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Research Article

An Egonet Analysis Exploring Social Support Structures of Construction Workers: A Pilot Study

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Abstract

Background and Objective: Construction industry workers have high levels of stress and suicide rates compared to other industries. Support mechanisms like social capital and social support help to protect against stress and distress, however, these support networks are unexplored in the construction management literature. The objective of this research was to determine if a social network approach can be used to understand if differences exist in the social capital and/or social support of workers with and without distress.

Materials and Methods: Psychological distress was measured using a sample of 14 site-based construction workers and collected data about their personal networks, in addition to the social support received from these networks (in particular, emotional, practical, informational and companionship support). Sociograms were created for each worker for their networks and compared them to determine if structural differences existed in the networks of distressed and non-distressed workers. **Results:** The workers without distress reported closer relationships, had more diversity in their networks and received more emotional support than those with distress. Also, having (and using) a partner was a key aspect of supporting well-being within their personal networks. Our findings suggest that exploring how social capital is accessed and the type of social support received warrants further exploration to understand how support networks and structures impact positively and negatively on psychological well-being. **Conclusion:** This early evidence also suggested that social network analysis could be used to understand differences in the support structures of workers. Also, there may be an opportunity for workplaces to implement activities or programs to help provide appropriate support at work to fill emotional and social support needs.

Key words: Egonet, construction worker, mental health, social capital, social network analysis, social support, psychological well-being

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Workers in the construction industry experience a higher incidence of stress and poor psychological well-being, along with higher rates of suicide compared to other industry workers combined^{1,2}. This is often attributed to occupational stressors such as excessive work demands³⁻⁷, poor interpersonal and relationship management⁷⁻¹⁰, intrapersonal issues such as poor financial management and substance use^{4,5,11,12} and the working environment including stressful and high-risk working conditions¹³. These factors contribute to increased distress experienced by the construction workforce. To mitigate these effects, workplace efforts currently focus on minimizing stress and occupational hazards, as well as implementing suicide awareness and intervention programs. These programs are aimed at increasing awareness by addressing and reducing the stigma associated with experiencing psychological distress, increasing help-seeking and seeking help for suicidal ideation^{14,15}.

An under-researched area, however, is the opportunity to examine the protective factors that are used to support well-being and minimize distress. This includes how social capital is utilized along with social support in improving and managing psychological well-being^{5,16}. One method for examining what protective factors are available is evaluating the personal networks of an individual. This can include their social capital, along with the social support that is provided through these networks. A social network analysis approach can also be adopted to examine these relationships. In this instance, social capital refers to the resources available (e.g., family, friends, work colleagues), whereas social network analysis refers to evaluating the resources (including examination of the social support provided) via these relationships.

Social capital can be described as a source (e.g., a person, organization, group, or even pet) that can in turn, provide a type of support (or resource) if/when needed¹⁷. Social capital can be measured in various ways including the examination of the structure (total number or diversity of sources). It can also be measured using the attributes of the sources, their properties, relationships and/or the resources that may be available from that source¹⁷⁻¹⁹. Studies examining capital at the individual level (rather than aggregated or community levels) were found to be better at predicting psychological well-being²⁰. Diversity (the varying composition) along with more capital (i.e., more sources available) tends to have a more positive impact on well-being²¹, however, Portes²² states that an individual who has too much social capital can have a

negative impact on well-being. This suggests in some circumstances, there may be more merit in exploring individual connections to understand how those connections and relationships act to facilitate and support psychological well-being.

Understanding how social capital is used to mitigate distress may help to determine the resources workers use (and need) to support their well-being (e.g., understanding if workers with higher distress have more, or less social capital). For example Andrews²³ indicates relational and cognitive components of social capital are related to increased performance, whereas the structural component was not. This means that the number or type of connections were less important than the relational exchanges (what the person may be receiving from the exchange, such as support). Also, Tsai²⁴ reported that when support was available at work, this had a positive impact on mental health in addition to physical health and job satisfaction. This suggests that having an available connection is less important, provided an individual can access a need (like social support) from a suitable available connection (e.g., a work colleague).

