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Measuring sense of place in project environments to promote positive mental wellbeing

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ABSTRACT

Sense of place describes people's perceptions of the distinguishing qualities and attributes of an environment that shape positive feelings of attachment and promote mental wellbeing. The purpose of the research was to identify the qualities and attributes of project work environments that contribute to the development of a sense of place, and to develop and test a survey instrument designed to measure these qualities and attributes. Characteristics of project work environments with the potential to create a positive wellbeing-promoting sense of place were identified from the extant literature. A survey instrument was developed, drawing on existing validated scales, to measure the extent to which a positive sense of place is present in project work environments. The survey tool was tested in two studies conducted in construction projects in New Zealand. The first study tested the construct validity and reliability of the survey instrument, and the extent to which the proposed components were associated with workers' positive mental wellbeing. The second study confirmed that the sense of place components are distinct and can be measured reliably using the survey instrument. Organisations can potentially use the survey instrument to evaluate the extent to which project work environments are supportive of workers' mental wellbeing, and to inform the development of strategies specifically focused on creating work environments that are likely to promote mental wellbeing amongst project workers.

1. Introduction

1.1. Background and aims

It is often stated that project work is stressful (Richmond & Skitmore, 2006; Haynes & Love, 2004; Leung et al., 2008; Aguilar Velasco & Wald, 2022). Stressors attributed to project work (that have been linked to mental unwellness) include: the occurrence of unexpected incidents that thwart the attainment of project goals (Gällstedt, 2003); a lack of resources (Richmond & Skitmore, 2006); project overload (Zika-Viktorsson et al., 2006); goal ambiguity, insufficient time, conflicting roles and adversarial or dysfunctional relationships (Darling & Whitty, 2019); excessive involvement in work, destabilisation of professional identities and unclear or precarious career pathways for project workers (Asquin et al., 2010).

The widespread acceptance that project work is intrinsically stressful has prompted researchers to consider the way in which project workers cope with work stress (Richmond & Skitmore, 2006; Haynes & Love, 2004). While the use of appropriate coping strategies is important in helping individual workers to manage work stress, there also exists an organisational duty (under work health and safety legislation) to provide workplaces that are healthy and safe (both physically and psychologically). This duty extends beyond helping individual workers to cope with adverse work conditions and requires that attention be focused on the creation of mentally healthy workplaces. Therefore, there is a strong case for organisations to consider ways to create work environments that promote project workers' mental wellbeing.

Some research also suggests that working in projects is something of a 'double-edged sword' because, although it has the potential to be stressful, project work can be highly motivating and more rewarding than routinised work (Gallestedt, 2003). In fact, harmful levels of work stress may not be endemic to projects. For example, Darling and Whitty (2019) argue that many of the stressors they observed in their study of project work were related to deficiencies in delivery and management which could be resolved by improving project management competency. This argument is also supported by Chiocchio et al. (2010) who report that workers' increased time involvement in project-based work (up to a threshold point) is associated with lower levels of psychological

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distress and higher level of psychological wellbeing. Importantly this finding was only significant for work in projectised organisations, i.e. those that work in projects often. Chiocchio et al. (2010) suggest this may be because, in projectised organisations, project management practices are more mature and workers are provided with clear goals, realistic deadlines, appropriate resourcing, multidisciplinary challenges and opportunities for growth. Thus, the extent to which project work is experienced as stressful or harmful may depend upon the 'health' of the work environment within which the work takes place.

A substantial body of literature examines the factors that negatively impact the mental wellbeing of project workers. For example, Sun et al. (2022) identified psychosocial stressors in construction project environments that have been linked to mental ill-health. However, less research has examined factors that have the potential to positively influence mental wellbeing in project work environments (Hutton et al., 2022). Hutton et al. (2022) comment on the need to consider determinants of mental wellbeing as being distinct from the determinants of mental illness.

The present research specifically focused on understanding the characteristics of project work environments that are associated with mental wellbeing. The study drew on a positive psychology paradigm to identify characteristics of work environments that promote positive wellbeing and to develop and test a survey instrument intended to measure the presence (or absence) of these characteristics in project work environments. The extant literature was reviewed to identify the work environment characteristics that are linked to positive mental wellbeing. A survey instrument was developed to measure six key characteristics identified as being most relevant. This measurement instrument was tested in two separate studies in the New Zealand construction industry. The first study examined issues of reliability of measurement and discriminant validity of the work environment characteristics incorporated into the instrument. Criterion validity of the measurement instrument was also evaluated by examining the relationship of survey components with a measure of the positive experience of mental wellbeing. The second study (in a different project environment) was used to test the replicability of the survey instrument's performance.

Before describing the research methods and presenting and discussing the results we first discuss the positive psychology framing of the study, introduce the sense of place concept and discuss why fostering a positive, health-promoting sense of place may be challenging in project-based work.

1.2. A positive psychology paradigm

Many occupational health initiatives focus on reducing sickness, presenteeism or sickness absence, which are all known to present a high cost to organisations. However, it is increasingly recognised that workers who are mentally and physically healthy are also more productive, shifting the emphasis from prevention of ill-health to the promotion of good health in the workplace (Christensen, 2017).

Hakanen and Schaufeli (2012) argue that workers' general wellbeing should be understood as being more than the absence of depressive symptoms. Rather, a state of general wellbeing constitutes the presence of a positive state of life satisfaction. There is an increasing call for research that investigates whether factors, other than those that cause ill-health, predict positive health (Torp et al., 2013). For example, Xu and Smyth (2023) call for the implementation of an ethics of care framework to address wellbeing issues in projects and recommend that future research should focus on examining how caring relations emerge, how to nurture caring leadership, and the specific role of caring in enhancing wellbeing in project contexts.

Understanding the 'conditions and processes that contribute to the flourishing or optimal functioning of people, groups, and institutions' is the overarching goal of the positive psychology movement (Gable & Haidt, 2005, p.104). Positive psychology is based on the premise that there is a need to focus scientific research and interest 'on understanding the entire breadth of human experience, from loss, suffering, illness, and distress through connection, fulfilment, health, and well-being' (Linley et al., 2006, p.6).

