

## Exploring construction employees' perspectives on the potential causes of psychological health conditions in the construction industry: A study in Ghana.

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Psychological ill-health conditions have become prominent among construction employees. This study aims to identify construction work-related factors that are likely to expose construction employees to psychological ill-health conditions. To achieve this aim mixed-methods approach was adopted, with the methods of qualitative focus group study first employed to derive unique findings from the experiences, perceptions, and opinions of the research participants. A 42-item inventory scale on construction work-related psychological risk factors was developed from the 16 focus group discussions held in Ghana. A comparative survey with 300 construction professionals and construction trade workers was then conducted in Ghana to confirm the findings from the qualitative study and to determine the critical risk factors. The most critical factors ranked by the construction professionals and construction trade workers were tight deadline pressures, and abusive/over-demanding supervision, respectively. Exploratory factor analysis employed revealed seven constructs of the 42 construction work-related risk factors, namely: high task demands, high role demands, poor relationships, poor work conditions, lack of autonomy, lack of feedback, and unfair treatments. Further analysis also revealed a positive correlation between all the factors and psychological health indicators. This study provides valuable insight into the development of preventive psychological health interventions for the construction industry globally.

**Keywords:** Occupational psychology; Psychological risk-factors; Work factors; Construction Industry; Construction Employees.

### Introduction

The construction industry is generally project-driven, and stakeholders usually place a high emphasis on the project being delivered on time, to a required quality standard and within budget (Dallasega, et. al., 2018; Bowen, et. al., 2014). Construction work is thus, usually associated with rapid working pace, dynamic tasks, high risks works, and complicated interpersonal working relationships, which can affect the psychological health of the construction employees (CIOB, 2006; Chan, et. al., 2012). The nature of the construction work and working environment also could expose employees of the construction industry to the risks of psychological disorders or poor health conditions, with effects on their level of efficiency

(Chakraborty, et. al., 2018; Marmot and Wilkinson, 2006). A previous study conducted by Leung, et. al., (2017) advocated that various risk factors that emanate from construction work can induce psychological disorders for construction employees, which could even lead to accidents at the workplace.

The construction industry in Ghana and many other developing countries could be stressful due to the fact that the nature of the industry is dynamic, uncertain, and coupled with transient workers (Fordjour and Chan, 2019; Ibem, et. al., 2011; Enshassi, et. al. 2016). For instance, it was revealed in a study conducted by Fordjour and Chan (2019) that psychological health conditions such as stress, anxiety, depression, and cardiovascular diseases were prevalent among the Ghanaian construction employees. Indicators of psychological health conditions could be categorized under physical, mental, and emotional symptoms (American Psychiatric Association, 2013). Previous studies have revealed that the level of productivity and job performance of construction employees could be affected by the various forms of psychological health conditions or disorders (Leung and Chan, 2012; Chan, et. al., 2012). Other effects of psychological disorders on employees also include ineffectiveness, poor communication, absenteeism, low morale, high job turnover, poor work relations, poor organizational climate and accidents in the construction workplace (Leung, et. al., 2017; O'Donoghue, et. al., 2016). The impact of construction employees' psychological disorders could, therefore, have both direct and indirect costs to the construction industry (Bowen, et. al., 2014).

It is imperative to conduct a study to investigate the critical construction work-related risk factors that are likely to influence the psychological health conditions of construction employees. The research on occupational psychology in the construction literature is still underexplored and limited, with a lot of research gaps to fill. Much of the study focuses on a single psychological health condition such as stress and explore factors from mainly the perspective of the construction project team members (Bowen, et. al., 2014; Leung, et. al., 2017). Little research attention is given to the construction trade workers who are likely to be more vulnerable to psychological health conditions as a result of their work (Chan, et. al., 2016). Exploring the perceptions of both construction professionals and construction trade workers would provide valuable insights on how such perceptions tie with their opinions on the responsibility for their psychological health conditions (Liang, et. al., 2018). No study was found that had conducted a comparative study between construction professionals (such as Architects, Engineers, Quantity Surveyors, and Construction Managers) and construction trade workers (such as Masons, Plumbers, Carpenters, Electricians, and Welders). This research study, therefore, sought to address these knowledge gaps by exploring the construction work-related factors associated with the psychological health of both construction professionals and construction trade workers. A comparative analysis of the results obtained from these two construction groups will also provide some insight into the factors that are critical to each working group.

Few studies of this nature have also been conducted in the developing countries, with many of these studies been conducted in the UK, China, Australia, Canada and others (Enshassi, et. al., 2016; Leung, et. al., 2017; Wang, et. al., 2017; Liang, et. al., 2018). No studies of this nature have been conducted in the construction industry of Ghana, which warranted Ghana to be selected as the geographical setting for this study. The validity and credibility of the findings from the study were assured by adopting a mixed-methods approach, employing first qualitative research approach then confirming the findings with a quantitative research strategy.

## **Background of Study**

Psychological health conditions such as stress, burnout, workaholism, depression, and anxiety, generally occur when construction employees encounter disparities between their job requirements and their ability to cope with these requirements (O'Donoghue, et. al., 2016). High job demands have been recognized widely to lead to the psychological disorders of employees (Wang, et. al., 2017; Bowen, et. al., 2014). Construction employees who are unable to control their work environment and job demands are likely to experience psychological disorders (European Agency for Safety and Health at Work, 2009). Work-related psychological health risks such as role stress or role strain often trigger responses from individuals, as efforts to cope with or manage the work factors (Harkness, et. al., 2005). Maladaptive coping strategies such as drinking alcohol, use of drugs, and poor sleeping habits adopted by the construction employees to self-manage their psychological health could have detrimental effects on the behavioural and organizational outcomes of the construction industry (Fordjour, et. al., 2019a; Chan, et. al., 2012). Work-related psychological risk factors could, therefore, impact the performance of construction employees and deteriorate their health, especially when they are unable to develop appropriate measures to moderate the effects of the symptoms of psychological disorders (McTernan, et. al., 2013). The adverse work factors could also cause psychological and physiological health problems for construction employees if not managed well (Duncan, 2005).

Previous studies have revealed work-related factors associated with construction employees' psychological disorders which include: job insecurity, high working pace, quantitative work overload, qualitative work overload, unclear roles in the organization, inflexible working schedules, unpredictable or irregular working hours, poor communication, lack of team participation, poor interpersonal working relationships, home and work conflicting demands and poor career development (Bowers, et. al., 2018; Leung, et. al., 2017; Senaratne and Rasagopalasingam, 2017; Chan, et. al., 2016; Cattell, et. al., 2016; Bowen, et. al., 2014). Aside from these factors, other construction work-related factors may be significant predictors of the psychological disorders of construction employees. The sources of occupational psychological distress are complex, dynamic and multivariate (Cattell, et. al., 2016); therefore, a multilevel perspective considering other geographical settings is essential. This study, therefore, seeks to explore from the perspective of the construction employees the critical construction work-related risk factors that can affect their psychological health and well-being. The perception of the construction employees is essential to identify and address any concern, that might be ignored by preconceived measures already established by earlier researchers without considering other variants such as different areas of context (Dadzie, 2013). The perspective from qualitative research approach provides an understanding and explanation of the reasons why people have diverse experiences instead of seeking for fundamental laws and external causes to explain people's behaviour (Easterby-Smith et. al., 2008).