Social support is often described as the tangible or intangible benefits that are available (or perceived to be available) to a person when needed. There are four types of social support in existing literature²⁵⁻²⁸: (1) Emotional support such as empathy, love, or compassion/caring, (2) Tangible (also known as instrumental or practical support) such as receiving help in a practical way such as lending money, providing care or assistance, (3) Informational support such as providing advice or information on a problem or issue that is being experienced and (4) Companionship which includes involvement in social activities or spending time with someone. Having social support positively impacts psychological well-being²⁹ and impacts positively on work performance^{30,31}. Beehr *et al.*³⁰, found support from colleagues was related to higher sales and increased psychological well-being. Further, social support at work provides many workplace benefits, including assisting with managing the experience of stress which helps individuals thrive³¹. This indicates that having appropriate social support available at work can encourage psychological well-being and promote adaptive coping mechanisms, both of which contribute to increased work performance.

Receiving emotional support from colleagues and supervisors is associated with lower work stress and greater job satisfaction³². It also highlights that work colleagues are important sources (social capital) within a person's network for providing support whether that support is work (or task) related, or for personal purposes (such as emotional support).

Examining if differences in social support accessed from varying resources in the network (such as work colleagues) will help to understand if work colleagues are being engaged to provide support to workers. This will help to determine if these relationships can be leveraged (e.g., through training and workplace interventions) by the construction industry as an additional mechanism to help minimize distress and suicide.

Subsequently, there is a need to explore the relational ties (and access to support) that are available to understand how the availability of the source (and what type of social support they provide) might impact psychological well-being, rather than focus on measuring support. One way to achieve this is through the analysis of an individual's social network. To do this, the use of egonet analysis is proposed to gather information related to important social capital (connections), understand the diversity of these networks and obtain information about what support is available and provided by the social capital within each of their social networks.

Social networks allow for the exploration of connections and relationships through the examination of a personal network. This can provide an estimated amount of social capital available, along with details and characteristics about the type of connections within a network. This can help to identify important relationships, how relationships occur and/or how resources (such as social support) are shared. Often the nature of the relationships and the mechanisms in which resources are shared, can be as important as the social capital that provides the support.

Mapping and understanding of social networks have been used to assist individuals experiencing severe mental health issues³³. In evaluating the egonets of adults experiencing distress, Wang *et al.*³⁴ found no differences in networks between those with and without clinically diagnosed depression. This indicates that the number of resources available in a network potentially has little impact on psychological well-being. Further, they found that embeddedness (interconnections between ties) helped with depression mitigation strategies for an individual. This is interesting as it suggests that the number of people within a network may not be key to ensuring good mental health, but potentially the availability of resources or connections to receive support is available when necessary. This suggests that a highly interconnected network is key to accessing support. A few constraints are worth highlighting as noted by Wang *et al.*³⁴. First, individuals were asked to nominate up to six individuals they were close to. Second, participants who

did not nominate anyone were excluded. Limiting the number of individuals within a network may have impacted the ability to determine if differences in the size of the network are important for mental well-being.

The use of social network analysis in construction management research is an emerging trend that can help develop a new way of examining problems by understanding the influence of relationships on management practices. This knowledge can help our understanding of how relationships and support networks might be impacting the psychological well-being of employees. This can help identify gaps in any resources (social capital) that could be leveraged or any social support that can be provided by workplaces to support psychological well-being. Subsequently, the objective of this research is to explore if any differences exist for construction workers in relation to their social capital and their social support using social network analysis. The rationale for investigating this is to examine if protective factors exist for supporting psychological well-being through examining the social networks of these workers using an egonet analysis. The aim of this pilot study is to determine if social capital and/or social support of workers who are not currently experiencing distress can be leveraged to help to identify ways to best support workers who might be experiencing distress. This knowledge can then be used to further research protective factors or explore personal networks further to help determine the best ways to support workers experiencing distress.