In relation to organisational interventions, the positive psychology movement has contributed to a relatively recent managerial focus on the creation of mentally healthy workplaces. In a mentally healthy workplace, steps are taken to eliminate risk factors for loss, suffering, illness, and distress, as well as to create a context within which workers are able to flourish (Harvey et al., 2014).

2. Sense of place

2.1. Sense of place definition

Sense of place is used to describe the perception of place in connection with the qualities and attributes that distinguish a place from others, give it a sense of authenticity, and induce feelings of attachment and belonging (Foote & Azaryahu, 2009). Kudryavtsev et al. (2012) argue that sense of place includes two complementary concepts: place attachment and place meaning. Place attachment describes 'the bond between people and places, or the degree to which a place is important to people' (Kudryavtsev et al., 2012, p. 231). Place meaning refers to 'the symbolic meanings that people ascribe to settings' (Kudryavtsev et al., 2012, p. 232).

It is increasingly accepted that health is shaped by social as well as biological and genetic factors. One of the most widely accepted models of the social determinants of health was developed by Dahlgren and Whitehead (1991). This model suggests that individuals' health is related to individual characteristics and lifestyle factors, but that health is also (and arguably to a greater extent) influenced by the conditions in which people live and work which are, in turn, shaped by a wider set of economic, social, and environmental forces (Allen et al., 2014, p.392). Understanding health as being shaped by the broader environments in which people live and work encourages professionals and policy makers to consider what they can do in their local environments to influence the health of the groups potentially impacted by their activities (Dahlgren & Whitehead, 2021). It is therefore useful to more closely examine the relationship between projects - as places of work - and the psychological wellbeing of project workers.

Consistent with these broader systemic understandings of health, sense of place (often associated with a person's living environment) has been linked to quality of life, health and wellbeing (Gattino et al., 2013; DeMiglio & Williams, 2016). In the environmental psychology and sociology disciplines, sense of place is focused on community, belonging, and identity and is associated with: 'exploring the dimensions of the people-place relationship; reduction of, and recovery from stress; psychological integrity and preventing mental illnesses' (Hausmann et al., 2015, p.121).

Sense of place in the workplace has received minimal attention in the extant literature, and research has often focused on the physical characteristics of the workplace associated with wellbeing. Furthermore, much of the research on sense of place in the workplace has focused on office-based knowledge workers (Foley, 2007; Miller et al., 2001). For example, Miller et al. (2001) focused on the interior setting of a workplace and operationalised the sense of place of knowledge workers to include comfort, control, noise, privacy, and personalisation. To the authors' knowledge, sense of place has not previously been examined in project-based work.

In relation to sense of place in the workplace, Foley (2007) considers the definition of work and suggests an approach which has particular implications for understanding projects as 'places' of work. Foley (2007, p.864) contends that the workplace should not be conceived 'as zones or territories but as modes of workplace interaction and proximity - entered into or withdrawn for discrete purposes, and which incorporate a range of tasks, activities and social encounters'. Foley's (2007) definition of

the workplace therefore extends beyond the physical place of work and incorporates a broad range of interactions and tasks that may take place in various precincts, workgroups, office and site locations and in which the workplace may change on a daily basis.

The sense of place concept was used in the present study to frame the exploration of the work environment characteristics that have the potential to contribute positively to the mental health and wellbeing of project workers.

2.2. Sense of place in project-based work

Arguably, the development of a sense of attachment and meaning in relation to one's place of work is likely to be more difficult in project work than in more stable, routinised work situations. Projects are inherently temporary and involve people from different organisations and functions who may not have worked together before and who may only work with each other for a limited period of time (Borg & Söderlund, 2014). Consequently, it may take time for project workers to learn to work together effectively, build trust and establish a sense of belonging to a team. Moreover, project workers are typically employed in different organisations or departments whilst simultaneously performing their project roles. The requirement to work together to deliver a project outside normal organisational boundaries or functional groups creates 'ambiguous belongings' that project workers experience as stressful (Borg & Söderlund, 2014). The lack of stability in project work, in terms of assignments, relationships and evaluations of performance has also been identified by Cicmil et al. (2016) as contributing to work stress and exhaustion. In juggling multiple project goals in the context of project complexity and finite resources, project workers reportedly experience a 'work-life in which nothing is stable, nothing and no one is reliable, in which professional reputations, performances and senses of personal worthiness are repeatedly challenged and may be lost' (Cicmil et al., 2016, p. 59).

In this challenging context it is useful to better understand the characteristics of work that foster attachment and meaning to a project (i.e. a sense of place), which can help to protect and/or promote project workers' mental wellbeing.

2.3. Components of a wellbeing-promoting sense of place in the work environment

Six mutually exclusive components were identified from the literature which reflect characteristics of places of work that are linked with positive mental health (see Fig. 1). Each component is briefly described below with reference to the supporting literature.

2.3.1. Social support

Social support refers to situations in which one person or group needs help to achieve an objective and another person or group offers resources to provide help (Dovidio et al., 2006; Eisenberger et al., 2002). In a workplace, social support focuses on 'collaborative problem solving and sharing information, reappraising situations and obtaining advice from a variety of personnel such as colleagues, supervisors and managers' (Brough & Pears, 2004, p.472). Kossek et al. (2011, p.292) conceptualise workplace social support as '(a) emanating from multiple sources, such as supervisors, coworkers, and employing organisations; and (b) distinguished by different types or foci of support that are either 'content general' or 'content specific.General work support refers to the degree to which workers perceive that supervisors or employers care about their global wellbeing on the job through providing positive social interaction or resources. Content-specific support refers to perceptions of care and the provision of resources to reinforce a particular type of role demand.' There is strong evidence of the association between social support and health, including mental health (Kawachi & Berkman, 2001). Perceived organisational support is also positively linked to worker engagement and wellbeing (Caesens et al., 2016) and negatively related to burnout (Walters & Raybould, 2007).

Fig. 1. Sense of place components.

