Comparative Assessment of the Mental Health of Traditional and Prefabricated Construction Workers

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Abstract

The construction industry has made significant improvement on health and safety performance, but construction workers still suffer from poor mental health and are susceptible to suicide ideation. Although useful, mental health improvement programmes, such as awareness campaigns and counselling, fail to address the stressors that are deeply rooted in the nature of the construction industry and its traditional ways of working. Prefabricated construction, which is the offsite assemblage of project components in a controlled environment before their installation on site, has the potential to reduce the impact of the stressor-inducing nature of the traditional construction. To assess the relevance of prefabrication to mental health improvement, traditional and prefabricated construction workers in Australia were surveyed to capture their stressors and poor mental health symptoms. Prefabricated construction participants reported significantly less exposure to stressors such as work-related criticisms, fatigue or tiredness, and poor working conditions, than the traditional construction workers. Furthermore, traditional construction workers exhibited significantly higher symptoms of burnout and depression such as loss of interest in life, feelings of unhappiness, and depression than their prefabricated construction counterparts. Therefore, the findings of this study show the stressor-reducing potential and mental health improvement quality of prefabrication, if properly planned, implemented, and managed.

Keywords: construction workers, mental health, stressors, prefabricated construction, traditional construction.

1. INTRODUCTION

Poor health and safety remain serious problems in the construction industry. However, there is a noticeable change in the causes of construction-related deaths from site accidents to work-related diseases including psychological and mental ill-health (International Labour Organization, 2020). Most past studies focused on the stressors of mental health among construction workers of certain demographics without paying adequate attention to the stressors that are influenced by the nature of construction and its conventional work environments and practices. Lingard and Turner (2015) focused on tradespeople or blue-collar workers while Frimpong et al. (2023) studied the mental health conditions of young construction workers. Other construction workers classifications for past mental health studies include cultural backgrounds, migration, or citizenship status in the country of practice, and the gender of the workers (Sunindijo and Kamardeen, 2017). In terms of work practices, mental fatigue and psychological pressure were also linked to the excessive usage of industry 4.0 technologies despite proven performance benefits of digital technologies in construction (Fagbenro, Oyediran and Onososen, 2022). Previously, Fagbenro et al., (2023) developed a theoretical framework to demonstrate the potential influence of adopting prefabricated construction methods on improving the mental health of construction workers. Built on past research, this paper empirically verifies the benefits of prefabrication on mental health.

2. LITERATURE REVIEW

Several studies on the mental health of construction workers have identified various stressors although, less attention has been paid to classifying them. This could be the reason why major intervention initiatives, such as MATES in Construction and Life Care Skills Program, have been reactive rather than being proactive. Recent studies have begun to classify the stressors and, this could be a step in the right direction to tackling the mental health challenges appropriately by moving towards prevention at work rather than pushing the agenda of coping, seeking help, speaking up, and other reactive steps that are commonly recommended to already distressed workers. Fagbenro et al., (2023) classified stressors of mental health into 3 overarching categories: industry-related, management/organisational, and personal stressors. All stressors that are intrinsic to or are borne out of the nature of the construction industry are grouped under industry-related and, are deemed to be the most influential stressors. These stressors influence the other two groups but are typically not influenced by others. This group represents a combination of stressors categorised as job control, job demand, and work hazard stressors by Chan, Nwaogu, and Naslund (2020) and task and physical stressors by Tijani, Jin, and Osei-kyei (2020). Management/organisational stressors, on the other hand, emanate from management's responses to challenges posed by the nature of the construction business and industry. They are experienced because of the existence of industry-related stressors and they, in turn, rub off negatively on the workers leading to personal stressors. Therefore, every move to reduce the industry-related stressors could wean off management and personal stressors and by implication, improve the mental health of construction workers.

2.1. Mental Health Stressors in Traditional Construction

Common causes of poor mental health for workers in traditional construction projects are work pressure, prolonged isolation from family and friends, long working hours which usually lead to physical and mental fatigue. As construction is usually being executed under tight schedule, unhealthy increase in work speed of cognitively demanding tasks expose the workers to poor psychological working conditions and physical injuries or musculoskeletal pains and disorders. These and other stressors that are deeply rooted in the business nature of traditional construction (Sunindijo & Kamardeen, 2017) are classified as industry-related by Fagbenro et.al. (2023). The industry-related stressors aggravate and sometimes, initiate the experience of management and personal stressors like work overload, discouraging shift rosters, and lack of involvement in decision making all of which breed other stressors such as communication breakdown, interpersonal conflicts, bullying, and work-life disharmony, among others (Sunindijo & Kamardeen, 2017; Chan et al., 2020; Tijani et al. 2020; Fagbenro et al. 2023).