Current study: This pilot study is interested in examining if workers who are distressed have different amounts of sources available in terms of their social capital. It will examine this through analysis of their personal networks (using egonets) to see if they differ in terms of their size (number of connections) and how close they are to the people they nominated (strength of the relationship). Further, it will examine if there are any differences in the type of social support they receive, which includes tangible, emotional, instrumental and companionship types of support. Examining if these support structures are different can help to determine if further research on the role of specific social support and social capital deficiencies is warranted. This initial evidence can also contribute to the current literature by identifying early opportunities for workplaces to provide support for those who may be experiencing distress. It is hoped that examining and learning about social capital and social support from those workers who are not currently experiencing distress, can help to identify ways to best support workers who might be experiencing distress.

Building on the egonet examination of networks and psychological well-being, this presents an opportunity to assess if workers who are experiencing distress have any differences in their levels of social capital or social support. To overcome limitations in Wang *et al.*³⁴ a free-recall (unrestricted) nomination will be used. Also, rather than examining embeddedness within the networks, this research will examine which sources of capital provide social support and how much (or little) support is provided by the nominated capital. This will be used to understand if a specific type of support provided by a nominated person is different between those with and without psychological distress. This can provide useful information in determining any gaps that may exist to help support those that need it to increase their psychological well-being. This will be explored using a qualitative-style approach by conducting an egonet analysis mapping these relationships and examining differences in the egonets for their size and diversity of their overall social capital and for the four types of social support. The following research questions have been generated for this research:

- **RQ1:** How does social capital differ in terms of the total sum and diversity for workers with and without psychological distress?
- **RQ2:** Are there any differences in the social support available (e.g., tangible, emotional, informational, companionship) from the social capital for workers with and without psychological distress?

MATERIALS AND METHODS

Study area: Data was collected using site-based civil construction workers recruited from a Tier 1 construction company located in Brisbane, Queensland (Australia). On the day the researcher collected data, employees self-selected to participate in interviews and data was collected in December 2018.

Participants: Fifteen workers were interviewed, with one participant excluded as they were a visiting office worker at the site. Subsequently, 14 site civil construction workers (100% male) were included who were recruited across two separate sites (site 1 $n = 9$, site 2 $n = 5$). Demographic information was available in Table 1 and Table 2.

Methodology and research design: Using structured interviews and a survey*, this research adopted the use of a

process designed to map the egonets of workers. This included obtaining details from participants about their social capital, along with information regarding the type and strength of social support from the social capital. Five sociograms were created for each participant including: (1) Social capital (type/diversity and closeness), (2) Emotional support (diversity of capital providing the support and the strength of its availability), (3) Practical support, (4) Informational support and (5) Companionship support. Sociograms were structured to present nominations who were perceived as closest, or as providing a lot of the type of support (positioned closer to the ego).

Materials: Participants were provided with category cards to help assist with identifying various types of social capital they could nominate. These cards included categories of parents, siblings, friends, work colleagues, sporting associations, professionals (e.g., general practitioners or mental health professionals), neighbors, in-laws). Participants were provided with details on the rating scales used in the research, e.g., social support, 3 = a lot of support, 2 = a moderate amount, 1 = provides a little, 0 = does not provide. If the capital did not provide a type of support, the social capital was removed from that egonet analysis. Examples of the meaning of each type of support were also used to assist the participant (e.g., emotional support means they provide you with love and caring when experiencing a problem).

Participants were provided with a survey that collected their demographic information and the Kessler-10 (K10). The K10 is a 10-item measure assessing symptoms of psychological distress over the past 4 weeks. It assesses symptoms related to depression (e.g., 'how often did you feel so sad that nothing could cheer you up') and anxiety (e.g., 'how often did you feel so nervous that nothing could calm you down'). Items are self-reported using a 5-item Likert rating scale using the following 1 = none of the time, 2 = a little of the time, 3 = some of the time, 4 = most of the time and 5 = all of the time. Items were summed to create a minimum score of 10 and a maximum score of 50. Each participant was then categorized into two groups: (1) Without distress based on a 'normal' score between 10-19 = likely to be well and (2) With distress, which combined mild (20-24), moderate (25-29) and severe scores (30-50). These levels were combined as this research was interested in participants who had any level of distress, whether it was mild, moderate, or severe. The survey has been used extensively and has good reliability ($\alpha = 0.92$) and validity measures across multiple countries and sample populations^{35,36}.