2.3.2. Community

A psychological sense of community refers to the human phenomenon of collective experience (Peterson et al., 2008). McMillan and Chavis (1986, p.9) describe a sense of community as 'a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together'. A workplace community is identifiable as a set of formal and informal networks of individuals who share a common association (Burroughs & Eby, 1998). In a work setting, Lambert and Hopkins (1995, p.152) define a sense of community as 'mutual commitment between workers and their employing organization'. A sense of community is positively related to experiencing higher levels of mental wellbeing (Boyd & Nowell, 2017; Peterson et al., 2008).

2.3.3. Life balance

Life balance describes a situation in which workers experience 'satisfaction and perceptions of success in meeting work and nonwork role demands, low levels of conflict amongst roles, and opportunity for inter-role enrichment, meaning that experiences in one role can improve performance and satisfaction in other roles as well' (Kossek et al., 2014, p,301). Life balance is strongly and consistently positively related to job and life satisfaction and negatively related to anxiety and depression across samples from seven different countries/cultures (Haar et al. 2014). Positive interaction between work and family has been linked to psychological wellbeing. For example, Allis and O'Driscoll (2008) report that nonwork-to-work facilitation is associated with higher levels of employee wellbeing, while Haar and Bardoel (2008) report that positive spill-over between work and family life was negatively associated with psychological distress and turnover intention.

2.3.4. Engagement

Work engagement describes 'a positive, fulfilling, affective-motivational state of work-related well-being' (Bakker et al., 2008, p187–188). The components of work engagement have been further defined as follows:

- vigour is characterised by 'high levels of mental resilience while working, the willingness to invest effort in one's work and persistence even in the face of difficulties'
- dedication describes 'being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride and challenge,' and
- absorption is characterised by 'being fully concentrated and happily engrossed in one's work, whereby time passes quickly, and one has difficulties with detaching oneself from work.' (Bakker et al., 2008, p.188)

2.3.5. Respect

A respectful workplace is one in which people feel worthy and recognised and incivility is not tolerated. Workplace civility reflects 'behaviour that helps to preserve the norms for mutual respect at work; it comprises behaviors that are fundamental to positively connecting with another, building relationships, and empathizing' (Pearson et al., 2000, p.125). In the workplace, civility 'demands that one speaks in ways that are respectful, responsible, restrained, and principled and avoid that which is offensive, rude, demeaning, and threatening' (Gill & Sypher, 2009, p.55). Workplace incivility is associated with psychological distress and strategies to improve respect and civility in the workplace can significantly reduce burnout (Leiter et al., 2011).

2.3.6. Resilience

Resilience can be understood as a process arising from the interplay between the individual and their work environment (World Health Organization, 2017). In the workplace, resilience describes the ability of an individual worker or group of workers to respond to everyday problems and challenges associated with work and be able to 'bounce back' when setbacks are encountered and remain effective in challenging situations. Beyond this, resilience in the workplace also incorporates the lasting benefit and learning that occurs through successfully coping with adverse situations (Cooper et al., 2013). Resilience in the workplace is positively linked to mental health (Kinman & Grant, 2011). Workforce resilience can be facilitated by the work environment, particularly through leadership and the prevailing workplace culture (Näswall et al., 2015).

2.4. Development of a survey tool to measure the sense of place components

The literature review also examined the ways in which each of the sense of place components has been measured. Psychometric scales that are demonstrably well-tested and reliable were considered for inclusion in the sense of place survey tool. The suitability of scales for inclusion in the survey tool was assessed using the following criteria:

- reliability in previous research (scales with strong internal consistency reliability were given preference)
- length (shorter scales were given preference)
- suitability of wording for professional/managerial and non-managerial/manual workers (scales with plain English wording were given preference), and
- positive/negative wording (scales that were worded positively rather than negatively were given preference).

Table 1 outlines the survey measures associated with each of the sense of place components which met the selection criteria. A fuller description of these components can be found in Lingard et al. Section 4 provides a brief overview of each scale.

Table 1
Sense of Place survey tool derivation.

SoP component	Scale name	Citation
Support	Social Support Index	Caplan et al. (1975)
Community	Brief Sense of Community Scale	Peterson et al. (2008)
Life balance	Work life balance	Haar (2013)
Engagement	Oldenburg Burnout Inventory	Demerouti et al. (2010)
Respect	Civility Norms Questionnaire-Brief	Walsh et al. (2012)
Resilience	Employee Resilience Scale	Näswall et al. (2015)

3. Model testing research methods: study one

3.1. Project-based data collection

The survey instrument was used to collect data at a construction project in New Zealand. One of the objectives of the project was to create a community which sought to prioritise the welfare, and health and safety of workers. The project involved the $100m upgrade of a food processing plant. The project commenced in December 2019 and finished in January 2022. The project involved over 1500 workers with an onsite peak workforce of 200 comprising of workers directly employed by the plant owner and up to 50 subcontractor organisations of varying sizes. All workers from the project were invited to complete the survey. At the time of the survey the onsite workforce was 80 and up to 18 subcontractors were involved. A link to an online Qualtrics survey was emailed to project members directly employed by the client organisation. As the client organisation did not have the email details of subcontracted project members, a paper copy of the survey was distributed to these workers. The data collection was approved by the RMIT University Human Research Ethics Committee.

3.2. Instrument

The first section of the survey asked questions related to respondents' demographics such as gender and age, duration at the project, and role at the project. The second section incorporated the six components of the sense of place, as summarised in Table 1 and outlined below:

- Social support was measured using the 8-item Social Support Index (Caplan et al., 1975). Four items measure supervisor support and four items measure coworker support. Participants were asked to respond to questions on a 4-point Likert scale ranging from '1' not at all to '4' a lot. An example item is: 'How much can your supervisor/manager be relied upon when things get tough at work?'.
- Community was measured using the 8-item Brief Sense of Community Scale consisting of items relating to needs fulfillment, membership, influence, and emotional connection (Peterson et al., 2008). Participants were asked to respond to questions on a 5-point Likert scale ranging from '1' strongly disagree to '5' strongly agree. An example item is: 'I feel like a member of the project'.
- Life balance was measured using the 3-item measure developed by Haar (Haar, 2013). Participants were asked to respond to questions on a 5-point Likert scale ranging from '1' strongly disagree to '5' strongly agree. An example item is: 'I am satisfied with my work–life balance, enjoying both roles'.
- Engagement was measured using the Oldenburg Burnout Inventory (Demerouti et al., 2010). Participants responded to the eight positively worded items from the dedication and vigour subscales on a 4-point Likert scale ranging from '1' strongly disagree to '4' strongly agree. An example item is: 'I can tolerate the pressure of my work very well'.
- Respect in the workplace was measured by the four-item unidimensional Civility Norms Questionnaire-Brief scale (Walsh et al., 2012). An example item is 'Rude behaviour is not accepted by my co-workers'. Participants were asked to respond to questions on a 7-point Likert scale ranging from '1' strongly disagree to '7' strongly agree.