## **Research Methodology**

A mixed-methods approach was adopted to obtain the required information for this study; thus, primary data collections using focus group study and questionnaire surveys were adopted. The qualitative nature of the focus group method adopted was intended to provide some unique findings, derived from the experiences, perceptions, and opinions of the research participants. The sixteen (16) focus group discussions revealed forty-two (42) items as construction work-related factors likely to influence the psychological health conditions of construction employees. The results from the qualitative data were used to develop the questionnaire for the

quantitative study. The quantitative research study was intended to measure the criticality of the construction work-related psychological risk factors identified and to identify the differences in the ratings of the factors among the two construction groups of respondents. The quantitative study was also used to assess the psychological health status of the respondents and analyse the correlation between the factors identified and the psychological health of the respondents.

Purposive sampling method was employed under non-probability sampling techniques for selecting the research participants for both the qualitative and quantitative study. This sampling technique was more preferred since the population was undefined and indefinite. A non-probability method of sampling is also fast in its approach and has a relatively cheap cost associated with the method of data gathering (Norusis, 2001). The research participants were selected on the basis that (1) they have some work experiences in a Ghanaian construction company and (2) they belong to either a construction professionals' group or a construction working trade. Employees that comprised of the construction professionals group include engineers, architects, quantity surveyors, supervisors, contractors, construction managers, and project managers. The construction trade working group included: masons, carpenters, plumbers, steel benders, and others.

#### *Ethical Considerations*

Every research requires that the researcher gives attention to appropriate research ethics, and this study is not an exemption. Voluntarily, respondents were allowed to take part in the study out of their free will. The prospective respondents were assured that the study result would not place any respondents at risk of civil or criminal liability nor damage respondents' employability, financial standing, or reputation. Anonymity and personal information of the participants were treated with confidentiality. Consent forms were also used to assure the participants of the confidentiality of their responses.

#### *The Qualitative Study*

Previous studies that relate to construction work factors associated with occupational psychology are usually based on a quantitative framework in the literature. This study first adopted the use of qualitative research design employing the methods of a focus group study to obtain some unique findings. A total of 16 focus group discussions were held in Ghana, with 90 construction employees, which comprised of 45 construction trade workers and 45 construction professionals. The focus group discussions were used to gather the research participants from 21 construction organizations registered under the Kumasi and Accra Metropolis of Ghana. Open-ended questions were employed for the exploratory nature of the qualitative research study. The respondents were first asked to indicate whether they have experienced some form of a psychological health condition such as stress, depression and anxiety as a result of their work. This question was used to determine whether the research participants have had a personal experience of psychological health and were appropriate respondents for the study. All the 90 research participants had indicated they had experienced some form of psychological health condition and were in a good position to contribute to the discussion.

The research questions for the focus group discussions were: (1) What are the issues regarding your job that make you experience psychological health conditions such as stress, anxiety, or depression? (2) What are the environmental conditions that lead to your psychological health

conditions? and (3) What are the working relationship issues that lead to your psychological health conditions? Each focus group comprised of a minimum of five (5) and a maximum of seven (7) participants and was led by a moderator. The construction trade workers consisted of employees such as carpenters, masons, welders, steel benders, painters, and electricians. The construction professionals also consisted of architects, contractors, engineers, and quantity surveyors. Ground rules with emphasis on equal voice of each participant, free allowance for objections and alternative suggestions were established for a quality data collection of the focus group study. The data from the focus group study were collected through various means such as individual worksheets, audiotape recording, and note-taking. Each focus group discussion lasted for a maximum of 1 hour.

### *Results from the Focus Group Discussion*

The sixteen (16) focus group discussions generated sufficient data. The individual responses, audiotaping, and group discussion were put together and summarised as the responses from the unit focus group. The data obtained from the focus group discussions were analysed using NVivo software to derive themes and meanings. The qualitative data analysis revealed forty-two (42) items as construction work-related factors likely to expose construction employees to psychological health conditions.

### *The Quantitative Survey Method*

This study sought to measure the criticality of the construction work-related psychological risk factors identified from the focus group study. To achieve this aim, a target of 300 questionnaires were purposively distributed to 150 construction professionals and 150 construction trade workers in Ghana. The target population for the study was 32 construction firms who were registered with the Kumasi and Accra Metropolitan Assembly. The construction firms belong to either one of the four construction works classification groups in Ghana, and these are D1K1, D2K2, D3K3, and D4K4 construction industries. The large-scale construction firms belong to D1K1; the medium-scale construction firms belong to D2K2 or D3K3, and the small-scale construction firms belong to D4K4 works classification. To achieve the target of 300 questionnaires, structured questionnaires of about 10 in number were distributed face-to-face to the respondents in all the 32 construction firms. The distribution of the questionnaires was done based on the non-probability sampling approach adopted for the study, to achieve the target number of respondents.

### *Questionnaire Design*

The questionnaire for this study had two sections, 1) scales to determine the psychological health status of the respondents and 2) scales to validate the factors identified from the qualitative study as significant. The measures for the psychological health indicators were developed from existing validated questionnaires by researchers such as Leung, et. al., 2017; Enshassi, et. al, 2016; O'Donoghue, et. al., 2016; and Magotra, 2016. Whilst the measures for the construction work-related factors were developed from the qualitative study. The questionnaire consisted of closed-ended questions that focused on the subject matter and aimed to cover the objective of the research. A Likert scale ranging from 1 to 5 was used to determine the level of frequency of psychological health indicators and the level of significance of the factors presented in the questionnaire. For the psychological health indicators, the respondents were requested to indicate the level of frequency of their experience of psychological health indicators, using the following frequency qualifications were used 'Very frequently (that is,

more than 2 times a day) rated as 5 points, 'Frequently (that is, 1 to 2 times a day)' rated as 4 points, 'Occasionally (that is, 2 to 3 times a week)' rated as 3 points, 'Rarely (that is, 2 to 3 times a month)' rated as 2 points, and 'Not at all' rated as 1 point. The respondents were also requested to indicate the level of impact the factors were to affect their psychological health, using the following qualifications: 'Very High' rated as 5 points, 'High' rated as 4 points, 'Moderate' rated as 3 points, 'Low' rated as 2 points, and 'Very Low' rated as 1 point.

### *The Hypotheses for the Study*

Some statements were systematically created and tested to establish whether there is a relationship between two or more variables and to determine whether the hypothesis tested should be rejected or not rejected.