*Research was conducted with ethical clearance from the university Human Research Ethics Committee (HREC) of Queensland University of Technology (approval number 1700001028)

Table 1: Worker characteristics

Characteristic	Range		M	SD
	Minimum	Maximum		
Age	21	58	33	12
Years in construction industry	2.5	20	8.5	4.7
Years with current company	0.6	20	5.4	5.6
Average days worked (per week)	5	6	5.3	0.5
Average hours worked (per week)	40	60	49.3	5.2

Table 2: Worker demographics

Demographic	N
Employment type	
Full-time	12
Causal	2
Type of worker	
Laborer/worker	12
Supervisor	2
Relationship status	
Single	5
Married/domestic partnership	8
Separated/divorced	1
Children	
No children	8
Yes (live with children 100% of the time)	6

Procedure: The interviews were conducted across two different sites which were pre-arranged. Notifications were sent to participants using emails, flyers and safety talks. An explanation of the study was provided and each person was asked to provide signed informed consent.

When conducting the social network portion of the interview, participants were asked to identify people (or organizations) that they would approach in negative or stressful situations. The protocol of the free recall name generator method was used³⁷. A list of categories (people, professionals, organizations, etc.) was used to prompt name generation. Network connections were listed using their relationship (e.g., spouse, sibling, work colleague and friend), how long they had known the person for, their age and how close they feel to the person they had nominated.

Once the connection was established (i.e., the capital identified) social support information was collected about each of the nominations including the perceived strength/availability for each of the social support types (emotional, practical, informational and companionship) provided. The data was collected in a specific order, first generating the list of names, then each of the nominations' details was obtained (gender, age, length of time known and their perceived closeness). Followed by details about the social support received from this person. Participants also completed the measure of psychological distress on paper. To avoid carry-over effects half of the participants completed the survey first, while the other half completed the social network analysis first³⁸.

Statistical analysis using UCINET was then used to create sociograms (egonets) of the participants' networks which included their social capital and social support relational information. Statistical Packages for the Social Sciences (SPSS) version 26 was used to provide the descriptives and to check the internal consistency (reliability) of the K10 data collected. Those that scored between 10-19 on the K10 were categorized as without distress and those scoring above 20 were categorized as with distress.

For the social capital, data representing the nominations in addition to their properties (i.e., their relationship (family, friend, work colleague), gender and self-reported closeness) was used for the first set of egonets. The second, third, fourth and fifth egonets were created on the amount of social support perceived as available to the participant (e.g., if the participant nominated the person as providing a lot of that type of support this was represented as being close to the ego in the network).

Each of the egonets was then compared and analyzed to determine the social capital diversity (i.e., their variation in types of connections), total sum and their closeness of relationships. Following this, each of the social support networks was compared in terms of their diversity, the total sum and the strength of the support available for each type of support.

RESULTS

Social capital: Overall, there was a range of capital available. The most commonly nominated capital was family, friends and/or work colleagues (Fig. 1). A summary of the differences in these nominations for workers with and without distress was presented in Fig. 2.

Social capital workers who had distress and who also had a partner, had very little close social capital compared to workers who did not have distress. Also, workers who were distressed tended to have work colleagues and very few friends outside of work. Workers who did not have distress nominated their partners and at least three other people in their network as very close and this appeared to be an important difference between those with and without distress (i.e., distressed workers with partners had fewer