- Resilience was measured using the Employee Resilience Scale (EmpRes) (Näswall et al., 2015). The EmpRes is a nine-item unidimensional scale. An example item is 'I seek assistance to work when I need specific resources', and 'I learn from mistakes at work and improve the way I do my job'. Using the scale of never '1' to almost always '7', participants were asked to indicate how often they displayed the behaviours listed.

The third section of the survey consisted of the Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS) which was used to measure positive mental wellbeing. The SWEMWBS (Stewart-Brown et al., 2009) is a 7-item self-report scale that demonstrates good internal reliability (Haver et al., 2015). An example item is 'I've been feeling optimistic about the future'. The response format is a 5-point Likert scale ranging from 'none of the time' (1) to 'all of the time' (5). The SWEMWBS is scored by first summing the score for each of the seven items and then transforming the total score for each person according to a metric score. Scores range from 7 to 35 and higher scores indicate higher positive mental wellbeing.

The final section of the survey included two open-ended questions: (i) What does being involved in the project mean to you? and (ii) Is there anything else you would like to add about your experiences while working on the project?

3.3. Analysis

Exploratory factor analysis (EFA) was undertaken to explore the dimensionality of the survey instrument. EFA is often used in the early stages of survey development because it can help to identify items that do not belong to the intended constructs the survey is designed to measure and that therefore should be removed. Internal consistency reliability was assessed by calculating the Cronbach's alpha coefficient for each subscale of the sense of place survey tool. Pearson product moment bivariate correlations between the sense of place components and the SWEMWBS measure of mental wellbeing were calculated. Finally, one way analysis of variance was used to test for significant differences in the mean sense of place scores of participants who fell into categories of high, medium and low psychological wellbeing (according to their SWEMWBS scores). Responses to the two open-ended questions asked at the end of the survey were thematically analysed.

4. Model testing results: study one

4.1. Sample

Seventy-three participants completed the survey at the construction project. The majority of participants were male (n = 60, 82.2%) and waged (n = 56, 76.7%). The mean age of participants was 40 years and the median age was 36 years (SD=14), with age of participants ranging from 20 to 76 years. Twelve (16.4%) participants had worked on the project for less than six months, 14 (19.2%) had worked on the project for 7–12 months, and 47 (64.4%) had worked on the project for more than 12 months. Thirteen (17.8%) participants were employed by the client organisation, and the remaining 60 (82.2%) participants were subcontractors. The largest group of participants (n = 17, 23.3%) were involved in construction or project management, followed by cleaning (n = 15, 20.5%), scaffolding (n = 11, 15.1%), mechanical (n = 7, 9.6%), building (n = 6, 8.2%), electrical/automation (n = 4, 5.5%), and painting (n = 3, 4.1%). Ten (13.7%) participants indicated they were involved in 'other' areas of the project.

4.2. Exploratory factor analysis

All items from the sense of place instrument were subjected to principal axis factoring (PAF) with direct oblimin rotation. Prior to performing PAF, the suitability for factor analysis was assessed. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) value was 0.675, exceeding the recommended value of 0.6 (Kaiser, 1970; Kaiser & Rice, 1974), the Bartlett's Test of Sphericity (Bartlett, 1954) was significant (p =.000) and the correlation matrix revealed the presence of many coefficients of 0.30 and above, therefore verifying that the data set was suitable for factor analysis. Principal axis factoring analysis (with direct oblimin rotation) revealed the presence of nine components with eigenvalues exceeding 1, explaining 35.9%, 8.9%, 6.9%, 6.2%, 5.3%, 4.4%, 3.1%, 2.8%, and 2.6% of the variance. Items that loaded together are indicated in grey shaded boxes in Table 7. In Table 7, loadings less than 0.3 are not reported. Generally, the survey items (questions) loaded as expected, reflecting that the internal structure of the sense of place survey is theoretically sound when applied to a construction project environment. There was minimal double loading and minimal splintering of the questions into factors that cannot easily be interpreted:

- Five of the eight *engagement* items loaded as expected on a single factor. One engagement item 'After working, I have enough energy for my leisure activities' cross loaded with the life balance items. Two items ('This is the only type of work that I can imagine myself doing' and 'I find my work to be a positive challenge') loaded on a different factor that could not be interpreted in a meaningful way.
- Eight of the nine *employee resilience* items loaded as expected on a single factor. One resilience item 'I learn from mistakes at work and improve the way I do my job' loaded on a different factor that could not be interpreted in a meaningful way.
- The three *life balance* items loaded as expected on a single factor.
- *Social support* split into two distinct factors reflecting support from supervisors and support from co-workers, which is acceptable as these two sources of support are theoretically distinct. The four items in each of these social support dimensions loaded as expected.
- The four *respect* items loaded as expected on a single factor although there was some cross loading for the items in this factor.
- Seven of the eight items measuring *community* loaded as expected on a single factor. One community item 'People in the project are good at influencing each other' loaded on a separate factor that could not easily be interpreted.

The final factor solution retained for subsequent analysis consisted of seven components and 35 items. Three items from the engagement scale, one item from the employee resilience scale, and one item from the community scale were excluded (as described above).