For this study, the hypotheses tested were:

1. Assume there is no statistically significant factor measured as construction work-related psychological risk factors.
2. Assume there is no statistically significant difference between the mean scores of the factors from the construction professionals' group "a" and construction trade workers' group "b".
3. Assume there is no positive correlation between the construction work-related psychological risk factors and psychological health indicators.

The value of the test statistics was 0.05.

If the  $p\text{-value} \leq 0.05$ , this means the difference in the mean scores is statistically significant, and hence, the null hypothesis will be rejected, and the alternative hypothesis considered.

If the  $p\text{-value} \geq 0.05$ , this means the difference in the mean scores is not statistically significant, and hence, the null hypothesis will not be rejected.

### *Data Analysis of the Quantitative Study*

The quantitative data collected were organized and coded and subjected to analysis using the Statistical Package for Social Scientists, version 19. The study utilized both descriptive and inferential statistics in analyzing the data, to draw conclusions from them. Descriptive statistics of mean and standard deviation were used to describe the frequency distribution of the data collected. Inferential statistics were adopted to interpret the data and for conclusions to be drawn that extended beyond the immediate data. One sample T-test was used to measure the level of significance of the factors as determined by all the respondents. Blom's fractional rank estimation method was used to assess whether the data obtained from the two construction working groups were normally distributed for all variables (Lo, 2018). Independent two-sample T-test was used to assess whether the means of the construction professionals' group statistically differed from the means of the construction trade workers group. This form of analysis was appropriate for comparing the means of two groups from which the samples are normally distributed (Norusis, 2001). Levene's Test for equality of variances was adopted for the independent two-sample test.

The ranking of the factors in the order of most critical factor was done to identify the critical factors and also to identify the differences in the ratings of the factors by the two construction groups. To determine the ranks of the various measures as determined by each construction working group, relative importance index (RII) was calculated using the method recommended by Enshassi, et. al. (2016).

The RII formula is as follows:

$$RII = \frac{\sum w}{H \times N_{\%100}}$$

where:

w = the weighting given by the respondents from the scale of 1 to 5.

H = 5, the highest of the weighting

N = total number of respondents in each construction working group (150 each).

Exploratory factor analysis was done to group the variables into constructs that have the same phenomena (Enshassi, et. al., 2016). To determine whether the data were suitable for factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling was utilized. Bartlett's test of sphericity was used to determine the multivariate normality of the variables measured. Principal component analysis method and varimax rotation method was utilized for the extraction analysis. Cronbach's alpha was used to test the reliability and internal consistency of the variables grouped under each of the themes. The alpha value ranges from zero to one. Reliability or internal consistency is considered unacceptable unless it is 0.7 or above (Norusis, 2001). Correlation analysis was used to investigate the strength and direction of the relationships between the construction work-related psychological risk factors and psychological health indicators (namely Physical Symptoms, Emotional symptoms, Cognitive Symptoms and Behavioural Symptoms). The significant p-value was set on the 0.05 or 0.01 level.

### *Results of the Quantitative Study*

Quantitative study was employed to confirm the findings from the qualitative study as statistically significant factors that can influence the psychological health of construction employees. The results from the descriptive analysis, one-sample T-test analysis and ranking of the factors have been shown in Table 1. The 42 identified construction work-related psychological risk factors were to be reduced into major constructs by employing exploratory factor analysis. For exploratory factor analysis, it is recommended that the Kaiser-Meyer-Olkin (KMO) value should be greater than 0.50 (Enshassi, et. al., 2016). The Chi-Square value using Bartlett's Test of Sphericity should also have a significant value of 0.05 or less (Norusis, 2001). The results of the measure of sampling adequacy using Kaiser-Meyer-Olkin (KMO) was 0.913, the results of sphericity using Bartlett's test and the approximate Chi-Square value, had a significance value of 0.000. The test results confirm that factor analysis was appropriate for the analyses of the data and depicted that the results of the data can be relied on. Exploratory factor analysis revealed that seven constructs existed among all the 42-construction work-related psychological risk factors. The total number of constructs extracted was based on Eigenvalues greater than 1. The cumulative total variance of the seven constructs extracted was about 79%. The seven constructs developed were: task demands, role demands, poor interpersonal work relationships, poor work conditions, lack of autonomy, lack of feedback, and unfair rewards/treatment. The internal consistency and reliability of the construct were good, as the Cronbach alpha value for all the constructs were above 0.7. Table 1 also presents the reliability analysis of the extracted constructs and the values of the Cronbach alpha of each item if it is deleted from a construct.