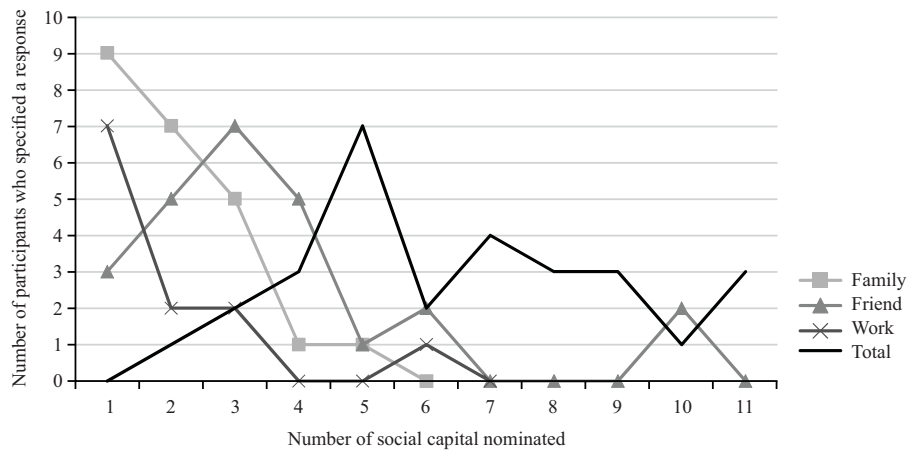


Fig. 1: Overall social capital nominated

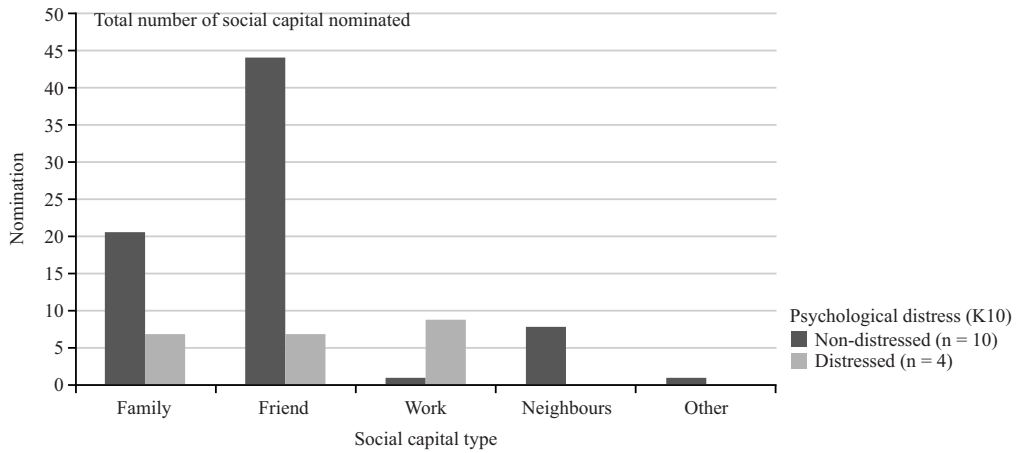


Fig. 2: Social capital nominations by distress

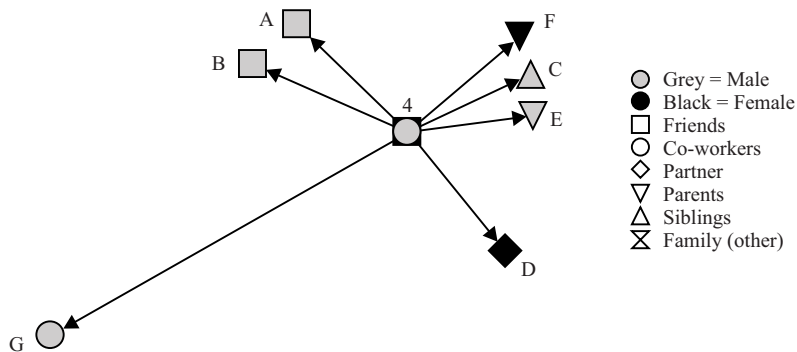


Fig. 3: Social capital and closeness egonet (without distress)

friends). A typical egonet for those without distress for social capital was presented in Fig. 3 and with distress in Fig. 4. There appeared to be little difference in overall closeness for those without partners regardless of their

level of distress in relation to the social capital and conclusions were unable to be drawn about overall capital and closeness for those without partners in this sample.