4.3. Internal consistency reliability

The Cronbach alpha coefficients for each of the sense of place component subscales and the wellbeing scale used in the study are presented in Table 2. The Cronbach alpha coefficients reflect excellent internal consistency reliability for the community, employee resilience, and life balance subscales, good internal consistency reliability for the supervisor support, engagement, respect and wellbeing subscales and acceptable internal consistency reliability for the co-worker support subscale.

Table 2
Cronbach alpha coefficients for the sense of place subscales and wellbeing measure.

Variable	Items	Cronbach's alpha
1. Supervisor support	4	.865
2. Co-worker support	4	.763
3. Community	7	.913
4. Life balance	3	.908
5. Engagement	5	.864
6. Respect	4	.866
7. Employee resilience	8	.904
8. Wellbeing	7	.814

Table 3
Bivariate correlations between components included in the sense of place survey instrument and positive mental wellbeing.

		SS	CS	C	LB	E	R	ER	W
Supervisor Support (SS)	Pearson Correlation	1							
	Sig. (2-tailed)								
Coworker Support (CS)	Pearson Correlation	.235*	1						
	Sig. (2-tailed)	.050							
Community (C)	Pearson Correlation	.454**	.392**	1					
	Sig. (2-tailed)	.000	.001						
Life balance (LB)	Pearson Correlation	.472**	.422**	.407**	1				
	Sig. (2-tailed)	.000	.000	.000					
Engagement (E)	Pearson Correlation	.481**	.359**	.602**	.596**	1			
	Sig. (2-tailed)	.000	.002	.000	.000				
Respect (R)	Pearson Correlation	.411**	.361**	.572**	.573**	.488**	1		
	Sig. (2-tailed)	.000	.002	.000	.000	.000			
Employee Resilience (ER)	Pearson Correlation	.346**	.280*	.515**	.366**	.426**	.566**	1	
	Sig. (2-tailed)	.004	.021	.000	.002	.000	.000		
Wellbeing (W)	Pearson Correlation	.459**	.355**	.587**	.510**	.557**	.572**	.682**	1
	Sig. (2-tailed)	.000	.003	.000	.000	.000	.000	.000	

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 4
Allocation of participants to high, medium and low wellbeing groupings.

Wellbeing status	No of participants	%
Low	7	10
Medium	49	70
High	14	20
Total	*70*	*100*

Note: 3 participants were excluded due to missing data.

4.4. Bi-variate correlations

Pearson product-moment correlations were run to ascertain the relationship between the sense of place component scores, and also the relationship between each of the sense of place component scores and participants' wellbeing. The results are presented in Table 3. The findings show that the sense of place components, as measured by the survey, are correlated with one another. Importantly, the components are also all statistically significantly correlated with wellbeing. The correlations between the sense of place components and wellbeing were all positive, i.e. as employees' perceptions of sense of place increases so too does their wellbeing. The correlations ranged from $r = 0.355$ (p=.003) for the relationship between co-worker social support and wellbeing to $r = 0.682$ (p=.000) for the relationship between employee resilience and wellbeing. Thus, the statistical associations between the sense of place components and employee wellbeing were all of medium or high strength.

These findings further support the validity of the sense of place survey items for use in a project environment because they are all significantly related to wellbeing in a way that makes theoretical sense.

4.5. Comparison of sense of place scores by wellbeing status

Participants were divided into three groups reflecting whether they reported low, medium or high wellbeing scores. The allocation of participants to groups was based upon the application of population norm scores for the short version of the Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) used in the study (Warwick Medical School, 2021). The SWEMWBS has a mean of 23.5 and a standard deviation of 3.9 in the United Kingdom general population samples (Ng et al., 2017). This means that 15% of the population can be expected to have a score >27.4 so we set the threshold for high wellbeing at 27.5. Conversely, 15% of the population can be expected to have a score <19.6, so we established a threshold point of 19.5, below which participants were deemed to have low wellbeing. Table 4 shows distribution of participants into these groupings based on the threshold values applied. Our results are close to Ng's findings that top 15% of scores range from 27.5 to 35.0 (high) and

Table 5
Comparison of mean SoP component scores by wellbeing status.

SoP component	Wellbeing grouping	Mean score	SD	F-ratio	p value	Effect size
Supervisor support	Low	2.93	.875	7.708	.001	0.189
	Medium	3.57	.512			
	High	3.88	.273			
Co-worker support	Low	3.39	.430	1.231	.299	NS
	Medium	3.54	.441			
	High	3.70	.451			
Community	Low	3.08	.659	11.068	.000	0.251
	Medium	3.94	.612			
	High	4.42	.602			
Life balance	Low	2.86	.960	7.268	.001	0.178
	Medium	3.62	.974			
	High	4.40	.643			
Engagement	Low	2.63	.637	9.739	.000	0.225
	Medium	3.1344	.413			
	High	3.53	.468			
Respect	Low	4.50	.408	9.765	.000	0.225
	Medium	5.79	.947			
	High	6.34	.891			
Resilience	Low	4.48	.985	19.248	.000	0.368
	Medium	5.60	.866			
	High	6.69	.267			

Table 6
Qualitative comments provided by participants.

Theme	Illustrative quotes
Teamwork and collaboration	• Being involved with a 'one team ethos'. Knowing there is support on all levels available. The project's willingness to engage and assist the contractors needs and suggestions. • It has been personally rewarding to be part of a team who have collectively worked through an extremely challenging project with multiple hurdles and big challenges, a team who have had open and honest conversations and have cared for one another, right to the end. • This has been an outstanding and very rewarding project. It has provided me with a lot of satisfaction and I've met some great people.
Pride in work	• Has been the most challenging project I have ever been involved in. One of the most frustrating as well as one of the most satisfying and proud projects. • [Project name] has been a great learning curve, and I feel like in ten years time I could look back at the buildings and be proud to say I played an important part in that project.
Enjoyable and safe work environment	• I come to work here because I enjoy working again and enjoy the environment I work in and the team I now work for. • Thank you to the entire [company name] management team for creating a fun safe work environment. Being here has turned my life around!!! • I used my experiences within the compound as a tool to entice more contractors when my team needed to increase. The compound is of significant value to the [project name]. I enjoy my work life here. • Excellent attempt to create a safer and more collaborative, safe and productive workplace. Impressed by management and their safety initiatives.
Sense of belonging and respect	• The contractor compound is a unique space to be involved with. It has grown a workplace culture that gives me and my team a sense of belonging and self-worth to the [project name] • There was a real feeling of care and respect for all members engaged in the project. This is in contrast to many projects I have worked on in my early career. • Loved being a part of the [project name] • The attitude and good manners of the team I've worked with has been the highlight. • I've enjoyed working alongside different professions/tradesman and have really enjoyed the family culture this project has developed.
Relationships	• [project name] is such a family orientated project, every single person I have met on this project has made me feel welcome and appreciated, and all people involved here have got each others' backs 100%. • The [project name] is a big whānau [extended family] where you get the respect from everyone. • It's been great, meeting a lot of people. Awesome environment to have the opportunity to work at. • Was a great opportunity to reconnect with old work colleagues and connect with new ones.