**Table 1: Statistical results of construction work-related psychological risk factors**

| S/N  | Construction work-related psychological factors            | Mean  | Rank             | Group RII (%)                     | Sig. (Equal) | Group Rank                              | Cronbach alpha |
|--|--|-------|------------------|-----------------------------------|--------------|---|----------------|
| <b>Construct 1: Task demands</b>                             |  |       |                  |                                   |              |   | <b>0.909</b>   |
| C1.  | Complex work methods                                       | 3.85  | 14 <sup>th</sup> | 74 <sup>a</sup> , 80 <sup>b</sup> | 0.609        | 15 <sup>th a</sup> , 13 <sup>th b</sup> | 0.897          |
| C2.  | Unfinished work  | 4.02* | 6 <sup>th</sup>  | 79 <sup>a</sup> , 81 <sup>b</sup> | 0.162        | 2 <sup>nd a</sup> , 12 <sup>th b</sup>  | 0.891          |
| C3.  | High volume of work  | 4.08* | 2 <sup>nd</sup>  | 78 <sup>a</sup> , 85 <sup>b</sup> | 0.733        | 5 <sup>th a</sup> , 2 <sup>nd b</sup>   | 0.890          |
| C4.  | Fast working pace  | 3.91  | 11 <sup>th</sup> | 73 <sup>a</sup> , 82 <sup>b</sup> | 0.534        | 18 <sup>th a</sup> , 8 <sup>th b</sup>  | 0.896          |
| C5.  | Tight deadline pressures                                   | 4.10* | 1 <sup>st</sup>  | 81 <sup>a</sup> , 84 <sup>b</sup> | 0.275        | 1 <sup>st a</sup> , 5 <sup>th b</sup>   | 0.893          |
| C6.  | Inadequate staffing levels                                 | 3.75  | 19 <sup>th</sup> | 78 <sup>a</sup> , 72 <sup>b</sup> | 0.019*       | 6 <sup>th a</sup> , 36 <sup>th b</sup>  | 0.908          |
| C7.  | High good performance expectation                          | 3.92  | 10 <sup>th</sup> | 74 <sup>a</sup> , 83 <sup>b</sup> | 0.369        | 17 <sup>th a</sup> , 6 <sup>th b</sup>  | 0.902          |
| C8.  | Work being repetitive and boring                           | 3.41  | 40 <sup>th</sup> | 65 <sup>a</sup> , 71 <sup>b</sup> | 0.000*       | 38 <sup>th a</sup> , 38 <sup>th b</sup> | 0.925          |
| C39.   | Inadequate resources                                       | 3.83  | 15 <sup>th</sup> | 78 <sup>a</sup> , 77 <sup>b</sup> | 0.014*       | 7 <sup>th a</sup> , 20 <sup>th b</sup>  | 0.901          |
| <b>Construct 2: Role demands</b>                             |  |       |                  |                                   |              |   | <b>0.825</b>   |
| C10.   | Unclear roles and expectations                             | 3.59  | 28 <sup>th</sup> | 71 <sup>a</sup> , 72 <sup>b</sup> | 0.014*       | 24 <sup>th a</sup> , 35 <sup>th b</sup> | 0.785          |
| C11.   | Skill underutilization                                     | 3.49  | 35 <sup>th</sup> | 68 <sup>a</sup> , 71 <sup>b</sup> | 0.000*       | 31 <sup>st a</sup> , 37 <sup>th b</sup> | 0.826          |
| C11.   | Conflicting demands from superiors and colleagues          | 3.71  | 21 <sup>st</sup> | 75 <sup>a</sup> , 73 <sup>b</sup> | 0.071        | 13 <sup>th a</sup> , 33 <sup>rd b</sup> | 0.789          |
| C13.   | Personal beliefs conflict with organizations' requirements | 3.57  | 30 <sup>th</sup> | 72 <sup>a</sup> , 71 <sup>b</sup> | 0.329        | 21 <sup>st a</sup> , 39 <sup>th b</sup> | 0.808          |
| C14.   | Incapable of meeting quality demand                        | 3.68  | 23 <sup>rd</sup> | 73 <sup>a</sup> , 74 <sup>b</sup> | 0.029*       | 19 <sup>th a</sup> , 29 <sup>th b</sup> | 0.783          |
| C15.   | Skills and abilities are not employed                      | 3.38  | 42 <sup>nd</sup> | 65 <sup>a</sup> , 70 <sup>b</sup> | 0.000*       | 39 <sup>th a</sup> , 40 <sup>th b</sup> | 0.825          |
| C16.   | Incompetence   | 3.65  | 25 <sup>th</sup> | 70 <sup>a</sup> , 76 <sup>b</sup> | 0.003*       | 26 <sup>th a</sup> , 24 <sup>th b</sup> | 0.831          |
| C17.   | High scope and job responsibilities                        | 4.07* | 3 <sup>rd</sup>  | 79 <sup>a</sup> , 82 <sup>b</sup> | 0.451        | 4 <sup>th a</sup> , 9 <sup>th b</sup>   | 0.784          |
| <b>Construct 3: Poor interpersonal working relationships</b> |  |       |                  |                                   |              |   | <b>0.786</b>   |
| C18.   | Poor management and autocratic leadership style            | 3.55  | 32 <sup>nd</sup> | 69 <sup>a</sup> , 74 <sup>b</sup> | 0.000*       | 30 <sup>th a</sup> , 30 <sup>th b</sup> | 0.849          |
| C19.   | Abusive and over-demanding supervisors                     | 3.87  | 13 <sup>th</sup> | 70 <sup>a</sup> , 85 <sup>b</sup> | 0.958        | 27 <sup>th a</sup> , 1 <sup>st b</sup>  | 0.728          |
| C20.   | Lack of teamwork and cooperation                           | 3.78  | 18 <sup>th</sup> | 74 <sup>a</sup> , 76 <sup>b</sup> | 0.070        | 16 <sup>th a</sup> , 23 <sup>rd b</sup> | 0.735          |
| C21.   | Aggression and offensive behaviours                        | 3.58  | 29 <sup>th</sup> | 69 <sup>a</sup> , 75 <sup>b</sup> | 0.000*       | 29 <sup>th a</sup> , 28 <sup>th b</sup> | 0.721          |
| C22.   | Poor communication   | 4.00* | 8 <sup>th</sup>  | 79 <sup>a</sup> , 81 <sup>b</sup> | 0.244        | 3 <sup>rd a</sup> , 11 <sup>th b</sup>  | 0.734          |
| C23.   | Hostility and discrimination                               | 3.56  | 31 <sup>st</sup> | 69 <sup>a</sup> , 73 <sup>b</sup> | 0.000*       | 28 <sup>th a</sup> , 32 <sup>nd b</sup> | 0.728          |
| <b>Construct 4: Poor work conditions</b>                     |  |       |                  |                                   |              |   | <b>0.898</b>   |
| C24.   | Limited time for relaxation                                | 4.05* | 4 <sup>th</sup>  | 76 <sup>a</sup> , 84 <sup>b</sup> | 0.477        | 11 <sup>th a</sup> , 4 <sup>th b</sup>  | 0.894          |
| C25.   | Poor accommodation and catering facilities                 | 3.73  | 20 <sup>th</sup> | 72 <sup>a</sup> , 78 <sup>b</sup> | 0.188        | 22 <sup>nd a</sup> , 17 <sup>th b</sup> | 0.862          |
| C26.   | Poor working space   | 3.80  | 17 <sup>th</sup> | 73 <sup>a</sup> , 79 <sup>b</sup> | 0.838        | 20 <sup>th a</sup> , 15 <sup>th b</sup> | 0.867          |
| C27.   | Poor lighting system                                       | 3.43  | 38 <sup>th</sup> | 68 <sup>a</sup> , 69 <sup>b</sup> | 0.004*       | 32 <sup>nd a</sup> , 42 <sup>nd b</sup> | 0.917          |
| C28.   | Exposure to Physical dangers                               | 4.01* | 7 <sup>th</sup>  | 77 <sup>a</sup> , 83 <sup>b</sup> | 0.815        | 8 <sup>th a</sup> , 7 <sup>th b</sup>   | 0.895          |
| C29.   | Noise exposure   | 3.89  | 12 <sup>th</sup> | 77 <sup>a</sup> , 79 <sup>b</sup> | 0.276        | 9 <sup>th a</sup> , 16 <sup>th b</sup>  | 0.856          |
| C30.   | Dust exposure  | 3.81  | 16 <sup>th</sup> | 75 <sup>a</sup> , 77 <sup>b</sup> | 0.200        | 14 <sup>th a</sup> , 19 <sup>th b</sup> | 0.872          |