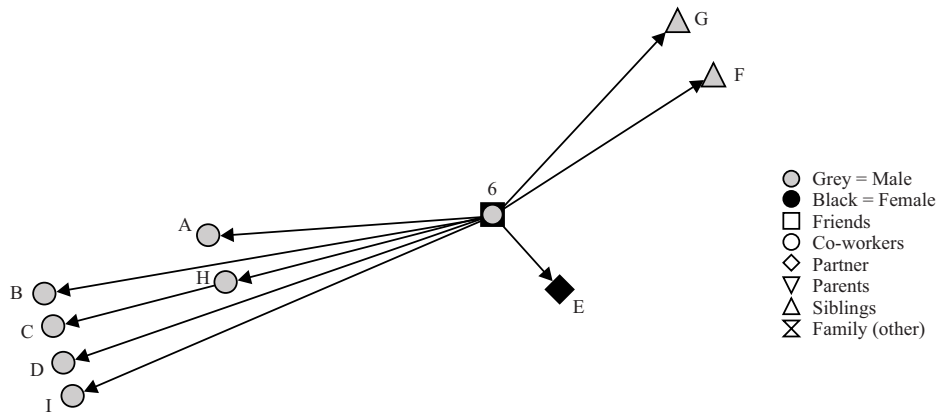


Fig. 4: Social capital and closeness egonet (distressed)

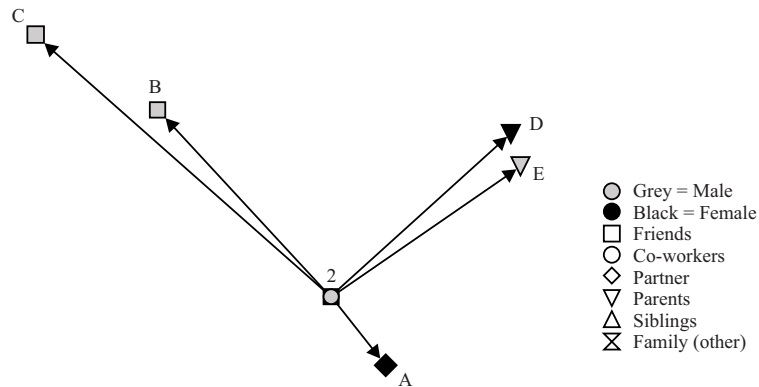


Fig. 5: Emotional support egonet (without distress)

Social support: Egonets were created for different social supports (emotional, tangible, informational, companionship). Each worker indicated the amount of social support provided by each of their nominated social capital and is represented by closeness to the ego on the egonet analysis (a lot is presented as closest to the ego on the diagram, whereas more distant connection provides less of that type of social support). If the person indicated that a particular connection did not provide this type of support, then the connection was removed from the egonet for that type of social support.

Emotional support: For these egonets, workers who did not have distress had more emotional support and more diversity in the type of connection providing the emotional support. This means that there were different sources like their partner (if they had one), friends, family, work colleagues, etc. that provided emotional support. Those who had distress had few people (i.e., they had less social capital available to provide them with emotional support) and subsequently they had less diversity in their networks in relation to providing emotional

support. For those workers who were experiencing distress, two of these reported that they did not have any friends that were available to provide them with emotional support. In comparison, workers who did not have distress had at least one close friend that provided emotional support.

For participants without distress, who also nominated a partner, they listed their partner as a close provider of emotional support. Whereas there was a distressed participant (with a partner) who did not list their partner as a primary source of support. Instead, they listed a work colleague as someone who provides a lot of emotional support. An example egonet for a site worker without distress was presented in Fig. 5 and a site worker with distress in Fig. 6.