the bottom 15% from 7.0 to 19.5 (low).

The statistical significance of the differences in mean sense of place component scores between wellbeing status was tested using a one-way Analysis of Variance. The results are shown in Table 5. Statistically significant differences were found between the mean scores of participants reporting low, medium and high levels of wellbeing for all of the sense of place components with the exception of co-worker support. For the purpose of determining the size of these effects, an effect size (Eta squared) was calculated by dividing the sum of squares between groups by the total sum of squares. According to Cohen (1988) an Eta squared value of 0.1 (1%) reflects a small effect; an Eta squared value of 0.6 (6%) reflects a medium effect and an Eta squared value of 0.14 (14%) reflects a large effect. As can be seen in Table 5, for all of the sense of place components for which a statistically significant between group difference was observed, the effect size was large.

4.6. Themes from open-ended survey questions

At the end of the survey participants were asked two open-ended questions and five themes emerged from the data, as outlined in Table 6. These comprised of teamwork and collaboration, pride in work, enjoyable and safe work environment, sense of belonging and respect, and relationships. For each of the themes, illustrative quotes are provided.

The comments made by participants in response to the open-ended questions reflect that a strong sense of place was experienced at the project. Participants described feeling part of a team, enjoying the collaborative nature of the project, having positive relationships with others at the project and feeling a sense of pride and satisfaction associated with participation in the project. These comments reflect the fact that the sense of place concept is relevant to project workers. Several of the participants' comments also reflect that they perceived that working at the project positively impacted their health and wellbeing.

5. Model testing methods and results: study two

5.1. Sample and methods

In order to validate the sense of place survey instrument, a second study was conducted to determine the stability of the factor structure. Workers from three construction projects were invited to complete a survey. The projects were being undertaken by a large manufacturing organisation in New Zealand. Study two incorporated the six components of the sense of place (as summarised in Table 1). Eighty-eight participants completed the survey. The majority of participants were male (n = 78, 88.6%) and the age of participants was spread across multiple groups: 20 years or under (3.4%), 21–29 years (17%), 30–39 years (26.1%), 40–49 years (28.4%), 50 years and over (20.5%). A further 4.5% of participants did not indicate their age group.

5.2. Exploratory factor analysis

All items from the sense of place survey instrument were subjected to principal axis factoring (PAF) with direct oblimin rotation in study two using a different sample to that of study one. Prior to performing PAF, the suitability for factor analysis was assessed. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) value was 0.769, exceeding the recommended value of 0.6 (Kaiser, 1970; Kaiser & Rice, 1974), the Bartlett's Test of Sphericity (Bartlett, 1954) was significant (p = .000) and the correlation matrix revealed the presence of many coefficients of 0.30 and above, therefore verifying that the data set was suitable for factor analysis. Principal axis factoring analysis (with direct oblimin rotation) revealed the presence of nine components with eigenvalues exceeding 1, explaining 36.6%, 9.6%, 5.8%, 4.6%, 4.4%, 1.0%, 3.9%, 3.3%, and 2.8%. Items that loaded together are indicated in grey shaded boxes in Table 8. In Table 8, loadings less than 0.3 are not reported. Generally, the survey items (questions) loaded as expected, reflecting that the internal structure of the sense of place survey remains theoretically sound when applied to different construction project environments. There was minimal double loading and minimal splintering of the questions into factors that cannot easily be interpreted:

Table 7
Factor analysis of Sense of Place survey items for study one.

	Engagement	Employee resilience	Life balance	Co-worker support	Supervisor support	Respect	Other (1)	Community	Other (2)
I feel more and more engaged in my work	.854								
When I work, I usually feel energised	.663								
Usually, I can manage the amount of my work well	.584								
I always find new and interesting aspects in my work	.441								.328
I can tolerate the pressure of my work very well	.406								
I resolve crises competently at work		.769							
I seek assistance to work when I need specific resources		.735							
I approach supervisors/managers when I need their support		.729							
I successfully manage a high workload for long periods of time		.708							
I effectively collaborate with others to handle unexpected challenges at work		.674		.326					
I re-evaluate my performance and continually improve the way I do my work		.609							
I effectively respond to feedback at work, even criticism		.605							.323
I use change at work as an opportunity for growth		.529							
I manage to balance the demands of my work and personal/family life well			.821						
After working, I have enough energy for my leisure activities			.745						
I am satisfied with my work-life balance			.720						
Nowadays, I seem to enjoy every part of my life equally well			.708						
How much do your coworkers go out of their way to do things to make your work easier for you.				.704					
How easy is it for you to talk to your coworkers?				.660					
How much can your coworkers be relied upon when things get tough at work?				.647					−0.343
How much is your coworkers willing to listen to your personal problems?				.469				−0.338	
How much does your supervisor/manager go out of their way to do things to make your work easier for you.					.802				
How much is your supervisor/manager willing to listen to your personal problems?					.742				
How easy is it for you to talk to your supervisor/manager?					.742				
How much can your supervisor/manager be relied upon when things get tough at work?					.700				
Rude behaviour is not accepted by my co-workers						−0.725			
Angry outbursts are not tolerated by anyone			.434			−0.710			
Respectful treatment is the norm	.407					−0.458			−0.331
My co-workers make sure everyone is treated with respect						−0.379		−0.305	
I learn from mistakes at work and improve the way I do my job		.446					−0.544		
People in the project are good at influencing each other						−0.306	.523		
This is the only type of work that I can imagine myself doing							.407		
I find my work to be a positive challenge	.373						.380		
I feel like I belong at the project								−0.768	
I feel connected to the project								−0.728	
I feel like a member of the project								−0.715	
I feel connected with others in the project								−0.673	
I have a say about what goes on in the project								−0.661	
The project helps me fulfil my needs								−0.591	
I can get what I need from the project						−0.326		−0.476	

Table 8
Factor analysis of Sense of Place survey items for study two.