| <b>Table 1a: Statistical results of construction work-related psychological risk factors (continuation)</b> |  |             |                  |                                   |                     |   |                       |
|---|--|-------------|------------------|-----------------------------------|---------------------|---|-----------------------|
| <b>S/N</b>  | <b>Construction work-related psychological factors</b>                   | <b>Mean</b> | <b>Rank</b>      | <b>Group RII (%)</b>              | <b>Sig. (Equal)</b> | <b>Group Rank</b>   | <b>Cronbach alpha</b> |
| <b>Construct 5: Lack of autonomy</b>  |  |             |                  |                                   |                     |   | <b>0.820</b>          |
| C31.  | Lack of influence on work decisions                                      | 3.70        | 22 <sup>nd</sup> | 71 <sup>a</sup> , 78 <sup>b</sup> | 0.059               | 25 <sup>th</sup> <sup>a</sup> , 18 <sup>th</sup> <sup>b</sup> | 0.856                 |
| C32.  | Matters being referred to supervisors even when capable of handling them | 3.46        | 37 <sup>th</sup> | 66 <sup>a</sup> , 73 <sup>b</sup> | 0.000*              | 37 <sup>th</sup> <sup>a</sup> , 34 <sup>th</sup> <sup>b</sup> | 0.736                 |
| C33.  | Too much supervision   | 3.66        | 24 <sup>th</sup> | 67 <sup>a</sup> , 80 <sup>b</sup> | 0.000*              | 35 <sup>th</sup> <sup>a</sup> , 14 <sup>th</sup> <sup>b</sup> | 0.761                 |
| C34.  | Insufficient authority over work   | 3.53        | 33 <sup>rd</sup> | 71 <sup>a</sup> , 70 <sup>b</sup> | 0.504               | 23 <sup>rd</sup> <sup>a</sup> , 41 <sup>st</sup> <sup>b</sup> | 0.821                 |
| <b>Construct 6: Lack of feedback</b>  |  |             |                  |                                   |                     |   | <b>0.863</b>          |
| C35.  | Supervisors not commenting on job performance                            | 3.51        | 34 <sup>th</sup> | 66 <sup>a</sup> , 75 <sup>b</sup> | 0.000*              | 36 <sup>th</sup> <sup>a</sup> , 27 <sup>th</sup> <sup>b</sup> | 0.712                 |
| C36.  | No recognition for work done   | 3.61        | 27 <sup>th</sup> | 67 <sup>a</sup> , 76 <sup>b</sup> | 0.000*              | 33 <sup>rd</sup> <sup>a</sup> , 22 <sup>nd</sup> <sup>b</sup> | 0.951                 |
| C37.  | No recommendation to improve situation                                   | 3.42        | 41 <sup>st</sup> | 63 <sup>a</sup> , 74 <sup>b</sup> | 0.000*              | 41 <sup>st</sup> <sup>a</sup> , 31 <sup>st</sup> <sup>b</sup> | 0.736                 |
| <b>Construct 7: Unfair rewards and treatment</b>  |  |             |                  |                                   |                     |   | <b>0.864</b>          |
| C38.  | Pay is relatively low  | 4.04*       | 5 <sup>th</sup>  | 76 <sup>a</sup> , 84 <sup>b</sup> | 0.575               | 10 <sup>th</sup> <sup>a</sup> , 3 <sup>rd</sup> <sup>b</sup>  | 0.856                 |
| C39.  | Employees treated unfairly with no job security                          | 3.63        | 26 <sup>th</sup> | 67 <sup>a</sup> , 77 <sup>b</sup> | 0.000*              | 34 <sup>th</sup> <sup>a</sup> , 21 <sup>st</sup> <sup>b</sup> | 0.832                 |
| C40.  | Imbalance between work effort and reward                                 | 3.95        | 9 <sup>th</sup>  | 75 <sup>a</sup> , 81 <sup>b</sup> | 0.656               | 12 <sup>th</sup> <sup>a</sup> , 10 <sup>th</sup> <sup>b</sup> | 0.867                 |
| C41.  | Lack of medical insurance  | 3.48        | 36 <sup>th</sup> | 64 <sup>a</sup> , 76 <sup>b</sup> | 0.000*              | 40 <sup>th</sup> <sup>a</sup> , 25 <sup>th</sup> <sup>b</sup> | 0.806                 |
| C42.  | Poor organizational support  | 3.45        | 39 <sup>th</sup> | 62 <sup>a</sup> , 75 <sup>b</sup> | 0.000*              | 42 <sup>nd</sup> <sup>a</sup> , 26 <sup>th</sup> <sup>b</sup> | 0.812                 |

*Note: Highly scored mean values and P- values less than 0.05 are marked with (\*).*

All the factors analysed in this study had their mean scores above 3.0 and a significant value less than 0.05. The null hypothesis stating that the individual factors were not statistically significant to be construction work-related psychological risk factor(s) will be rejected, and the alternative hypothesis accepted. The results from the quantitative study indicate that all the 42 factors identified from the qualitative study are significant as highly influential or influential factors of construction workers psychological health. The results from the descriptive analysis revealed that tight deadline pressure was the highest scored factor and skills and abilities not fully employed as a factor recorded the least score by all the respondents. The results could be because time is a critical factor in every project's outcome. In descending order, the highly scored mean factors were tight deadline pressures, high volume of work, high scope and job responsibilities, limited time for relaxation, pay is relatively low, unfinished work, exposure to physical dangers, and poor communication. These factors could cause construction employees psychological ill-being conditions of stress, anxiety, emotional distress, fatigue, frustration, irritation, upset, agitation, tension, emotional exhaustion, and numbness. These could lead to direct costs (such as poor job performance, low productivity, high turnover, work stoppage, and increased rate of accidents) and indirect costs (such as errors in work, low motivation, hostile working environment) as consequences to the construction industry.

For the comparison of the results among the two construction groups, the Blom's fractional rank estimation test was done, which revealed the data were normally distributed. Hence, the results of the two groups could be compared for all the variables. The comparison of the results

of the two construction groups have also been presented in Table 1. Independent two-sample T-test was used to determine whether the difference in the ratings by the two respondents' groups were statistically significant. The significance value of the Levene's Test for equality of variances have been presented. The group mean together with the values of the relative importance index (RII), were used to rank the factors as identified in each group of respondents and presented in Table 1.

Levene's Test for equality of variances among the two construction working groups indicated that equal variances were assumed for twenty-two (22) of the factors analyzed, as their p- values were greater than 0.05. On the other hand, the factors that showed a statistically significant difference between the mean scores of the two groups were also twenty (20) in number. These 20 factors had their p- values less than 0.05 and marked with (\*), as shown in Table 1. The null hypothesis that assumes no statistically significant differences between the mean scores of the two construction groups will be rejected, and the alternative hypothesis that states otherwise will be accepted for these 20 factors. However, the null hypothesis will not be rejected for the 22 other factors that revealed no statistically significant differences and assumed equal variances for the two construction groups. The similarities in the significance of the factors rated by the two construction working groups indicate that those factors are likely to expose all construction employees to the risk of psychological disorders such as stress, anxiety, depression and the likes, irrespective of the underlining factors listed previously (Wang, et. al., 2017). Construction employees may experience mental and emotional indicators of psychological disorders such as anxiety, boredom, trembling, low self-esteem, forgetfulness, depression, anger, apathy, worry, fatigue (Goetzel, et. al., 2018).