Tangible support, informational support and companionship: For the remaining types of social support, regardless of the relationship status and psychological well-being/distress, there appeared to be very little difference in the networks across each of these types of support. All participants nominated at least one to two sources as

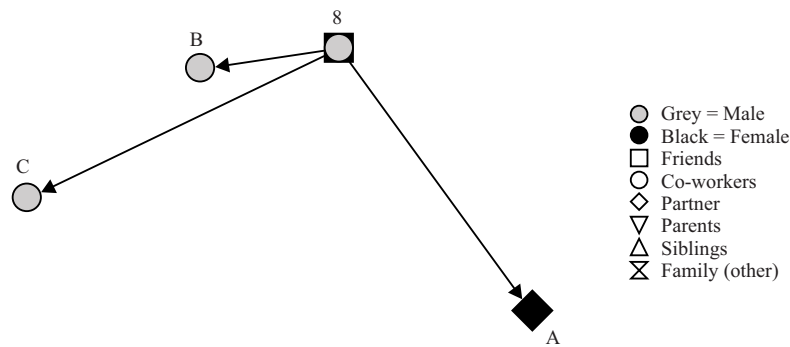


Fig. 6: Emotional support egonet (distressed)

providing a lot of each of these support types, with closeness also reported consistently across each of these supports. Further, there was also a lot of diversity including friends, neighbors, work colleagues and family. Overall, it appeared there was plenty of tangible, informational and companionship support available for those with and without distress.

DISCUSSION

The purpose of this pilot study was to explore the personal networks of construction workers with and without distress to determine if differences existed in the amount, type and closeness of social capital and social support. This pilot explored these networks to see if the size (number of connections), reported closeness of these relationships (strength) and the diversity (varying types of connections) were different and if these differences were consistent for workers with and without distress. There were two primary research questions: RQ¹ how does social capital differ in terms of the total sum and diversity for workers with and without psychological distress? RQ² are there any differences in the social support available (e.g., tangible, emotional, informational, companionship) from their social capital for workers with and without psychological distress?

In relation to RQ¹ workers without distress tended to have larger and more diverse networks. This early evidence suggests that for site-based construction workers having a large network that they feel close to, along with a variety of social capital is potentially important for helping to maintain psychological well-being. This evidence supports that an increase in diversity in addition to more availability of social capital was related to better well-being²⁰⁻²³. This also supports Wright and Silard²⁷ who suggested that fewer connections were related to feelings of workplace distress. However, this research contradicted the findings of

Wang *et al.*³⁴, who reported no difference in the network size for those with and without depression. Together, these findings indicate that for these construction workers, it is important to have access to more people with a diverse network. This subsequently indicates that leveraging workplaces and recruiting work colleagues as a source of social capital to provide support could be beneficial for the construction industry to help support psychological well-being.

This pilot also indicated that specifically workers who were experiencing distress and had a partner, tended to have very few close relationships. Further, these workers also had low diversity in their social capital composition and had an overreliance on work colleagues as part of their networks (i.e., they had few to no friends outside of work). This supports evidence about the importance of a diverse network²⁵. Workers who were experiencing distress and did not have a partner also had very few close relationships, however with these networks it was difficult to determine if the critical issue relating to their distress was the diversity or closeness of these relationships. Subsequently, further research exploring these networks (or relationships) in greater detail is needed. Regardless, this initial evidence indicates that being close to one's social capital allows access to different resources to help address a need as it arises. In relation to the workers who had few friends and were using work colleagues, this further supports the use of these relationships to assess if there is an opportunity for workplaces to implement initial support programs. This could help to provide appropriate support to workers who may need it.

To answer RQ² there were no distinct differences in social support for size or diversity in relation to practical, informational and companionship types of support. This seems to suggest that for these aspects of support, the size or diversity of the network does not impact distress, as outlined by Wang *et al.*³⁴. For emotional support, however,

workers without distress (who also did not have a partner) reported more close relationships (their connections were stronger) and they also had more diversity in the types of people providing emotional support. This adds to the literature in terms of the importance of emotional support which indicates emotional support helped to improve stress^{23,24}. This early evidence also suggests that in the absence of a partner, workers have better psychological well-being when they have access to emotional support. This supports the need for further study and acknowledges that there is a potential for construction worksites to consider workplace programs (or interventions) to provide emotional support to bridge this gap, for example through training programs aimed at developing listening and communication skills.