2.2. Potential Positive Influence of Prefabrication on Workers' Mental Health

To achieve improved mental health for construction workers, Lingard and Turner (2015) propose changes to the nature, culture, and the traditional ways of working conditions in the industry. This, if well implemented, may reduce the chances of occurrence of many stressors, especially the industry-related stressors, which are the sources of physical and psychological pains that are habituated with construction (Ajslev et al., 2013). By virtue of the better health and safety, cost, and time performance of prefabrication, it has a significant potential to positively impact the mental health of construction workers and significant reduction in pressure common with the traditional in-situ construction through construction processes standardisation (Gibb, 2001). With prefabrication, total project time is reduced because of the availability of ample design time, simultaneous site preparation and offsite components manufacturing which could lead to less onsite trade overlap, improved productivity (Court et al., 2009), and reduction in work pressure, unhealthy work speed, fatigue, long working hours, work overload, and unfavourable shift rosters all of which are impacted by unpredictability of conventional construction time. Reducing the impact of these stressors could enhance the work-life balance of workers and brighten their chances of pursuing further career-enhancing trainings to improve their job security prospect, socioeconomic, and financial status (Fagbenro et al., 2023). With standardisation

and repetitiveness of processes guaranteed, design-related communications and instructions could become clearer which in turn, could reduce the frequency of work-related interpersonal conflicts and workplace harassment. Furthermore, the imbalance gender ratio of construction site workers could be challenged with proper implementation of prefabrication because it could attract more women into onsite roles as the method involves lesser degree of manual handling and more mechanisation than the conventional construction approach. Mental and other consequences of poor safety records of construction could be challenged by the better health and safety performance of prefabrication fostered by reduced onsite trade overlap and unsafe site congestion (Court et al., 2009).

3. RESEARCH METHOD

This study compares mental health stressors and poor mental health symptoms of traditional and prefabricated construction workers. Questionnaire (paper and online) survey was used to elicit information from 39 and 33 traditional and prefabricated construction workers (tradespeople and professionals) respectively, from 3 Australian states of New South Wales (NSW), Queensland, and Victoria. Aside from the participants' general information section, the questionnaire contained 2 more sections with one measuring mental health stressors (35 variables) and the other assessing poor mental health symptoms (8 variables) on a 7-point Likert scale ranging from "Never" to "Always" representing 1 to 7. Collected data were subjected to mean scores to summarise the data, and independent samples t-test to assess the significance between the mean scores of the 2 categories of participants, on the variables examined.

4. DATA PRESENTATION AND ANALYSIS

4.1. Mental Health Stressors

Generally, prefabricated construction workers fare better as the participants reported less severe exposure to the stressors than their traditional construction counterparts. Fatigue or tiredness, IR6 *($p = 0.032$)* and poor working conditions, IR10 *($p = 0.014$)* are the industry-related stressors with statistically significant difference in their means. Five of the twelve management stressors, which are inadequate provision of job resources, MS2 ($p = 0.039$), unclear supervisor's/management's directions, MS3 ($p = 0.029$), poor communication of instructions and ideas, MS4 ($p = 0.017$), undue and excessive criticisms, MS8 ($p = 0.049$), and poor workers' support mechanism, MS11 ($p = 0.048$) showed statistically significant differences between the means of traditional and prefabricated construction participants. Age discrimination, PS1 *($p = 0.011$)* and lack of opportunities for further learning, PS6 *($p = 0.005$)* were the personal stressors with statistically significant differences between their means. Detailed results of the mean scores, ranks, and p-values of the independent samples t-test are shown in Table 1.