	1 Community	2 Employee resilience (worker resources)	3 Supervisor support	4 Respect	5 Engagement (vigour)	6 Co-worker support	7 Engagement (dedication)	8 Life balance	9 Employee resilience (organisational resources)
I feel connected with others at the project	.694								
I feel connected to the project	.651								
I have a say about what goes on at the project	.577								
I feel like I belong at the project	.546								
I feel like a member of the project	.517								
I learn from mistakes at work and improve the way I do my job		.808							
I reevaluate my performance and continually improve the way I do my work		.766							
I resolve crises competently at work		.634							
I effectively respond to feedback at work, even criticism		.560							
How easy is it for you to talk to your supervisor/manager?			−0.878						
How much does your supervisor/manager go out of their way to do things to make your work easier for you?			−0.692						
How much can your supervisor/manager be relied upon when things get tough at work?			−0.651						
How much is your supervisor/manager willing to listen to your personal problems?			−0.553						
Angry outbursts are not tolerated by anyone at the project				−0.721					
Rude behaviour is not accepted by my coworkers at the project				−0.612					
Respectful treatment is the norm at the project			−0.325	−0.581					
My coworkers make sure everyone at the project is treated with respect				−0.428			.318		
I can tolerate the pressure of my work very well					.714				
Usually, I can manage the amount of my work well					.675				
When I work, I usually feel energised					.434		.337		
How much can your coworkers be relied upon when things get tough at work?						.738			
How much do your coworkers go out of their way to do things to make your work easier for you?						.715			
How easy is it for you to talk to your coworkers?	.357					.473			
How much are your coworkers willing to listen to your personal problems?	.315					.437			
I always find new and interesting aspects in my work							.698		
This is the only type of work that I can imagine myself doing							.591		
I find my work to be a positive challenge		.307					.326		
Nowadays, I seem to enjoy every part of my life equally well					.302			−0.569	
The project helps me fulfil my needs								−0.535	
At the project, I am satisfied with my work–life balance	.318							−0.468	
I can get what I need from the project								−0.462	
I manage to balance the demands of my work and personal/family life well					.376			−0.421	
I approach supervisors/managers when I need their support									−0.731
I seek assistance to work when I need specific resources									−0.644
I use change at work as an opportunity for growth									−0.631

- As in study one, seven of the eight items measuring *community* were retained in the final solution and one item 'People at the project are good at influencing each other' was excluded as it loaded on a separate factor that could not easily be interpreted. Five of the community items loaded onto one factor (factor 1).
- The *life balance* factor (factor 8) comprised of the same three items reported in study one, along with two community items focused on needs fulfilment ('The project helps me fulfil my needs' and 'I can get what I need from the project'), suggesting this element of community describes a project which enables workers to fulfil their needs in both the work and life domains.
- Seven of the nine *employee resilience* items were retained in the final solution. Unlike study one, the seven items loaded onto two separate factors which is theoretically supported on the basis that resilience is enabled by a combination of personal and work resources. The four resilience items loading onto factor 2 are aligned with personal resources which relate to learning from mistakes, reevaluating performance to continually improve, resolving problems at work competently, and effectively responding to feedback at work. The three resilience items loading onto factor 9 are aligned with work resources that focus on support from managers, seeking assistance when required, and positively responding to change at work. One item, 'I effectively collaborate with others to handle unexpected challenges at work' loaded on a different factor that could not be interpreted in a meaningful way, and one item did not load onto a factor at all ('I successfully manage a high workload for long periods of time').
- As in study one, *social support* split into two distinct factors reflecting support from supervisors (factor 3) and support from co-workers (factor 6), which is acceptable as these two sources of support are theoretically distinct. The four items in each of these social support dimensions loaded as expected.
- As in study one, the four respect items loaded as expected on a single factor (factor 4).
- Six of the eight engagement items were retained in the final solution. Three items measuring the vigour component of engagement loaded onto a factor (factor 5), and three items measuring the dedication component of engagement loaded onto a factor (factor 7). As in study one, one engagement item 'After working, I have enough energy for my leisure activities' cross loaded with the life balance items. One item ('I feel more and more engaged in my work) loaded on a different factor that could not be interpreted in a meaningful way.

The final factor solution consisted of nine components and 35 items. Two items from the engagement scale, two items from the employee resilience scale, and one item from the community scale were excluded (as described above).

The findings of study two are closely aligned with study one, with both solutions consisting of 35 items. Three key differences emerged in the factor structures of study one and study two. The resilience and engagement items each split into two factors, both of which reflect established theoretical dimensions of these concepts (as explained above). The third key difference between study one and study two was the loading of the three life balance items with the two community items focused on needs fulfilment, all of which focus on meeting work and life needs.

Table 9
Cronbach alpha coefficients for the sense of place: study two.

Variable	Items	Cronbach's alpha
1. Community	5	.906
2. Employee resilience: personal resources	4	.863
3. Supervisor support	4	.853
4. Respect	4	.788
5. Engagement: vigour	3	.752
6. Co-worker support	4	.778
7. Engagement: dedication	3	.634
8. Life balance	5	.884
9. Employee resilience: work resources	3	.807

5.3. Internal consistency reliability

The Cronbach alpha coefficients for the nine factors emerging from study two are presented in Table 9. As in study one, the Cronbach alpha coefficients reflect satisfactory internal consistency reliability for all factors, with the exception of the engagement-dedication factor. It's possible that the Cronbach alpha coefficient was impacted by the small number of items comprising the engagement-dedication factor (Cortina, 1993). However, the extent to which this factor should be retained needs to be considered in further testing of the survey instrument.