For emotional support, those that had partners who were experiencing distress did not have a lot of emotional support available. These workers lacked the number of resources available to them and subsequently diversity. To understand this further, more information is needed to examine the impact of how having a partner and social support (particularly emotional support) availability and its role in supporting psychological well-being. For example, it is possible that having a partner alone may not be enough to provide the emotional support needed when workers are feeling distressed. To elaborate, there was one distressed participant who reported they did not rely on their partner to provide emotional support. Therefore, further understanding is needed to discover how distressed workers might access their emotional support if their partner is not able to provide support (or for some reason they are not able to utilize the partner in the first instance). This could be explored by examining how accessing a particular type of social support might differ for distressed vs non-distressed workers in a larger study. This could help to determine the extent of the importance of accessing different types of social capital for emotional support in relation to helping them with their psychological well-being.

In summary, by conducting the analysis of these egonets and exploring how the composition of personal networks in relation to their social capital and social support has provided an early indication that closeness and diversity for social capital are potentially important for supporting construction workers psychological well-being. Further, emotional support availability, particularly the strength/closeness of availability is also important, particularly for those workers who could not access emotional support from their partner or who had a lack of diversity in their network. This early evidence suggests that having emotional support available to access when needed from a range of different people is important for helping

workers manage their psychological well-being and supports the existing literature^{19-21,23,24}. When there is an absence of emotional support and fewer people to access it when needed, this tends to have a negative impact on workers psychological well-being.

Limitations and future research: It is acknowledged that this study is a pilot and that the sample is a very small specific subset of civil construction workers recruited from a single company in Brisbane which is a limitation. It is also acknowledged that this may have impacted the findings as the analyses had very few distressed participants to conclude on any network differences for those with and without distress and should therefore be interpreted cautiously. Further, limited qualitative data was collected during the network analysis. This detail may have assisted in understanding the impact of these relationships better.

Future research should explore how accessing social support influences distress and seek to understand the circumstances in which a specific type of social capital is accessed when requiring social support. Further, the research could examine how accessing support impacts distress for those without a partner as there was not enough detail in this pilot study to determine the important relationships for accessing support, particularly emotional support. Alternatively, a qualitative study seeking to explore these relationships and their experiences in relation to the barriers and facilitators to seeking social support from their networks could be undertaken to provide more data on this important issue. There was also evidence to suggest the importance of the partner in accessing support, which could be followed up in a larger study seeking to understand this better.

CONCLUSION

The outcomes of this pilot study exploring social networks support the use of social network analysis for collecting information about social capital and social support. It also found that having more social capital along with increased diversity, as well as access to emotional support is associated with better psychological outcomes. This pilot study also provides early evidence that construction workers without distress tended to have more capital available to them, though it is unknown how the quality of these diverse relationships might impact their well-being. A larger study focusing on exploring these relationships further should be conducted to give further insight into the importance of social capital (total number and diversity) and how access to (or lack of access to) emotional support impacts psychological well-being. This pilot

study also provides early evidence that suggests the provision of emotional support from different people is also important for psychological well-being. Different sources of social capital provide a specific type of support during times of need and access to those friends and in some cases their partner can impact psychological well-being. Despite these conclusions, the relationships along with how they might be accessed for social support (such as emotional support when needed) is complex. This pilot study exploring personal networks helps to better understand the needs of construction workers in relation to social support to help with minimizing their distress. This knowledge can contribute to understanding the psychological needs of construction workers and help to address their distress (and ultimately assist in reducing suicide) for the construction industry.

SIGNIFICANCE STATEMENT

The primary contributions of this research indicate that for construction workers that having more social capital with increased diversity and access to good emotional support is the key to helping to minimize distress. This is useful information given that those with distress also appeared to recruit work colleagues as a source of capital to provide support. This means there is a potential opportunity for workplaces to provide mechanisms or interventions that can give workers the skills to provide effective emotional support (e.g., empathy and communication skills). This can help to improve psychological well-being for those who do not have access to social support or do not have appropriate social capital to provide this. In turn, by leveraging and implementing protective factors at work can help to minimize psychological distress and help to address high suicide rates currently experienced within the construction industry.

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