Table 1: Mental Health Stressors

SN	Mental Health Stressors	Traditional		Prefabrication		Overall		p-value	Sig
		Mean	Rank	Mean	Rank	Mean	Rank		
IR	**Industry-Related Stressors**								
IR1	Work pressure	5.23	1	4.94	1	5.10	1	0.344	No
IR2	Long working hours	4.90	2	4.79	2	4.85	2	0.738	No
IR3	Psycho-social isolation (from family and friends)	3.87	6	3.45	6	3.68	6	0.239	No
IR4	Bodily or musculoskeletal pain	3.44	7	3.33	7	3.39	7	0.783	No
IR5	Physical injuries from work incidents	2.62	12	1.97	12	2.32	12	0.064	No
IR6	Fatigue or tiredness	4.87	3	4.06	3	4.50	3	0.032	**Yes**
IR7	Unhealthy increase in work speed	4.36	5	3.88	4	4.14	5	0.213	No
IR8	Work-related physical illness	2.95	9	2.27	9	2.64	10	0.062	No
IR9	Job insecurity	2.87	11	2.45	8	2.68	8	0.308	No
IR10	Poor working condition	2.95	9	2.12	11	2.57	11	0.014	**Yes**

SN	Mental Health Stressors	Traditional		Prefabrication		Overall		p-value	Sig
		Mean	Rank	Mean	Rank	Mean	Rank		
IR11	The stigma or discrimination attached to mental health	2.97	8	2.27	9	2.65	9	0.110	No
IR12	Job mental (cognitive) demand	4.38	4	3.88	4	4.15	4	0.245	No
MS	**Management/Organisational Stressors**								
MS1	Interpersonal conflicts with junior and senior colleagues	3.54	5	3.00	3	3.29	4	0.188	No
MS2	Inadequate provision of job resources	3.85	2	3.03	2	3.47	2	0.039	**Yes**
MS3	Unclear supervisor's/management's directions	3.49	6	2.72	6	3.14	6	0.029	**Yes**
MS4	Poor communication of instructions and ideas	3.82	3	2.94	4	3.42	3	0.017	**Yes**
MS5	Unfavourable shift rosters	2.69	11	2.06	12	2.40	11	0.085	No
MS6	Technology overload e.g., BIM, drones, etc.	2.62	12	2.15	11	2.40	11	0.187	No
MS7	Work overload	4.33	1	3.70	1	4.04	1	0.112	No
MS8	Undue and excessive criticism	3.33	8	2.55	9	2.97	8	0.049	**Yes**
MS9	Lack of task autonomy	3.15	9	2.55	9	2.97	8	0.107	No
MS10	Lack of participation in decision-making	3.15	9	2.60	8	2.90	10	0.156	No
MS11	Poor workers' support mechanism	3.44	7	2.61	7	3.06	7	0.048	**Yes**
MS12	Poor feedback mechanism	3.59	4	2.91	5	3.28	5	0.096	No
PS	**Personal Stressors**								
PS1	Age discrimination	2.87	3	1.88	8	2.42	4	0.011	**Yes**
PS2	Gender discrimination	2.05	11	2.00	7	2.03	11	0.889	No
PS3	Workplace harassment	2.21	10	1.85	10	2.04	10	0.273	No
PS4	Financial difficulties	2.79	4	2.48	2	2.65	3	0.390	No
PS5	Low socio-economic status	2.36	7	2.03	6	2.21	7	0.378	No
PS6	Lack of opportunities for further learning	3.15	2	2.15	4	2.69	2	0.005	**Yes**
PS7	Poor work-life balance	4.18	1	3.48	1	3.86	1	0.108	No
PS8	Language barriers	2.49	6	2.09	5	2.31	6	0.328	No
PS9	Racial discrimination	2.28	8	1.88	8	2.10	8	0.247	No
PS10	Cultural values conflicts	2.62	5	2.18	3	2.42	4	0.270	No
PS11	Religious values conflicts	2.28	8	1.82	11	2.07	9	0.176	No

N=72; 1 = Never; 2 = Rarely; 3 = Occasionally; 4 = Sometimes; 5 = Often; 6 = Usually; 7 = Always; Sig.=Significance

4.2. Mental Health Conditions of Construction Workers

The state of mental health of the participants was also assessed with 8 variables that were adapted from the SF-36 questionnaire health survey. A comparison of the mean scores of the experience of the traditional and prefabricated construction participants revealed that the latter group fare better than the former. Significant differences between the means, with prefabricated construction workers having lower scores, were recorded for 3 variables which are feeling less interested in life, MH5 *(p = 0.044)*, feeling so down in the dumps (unhappy) that nothing could cheer you up, MH7 *(p = 0.004)* and feeling downhearted and depressed, MH8 *(p = 0.006)*.