6. Discussion

6.1. Validity and reliability of the survey instrument

The exploratory factor analysis (EFA) of the survey data revealed a clear factor structure with minimal cross loading of items in both studies one and two, suggesting the sense of place component subscales captured discreet (rather than overlapping) constructs in different project work environments. Thus, the data analysis suggests that the survey instrument appears to have good discriminant validity. Results also revealed that the survey component subscales all had satisfactory internal consistency reliability when used in a project context, with the exception of the dedication-engagement subscale in study two. The findings therefore suggest that the survey instrument developed in this research generally performs in a psychometrically acceptable way when used in a project work environment.

6.2. Social support from supervisors and coworkers

In both studies one and two, the survey items measuring workplace social support split into two distinct factors: one reflecting social support from one's supervisor, and the other reflecting social support from one's co-workers. This is perhaps unsurprising as previous studies have found that the effects of social support on mental health and wellbeing-related outcomes varies depending on the source of social support (Baruch-Feldman et al., 2002). Both supervisor support and co-worker support were positively correlated with the measure of mental wellbeing used in study one. These findings suggest that support from co-workers and supervisors is potentially important for mental wellbeing and therefore work environments in which support is available from multiple sources should be fostered.

6.3. Differences between study one and study two

In study two the survey items further split. The work engagement items split into vigour-engagement and dedication-engagement. This is theoretically sound because existing measures of work engagement (including the Oldenburg burnout inventory) include positively worded items that are aimed to measure engagement as the antithesis to burnout, and conceptualise vigour and dedication as two distinct constructs (Demerouti & Bakker, 2008). These dimensions of work engagement were not distinguishable from one another in study one, which is consistent with previous research that shows that a multi-factor structure for work engagement is not always found (Sonnentag et al., 2003).

Also in study two, the resilience items loaded on two distinct components (reflecting personal and work-enabled resources). This distinction is also theoretically sound and supported by empirical evidence (Hartmann et al., 2020; Mubarak et al., 2022).

These differences in factor loadings indicate that the survey instrument developed in this study can potentially be used to understand

social support, work engagement and resilience in a more granular way than was first anticipated, i.e. capturing different facets of social support, resilience and work engagement, rather than treating these as singular constructs.

6.4. Implications for managing mental wellbeing in projects

The criterion validity of the sense of place survey instrument was reflected in study one in the consistent and significant positive correlation between the subscale scores and the short version of the SWEMWBS measure of mental wellbeing deployed. In addition, significantly different sense of place component scores were found for participants with high, medium and low wellbeing (for all components except co-worker support). Although the study one survey sample size is relatively small, and data was collected from only one project, the findings suggest that measuring the extent to which workers experience the sense of place components is likely to be a good indicator of the 'healthiness' of the project work environment.

The strong and consistent positive relationships between the survey components and the measure of mental wellbeing (in study one) suggest that the survey could usefully be used to help organisations to create more positive and supportive work environments to promote mental wellbeing in projects.

The elimination of risk factors for poor mental health is important in a legal sense. However, the dual continuum theory of mental health suggests that, although a reduction in risk will help to prevent mental ill-health, it may not necessarily promote positive mental wellbeing (Hutton et al., 2022).

While project-based work is not necessarily inherently stressful (as some have previously claimed), neither is it inherently health-promoting. The extent to which project-based work can be experienced as health-promoting is likely to depend very much on the quality of project management and the resulting work environment (Darling & Whitty, 2019). Given the particular challenges inherent in project work associated with the temporariness of projects and the 'ambiguous belongings' experienced by project workers (Borg & Söderlund, 2014), a sense of attachment and wellbeing may need to be actively fostered.

Much previous research has focused on the factors that adversely affect the mental health of project workers. However, there is relatively little research in which health-promoting interventions have been developed and robustly evaluated. The sense of place survey tool can potentially be used by researchers to inform the development of interventions designed to improve the mental wellbeing of project workers, as well as to measure the extent to which these interventions are effective in improving the 'healthiness' of a project work environment.

The focus of the survey instrument on characteristics of the work environment goes beyond much of the existing literature that focuses on individual workers' coping strategies. There is a strong preference for the implementation of primary interventions that make workplaces healthier. These are contrasted with secondary interventions that alter the way that workers perceive or respond to job adversity or tertiary interventions treat and rehabilitate workers whose health has been affected by work (LaMontagne et al., 2007). The survey instrument developed and tested in this research can assist organisations to develop targeted and effective primary interventions to help them to foster a health-promoting project work environment.

6.5. Limitations

The current study was limited to the extent that testing was performed in construction projects in a single geographical location (New Zealand). It is recommended that further testing examine the performance of the model and survey instrument in projects of different sizes and types. Further testing should also include longitudinal data collection to ascertain the direction of relationships between the sense of place survey components and mental wellbeing and to test for causality. The extent to which the sense of place survey components measured at one point in time are able to predict mental wellbeing at a subsequent point in time could then be ascertained. This would enable the usefulness of the survey instrument as a 'leading' indicator of mental wellbeing to be determined. The survey instrument should also be tested amongst project workers in industries other than construction to ascertain the extent to which the concepts and their relationships to mental health apply in other projectised industries.

7. Conclusion

The research developed and tested a survey instrument designed to measure characteristics of a project work environment that have the potential to promote positive mental wellbeing amongst workers. The survey instrument was tested in two separate studies and found to perform well in two different project contexts. The component measures included in the survey instrument demonstrated good discriminant validity and internal consistency reliability. The criterion validity of the survey instrument was evident in strong and consistent positive correlations with a measure of mental wellbeing. The survey instrument appears to be a robust and useful measurement tool that can help be used by researchers and project management teams to inform the development of health-promotion interventions that target the project work environment, rather than individual worker behaviours.

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