A comparison of the statistical results obtained from the construction professionals' group and construction trade workers group showed some significant differences in the rankings of the factors, as shown in Table 1. For instance: tight deadline pressure as a psychological risk factor was ranked 1<sup>st</sup> by the construction professionals but 5<sup>th</sup> by the construction trade workers. Abusive and over-demanding supervisors as a factor was rather ranked 1<sup>st</sup> by the construction trade workers but 27<sup>th</sup> by the construction professionals. The differences in the opinions of the two construction groups indicate that these construction work-related psychological factors could affect a construction employee at different degrees of severity based on underlining factors such as work trade, task level, type of role, pay differential, working experience and other demographic characteristics such as age, gender, and educational background (Fordjour, et. al., 2019b; Kollmann, et. al., 2019). Construction trade workers unlike the construction project team members are usually at the lowest rank of most construction organizations and therefore have little or no influence on their jobs, leading to them experiencing psychological ill-being conditions or disorders (Leung, et. al., 2017; Bowen, et. al., 2014). A study conducted by Fordjour and Chan (2019) revealed that psychological disorders such as stress, anxiety, and depression were more prevalent among construction trade workers than construction professionals.

Studies conducted in other developing countries also revealed similar factors identified in the study. For instance, a study conducted by Ibem, et. al., (2011) in Nigeria and a study conducted by Enshassi and Al.Swaity, (2015) in Gaza – Strip Palestine also revealed similar construction work psychological risk factors such as high volume of work, fast working pace and tight deadlines. Similar factors revealed in a study conducted in South Africa by Bowen, et. al., (2013) were poor working space and insufficient authority over work. Pay being relatively low and lack of feedback as psychological risk factors were also identified in a study conducted in China by Leung and Chan, (2012). Unclear roles and expectations and conflicting demands

from superiors and workers were also mentioned in Sri Lanka by Senaratne and Rasagopalasingam, (2017). However, the key factors, including unfinished work and abusive supervision, that were identified by this study were not revealed or measured by the previous researchers.

The relationships between the construction work-related factors and psychological health indicators were assessed. The results from the correlation analysis has been presented in Table 2.

**Table 2: Correlation analysis of the construction work-related psychological risk factors and psychological health indicators.**

| Ref. | Constructs                               | Grand Mean | Inter-Item Correlation Matrix |                    |                    |                      |
|------|--|------------|-------------------------------|--------------------|--------------------|----------------------|
|      |  |            | Physical Symptoms             | Emotional symptoms | Cognitive Symptoms | Behavioural Symptoms |
| 1.   | Physical Symptoms                        | 3.17       | 1.000                         | -                  | -                  | -                    |
| 2.   | Emotional symptoms                       | 3.68       | 0.776**                       | 1.000              | -                  | -                    |
| 3.   | Cognitive Symptoms                       | 3.34       | 0.607**                       | 0.805**            | 1.000              | -                    |
| 4.   | Behavioural Symptoms                     | 3.33       | 0.827**                       | 0.663**            | 0.635**            | 1.000                |
| 5.   | High Task Demands                        | 3.88       | 0.557**                       | 0.712**            | 0.814**            | 0.596**              |
| 6.   | High Role Demands                        | 3.64       | 0.437**                       | 0.628**            | 0.494**            | 0.311**              |
| 7.   | Poor interpersonal working relationships | 3.72       | 0.382**                       | 0.500**            | 0.622**            | 0.549**              |
| 8.   | Poor Work Conditions                     | 3.81       | 0.534**                       | 0.597**            | 0.719**            | 0.684**              |
| 9.   | Lack of Autonomy                         | 3.59       | 0.036*                        | 0.014*             | 0.232**            | 0.135*               |
| 10.  | Lack of Feedback                         | 3.55       | 0.583**                       | 0.584**            | 0.563**            | 0.410*               |
| 11.  | Unfair Rewards and Treatment             | 3.72       | 0.592**                       | 0.463**            | 0.333**            | 0.536**              |

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

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

At the significant p-value of 0.05 or 0.01 level as shown in Table 2, the results of correlation analysis revealed that all the construction work-related psychological risk factors identified in this study positively related to the psychological health indicators of physical symptoms, emotional symptoms, cognitive symptoms and behavioural symptoms. Detailed description of the 7 main constructs of the factors identified has been provided.

#### *Construct 1: High task demand*

Where construction employees are required to undertake many tasks and engagements within a limited time frame (Gunduz and Yahya, 2018; Leung, et. al., 2017). Insufficient time required to complete an assigned task could expose both construction trade workers and project team members to psychological ill-being conditions such as stress and anxiety (Artime, et. al., 2019; Fordjour and Chan, 2019). Psychological disorders of construction employees hence result from multitasking, particularly where the quantitative workload demands exceeds their individual abilities to meet the job demands (Tomaschek, et. al., 2018; Cattell, et. al., 2016). Where construction workers are required to undertake many tasks and engagements within a limited time frame, this exposes them to psychological ill-being effects (Artime, et. al., 2019). Psychological ill-being of construction workers hence results from multitasking, particularly

where the quantitative workload demands exceeds their individual abilities to meet the demands (Leung and Chan, 2012). Insufficient time required to complete an assigned task also exposes construction workers to psychological ill-being conditions (Yang, et. al, 2017). Where the resources needed to work efficiently are inadequate, these could affect the psychological health of construction workers (Leung and Chan, 2012). The construction works related factors identified uniquely by this study are very significant and could easily expose construction workers to psychological health conditions such as stress, depression and anxiety. All the factors revealed under this category are therefore likely to have behavioural and physiological effects of psychological ill-being conditions on the construction employees, with effects on the construction industry. Organisational measures such as task redesign with the provision of alternative roles and additional manpower can help mitigate the effects of high task demands on the construction employees.

### *Construct 2: High role demands*

The most critical construction work-related factors revealed and categorized under role demands, in descending order are high scope and job responsibilities, and conflicting demands from superiors and colleagues. These factors could cause construction employees psychological ill-being conditions such as stress and rage, with a direct cost of low productivity and poor job performance, and indirect cost of breakdown in communication to the construction industry. Construction industries that lack standardized working procedures are usually associated with unclear working roles, duplicated works, role conflicts, with effects on the construction employees' psychological disorders (Leung and Chan, 2012). When employees are also torn between conflicting roles and work demands, it leads them to experience various forms of psychological ill-being conditions (Yang, et. al, 2017; Wang, et. al., 2017). Where a construction employees' role is not clearly defined or ambiguous due to multiple functions, this also predicts psychological ill-being conditions such as workaholism and burnout (Bhanugopan and Fish, 2006). Likewise, when employees perceive they lack the skills and knowledge to handle difficult tasks or qualitative work demands, this could lead to the employees experiencing various forms of psychological disorders (Zhao, et. al., 2002; Mehta and Chaudhary, 2005).