Table 2: Mental Health Conditions of Construction Workers

SN	Mental Health Conditions	Traditional		Prefabrication		Overall		p-value	Sig.
		Mean	Rank	Mean	Rank	Mean	Rank		
MH1	Cut down on the amount of time you spend on work or other activities to improve your emotional health	3.23	6	3.21	2	3.22	3	0.958	No
MH2	Accomplished less than you would like	3.87	1	3.39	1	3.65	1	0.131	No
MH3	Didn't do work or other activities as carefully as usual	3.44	3	3.06	3	3.26	2	0.281	No

SN	Mental Health Conditions	Traditional		Prefabrication		Overall		p-value	Sig.
		Mean	Rank	Mean	Rank	Mean	Rank		
MH4	Emotional problems interfere with your normal social activities with family, friends, neighbours, or groups	3.38	4	2.91	4	3.17	5	0.177	No
MH5	Feeling less interested in life	3.31	5	2.45	6	2.92	6	0.044	**Yes**
MH6	Feeling very nervous	3.51	2	2.79	5	3.18	4	0.081	No
MH7	Feeling so down in the dumps (unhappy) that nothing could cheer you up	3.23	6	2.09	8	2.71	8	0.004	**Yes**
MH8	Feeling downhearted and depressed	3.25	6	2.15	7	2.74	7	0.006	**Yes**

N=72; 1 = Never; 2 = Rarely; 3 = Occasionally; 4 = Sometimes; 5 = Often; 6 = Usually; 7 = Always; Sig.=Significance

5. DISCUSSION OF FINDINGS

The significant lower experience of fatigue or tiredness corroborates the benefits and capabilities of prefabrication to reduce manual handling and wasted labour effort in construction (Sunindijo, Wang and Haller, 2023). Also, the experience of better working conditions by prefabricated construction workers aligns with safer working environment in prefabrication through easier identification of safety hazards (Gibb, 2001), reduction in dangerous working postures, and availability of convenient spaces for safe fabrication of building components and modules (Pasquire, Gibb and Blismas, 2005). The better faring of prefabricated construction workers in interpersonal relationships, through improved roles clarity which could in turn reduce work-related criticism and bullying (Fagbenro et al., 2023), confirms the benefit of prefabrication to improve construction quality and labour efficiency through process and product standardisation (Gibb, 2001). The significantly lower exposure to age-related and gender-based stressors by prefabricated construction workers conforms with hypothesized impacts of process standardisation (Gibb, 2001) through the enhancement of ideas and information exchange among workers, enhanced task understandings, and reduced task-induced bullying and harassment especially, for young and female workers. Furthermore, lower score of gender-based discrimination in prefabrication corroborates the method's benefit of providing favourable working conditions for women through significant reduction in manual handling and physically demanding tasks (Fagbenro et al., 2023). Prefabricated construction workers have more opportunities for further learning and career advancement because of the benefits of reduced workload and work pressure (Chan, Nwaogu and Naslund, 2020) through enhanced productivity, faster project delivery, and significantly less weather dependent construction (Gibb, 2001). Exhibition of significantly lower symptoms of anxiety, burnout, and depression among prefabricated construction workers confirms mental health-improving quality of prefabrication (Fagbenro et al., 2023). Prefabrication reduces body and musculoskeletal pains, both of which are linked to adjustment disorders (Turner and Lingard, 2020), by employing ergonomically compliant tools.

5.1. Limitation of the Study

The number of construction professionals is disproportionately higher than the tradespeople among the participants. Although the study compares the mental health of traditional and prefabricated construction workers, it did not consider the occupation of the participants as this might influence the workers' experience of the stressors and the mental health symptoms.

6. CONCLUSIONS

This paper examines the impact of adopting prefabrication on improving the mental health of construction workers. The study confirms the capability of prefabrication to significantly reduce fatigue in workers, promote better working conditions, adequacy of job resources, foster clear communication of instructions and ideas from supervisors and managers, reduced criticism, and better workers' support mechanisms. It was also found that proper implementing of prefabrication could reduce task-induced age discrimination and promote opportunities for further learning through reduced workload and pressure. Furthermore, the results showed that prefabricated construction workers were less likely to suffer anxiety or burnout or depression than traditional construction workers.

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