back on the conceptual framing of Fig. 1, which combined the notion of caring-with and technology as infrastructures for migrants in small towns, we can see through our findings that technology-mediated care for migrants occurs through a tripartite relationship of place, platform and people.

CRedit authorship contribution statement

Ash Alam: Conceptualization, Writing – original draft, Formal analysis, Validation, Resources, Investigation, Visualization, Software, Methodology, Data curation, Supervision, Project administration, Writing – review & editing, Funding acquisition. **Bahamin Badihi:** Writing – original draft, Software, Writing – review & editing, Methodology, Data curation, Resources, Investigation, Conceptualization, Visualization, Validation, Project administration, Formal analysis. **Eti-enne Nel:** Supervision, Formal analysis, Visualization, Software, Methodology, Writing – review & editing, Validation, Resources, Data curation, Investigation, Conceptualization, Writing – original draft,

Project administration, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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