Construction industries that lack standardized working procedures lead to unclear working roles, duplicated works, role conflicts, with effects on construction workers psychological health (Leung, et. al., 2017). When workers are torn between conflicting roles and work demands, it leads to them experiencing various forms of psychological ill-being (Yang, et. al, 2017). Where a construction worker's role is not clearly defined or ambiguous due to multiple roles, this predicts psychological ill-being conditions such as workaholism and burnout (Bhanugopan and Fish, 2006). When workers perceive that they lack the skills and knowledge to handle difficult tasks or qualitative work demands, this could lead to workers experiencing various forms of psychological ill-being (Love, et. al., 2009). Most construction workers in Ghana are uneducated and lack the necessary skills and knowledge for quality works. Hence, the construction works related factors revealed and categorized under role demands are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. Organisational measures such as proper planning of project activities and support from other staff can also alleviate the effects of high role demands on the psychological well-being of the construction employees.

### *Construct 3: Poor Interpersonal working relationships*

Poor working relations could lead to high levels of psychological ill-being conditions, with an effect on project performance (Bowen, et. al., 2014). Good relationships among colleague workers and superiors are, therefore, essential for every project's success (Leung and Chan, 2012). Where the superiors are abusive and over-demanding, this could affect the psychological health of the construction employee (O'Donoghue, et. al., 2016). The most critical construction work-related factors categorized under poor interpersonal working relationships are poor communication, abusive and over-demanding supervisors. These factors could also cause construction employees psychological conditions such as depression and irritation, with the direct cost of poor job performance and indirect cost of job dissatisfaction to the construction industry. Negative personality traits of superiors and co-workers, such as aggression and offensive behaviours, could cause construction employees to experience psychological ill-being conditions (Bhanugopan and Fish, 2006). Lack of teamwork and cooperation also affects the psychological disorders of construction employees (Harkness, et. al., 2005). Poor communication skills lead to misunderstanding, which affects project outcomes (Chan, et. al., 2012).

Poor communication thus could have a negative impact on the job performance of construction employees with an effect on their psychological health (Leung, et. al., 2017). Hostility and discrimination experienced by the construction employees from their superiors or colleagues, with perceived lack of work support, influence the psychological ill-being and well-being conditions of the construction employee (Bhanugopan and Fish, 2006). The skills adopted by construction project team members to manage the construction projects are essential for the expected project outcome and profitability of the firm (Lee, et. al., 2019). Even though construction workers are familiar with the basic work practices, they need to be supervised at every stage of the work (Leung and Chan, 2012). However, where the construction managers are abusive and overdemanding, this could affect the psychological ill-being of the construction workers (O'Donoghue, et. al., 2016). Hence, the construction works related factors revealed and categorized under poor interpersonal work relationships are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. Measures such as improved supervisory and good working relations can promote a psychologically safe and healthy construction workplace.

### *Construct 4: Poor work conditions*

Poor work conditions could lead to low productivity and unsatisfactory job performance by the construction employees, this can cause project failure and delays, with additional costs to the construction industry (Gunduz and Yahya, 2018; Leung and Chan, 2012). Limited time for relaxation, exposure to physical dangers were the most critical construction work-related factors categorized under poor working conditions. These factors could cause construction employees psychological ill-being conditions such as emotional exhaustion and tremble, with the indirect cost of errors in work and direct costs of accidents and sick leave to the construction industry. Construction works are usually done in extreme temperatures and environmental conditions, which could subsequently lead to psychological or physiological health hazards for the construction employees (Chan, et. al., 2016; Harkness, et. al., 2005). For instance, noise exposure as revealed to be construction work-related factor could expose construction employees to psychological ill-being condition of deafness, with a direct cost of increased medical costs to the construction industry (Lee, et. al., 2019). Dust exposure as a factor could

also cause construction employee psychological ill-being conditions of poor breathing, with a direct cost of increased medical costs to the construction industry (Sharma, 2013).

Poor environmental working conditions could lead to low productivity and unsatisfactory job performance by the construction workers, this can lead to project failure and delays, with additional costs to the construction industry (Leung and Chan, 2012). Hence, the construction works related factors revealed and categorized under poor working conditions are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. Organisational measures such as improved working conditions, provision of adequate salary and resources for work, encouraging workers to take leave and enforcing break hours will also moderate the impact of poor working conditions on the general health and well-being of the construction employees.

#### *Construct 5: Lack of autonomy*

Organizational factors such as organizational complexity and bureaucratic working culture of a construction company (Leung and Chan, 2012) could expose construction employees to psychological ill-being conditions. Construction employees could be deprived of their interest in other aspects of the work, while struggling to perform at other areas, with consequences on their psychological health condition and the outcome of the job (Fordjour, et. al., 2019a; Zhao, et. al., 2002). The most critical construction work-related factors categorized under lack of autonomy are lack of influence on work decisions and too much supervision. These factors could expose construction employees to psychological ill-being conditions of irritation and worn-out, with the direct cost of poor performance and indirect cost of job dissatisfaction to the construction industry. The level of autonomy given to construction employees over their work could have a direct influence on their psychological well-being (Sommovigo, et. al., 2019; Love, et. al., 2009). Organizational policies that do not consider the opinions and feelings of employees could also lead to the psychological disorders of the construction employees (Harkness, et. al., 2005). Hence, the construction works related factors revealed and categorized under lack of autonomy are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. Organisational preventive measures such as the provision of flexible work schedules for workers has the potential of mitigating the effects of lack of autonomy on the construction employees.

#### *Construct 6: Lack of feedback*

The study revealed work-related factors categorized under lack of feedback such as no recognition for work done, and supervisors do not comment on job performance. These factors could expose construction employees to psychological ill-being conditions of worry and discouragement, with the direct cost of high turnover and indirect costs of job dissatisfaction to the construction industry. Construction employees need to know the mindset of their superiors regarding their job performance, and this is an appropriate means of emphasizing the job requirements clearly to the workers (Bowen, et. al., 2014; Leung, et. al., 2017). Hence, the construction works related factors revealed and categorized under lack of feedback are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. The provision of psychological health systems and counselling services

such as scheduling 1-1 meetings, helplines, and mental health first aiders can be provided to mitigate causes of psychological distress among construction employees.

#### *Construct 7: Unfair rewards and treatment*

The most critical construction work-related factors revealed under unfair rewards and treatments are pay is relatively low and imbalance between work effort and reward. These factors could also expose construction employees to psychological ill-being condition of rage and depression, with the direct cost of poor job performance and indirect cost of a hostile working environment as consequences to the construction industry. Where construction employees perceive they are treated unfairly and lack support from their superiors, they tend to distrust their superiors, and this could lead to behavioural effects of psychological disorders on the employees (Sommovigo, et. al., 2019; Enshassi, et. al., 2016; Chan, et. al., 2012). Fear of losing one's job has also been revealed to be among the powerful factors that lead to construction employees' psychological disorders (Cattell, et. al., 2016; Liang, et. al., 2018). Organizational factors that lead to construction employees' psychological disorders include low recognition of workers' effort, lack of job security, job redundancy, non-commensurate wages and under participation in decision making (Sharma, 2013; Bowen, et. al., 2014). Hence, the construction works related factors revealed and categorized under unfair rewards and treatment are likely to have behavioural and physiological effects of psychological ill-being conditions on the construction workers, which could lead to consequences of direct and indirect cost to the construction industry. Organisational measures such as acknowledging or rewarding good work done and establishing a welfare committee for employees at the workplace can help moderate the effects of unfair rewards and treatments on the psychological well-being of the construction employees.

### **Conclusion**

This study sought to explore the construction work-related factors that can affect the psychological health of both construction professionals and construction trade workers. Given the paucity of occupational psychological health research in the construction industry, a mixed-methods approach was adopted by first employing the methods of qualitative research. The qualitative method of focus group study adopted was deemed ideal for exploring and understanding the construction work-related factors from the perspective of the construction employees. A total of sixteen (16) focus group discussions were held in Ghana with 90 construction employees. The focus group discussions revealed forty-two (42) items as construction work-related factors associated with the psychological disorders or ill-being conditions of construction employees. The qualitative data provided an essential new perspective based on the experiences of the research participants. A quantitative research approach was then adopted to confirm or validate the findings from the qualitative study and also to determine the criticality of the factors revealed as construction work-related psychological risk factors. All the 42 construction works related factors revealed and measured in this study were deemed significant to affect the psychological health of both the construction professionals and construction trade workers. These factors can have behavioural and physiological effects which lead to consequences of direct costs such as low productivity and poor job performance and indirect costs such as low motivation and job dissatisfaction. The critical construction work-related psychological risk factors identified in the study were: tight deadline pressure, high volume of work, high scope and job responsibilities, limited time for relaxation, pay is relatively low, unfinished work, exposure to physical dangers, and poor communication. The construction professionals' group and the construction trade workers

group had different opinions regarding the criticality of these factors as construction work-related psychological risk factors, for instance, tight deadline pressure was ranked as the most critical factor by the construction professionals, but abusive/over-demanding supervision was ranked as the most critical factor by the construction trade workers. The differences in the opinions of the two construction groups could be due to some underlining factors such as work trade, task level, type of role, pay differential, working experience and other demographic characteristics such as age, gender, and educational background. Using exploratory factor analysis, the 42 construction work-related factors revealed in this study were further grouped under seven main constructs namely: high task demands, high role demands, poor interpersonal working relationships, poor work conditions, lack of autonomy, lack of feedback and unfair rewards/ treatment. The results of the correlation analysis revealed that all the construction work-related psychological risk factors identified in this study positively related to the psychological health indicators of physical symptoms, emotional symptoms, cognitive symptoms and behavioural symptoms. Therefore, the construction works related factors identified uniquely in this study are very significant and could easily expose construction employees, no matter the jurisdiction to psychological health conditions such as stress, depression and anxiety.

Some comparisons of the findings from this study conducted in Ghana were made with studies conducted in other developing countries such as China, Nigeria, Sri Lanka, South Africa and Gaza Strip – Palestine. This was to indicate whether the construction work psychological risk factors revealed in this study have also been identified by the other studies. Some of the findings were also revealed to be inconsistent with findings from previous studies conducted in other developing countries such as China, Nigeria, Sri Lanka, South Africa and Gaza Strip – Palestine. The findings from this study, therefore, could be applied to other jurisdictions, especially the developing countries that share common characteristics with that of Ghana. However, the key factors, including unfinished work and abusive supervision, that were identified by this study, were not revealed or measured by the previous researchers. This could be due to the fact that the previous researchers focused on only one aspect of psychological health problems, which is stress; while this study incorporated all factors that could lead to psychological problems such as stress, anxiety, depression and frustration.

The conduct of this study in a single geographical setting that is Ghana is a limitation of this study. However, occupational psychology research is still under-explored in the construction literature, and there are many research gaps to be filled, considering the area of context and multi-level perspectives. The mixed-methods approach, the cross-sectional design of comparing two construction working groups and the geographical setting, where such a study has never been conducted, makes this study credible and impactful. The qualitative data generated from this study were all confirmed to be statistically significant factors that can influence the psychological health of the construction employees. The findings from the study, therefore, form a basis for designing a preventive psychological health management model for construction workers in Ghana and globally; as the findings from this study could be applied to other jurisdictions especially the developing countries that share common characteristics with that of Ghana. This study thus contributes sufficiently to the construction literature on occupational psychological issues, with the intention to promote a psychologically safe and healthy construction workplace.



## **Recommendations**

Despite institutional arrangements put in place in certain construction industries to promote work and happiness, the less than optimal working conditions and inadequate yet dwindling work factors could conspire with other personality factors to put most construction workers at the risk of occupational psychological health problems. This study recommends preventive psychological health strategies and interventions for the construction industry, which could be divided into primary, secondary and tertiary strategies. The primary strategies aim at reducing or eliminating the construction work-related factors that are likely to expose construction workers to psychological ill-being conditions, such as abusive and overdemanding supervisors and tight deadline pressures. Examples of the primary strategies include improved supervisory relations, proper planning of project resources, good project time management skills and provision of adequate resources. The secondary strategies seek to build construction workers' coping capabilities in dealing with the triggers of psychological ill-being conditions, which cannot be eliminated completely such as unfinished work, high task demands and poor working conditions. Examples of the secondary interventions include establishing a welfare committee and offering free counselling services for the construction workers. The tertiary strategies seek to moderate the effects of psychological health conditions on the construction workers through interventions such as: providing organisational support to workers experiencing some form of psychological health conditions such as stress and depression.

The study also recommends psychological health systems and interventions for construction workers to protect them from the effects of psychological ill-being such as poor health and low work productivity. Extrinsic factors such as job security, pay and pension benefits, as well as intrinsic factors such as the feeling of being needed, valued, fulfilling personal and organisational goals, meeting deadlines, adequate job demands and good interpersonal relationships, could enhance the psychological well-being of the workers. It is imperative that the culture of every construction organization incorporate in it an aspect or element of health, to ensure that the values and attitudes of the managers and workers are geared towards improved health and psychological well-being conditions of people in the construction industry. Construction management should also concern itself with the welfare of the people, by ensuring that workers are protected from physical and psychological health problems as they undertake the construction works. This study recommends that future research be conducted employing both qualitative and quantitative methods to identify both individual and organisational preventive strategies to mitigate the causes of psychological health conditions in the construction industry of Ghana and globally. Further research can also be conducted to establish a much stronger relationship between the factors, psychological indicators and the preventive measures.

## **Data Availability Statement**

All data generated or analyzed during the study are included in this article.

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