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The mediating and moderating role of coping on occupational stress and psychological well-being among the construction workforce in South Africa: the psychological stress theory approach

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Abstract

Purpose – The purpose of this cross-sectional study is to examine the direct relationships between occupational stress (OccS), coping and well-being (WB). The study further examined the mediating and moderating roles of adaptive coping and maladaptive coping on OccS and WB among the construction workforce in South Africa.

Design/methodology/approach – Data were collected from construction companies in South Africa, and the sample were conveniently selected based on proximity and familiarity with the researcher. A total of 201 subjects were suitable for conducting the study after data were screened. A quantitative research approach was used, and data were analysed in IBM SPSS v28 for descriptive statistics and exploratory factor analysis. The reliability and validity of the constructs were measured and met the minimum thresholds. Furthermore, IBM AMOS v28 was used for confirmatory factor analysis and structural equation modelling to test the hypothesised relationships. Process macro v4.2 was also used to test the mediation and moderation relationships. Psychological well-being was measured using the validated WHO-5 Well-being Index Measure.

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Findings – The finding of the study revealed that subjective well-being was good, with a score of 77.97 out of 100. The finding also revealed that there were no significant relationships for the hypothesised mediation relationships between either adaptive coping and maladaptive coping as mediators between OccS and WB, although there was a partial mediation relationship when both maladaptive and adaptive coping mediated the relationship between OccS and WB. Furthermore, adaptive coping acted as a moderator between OccS and WB.

Research limitations/implications – The study only focuses on the mediation and moderation relationships between OccS and subjective WB. Adaptive coping was limited to social support and active coping, while WB was limited to quality of life. The study is quantitative and suffers from the limitations associated with this type of research. Furthermore, while sound measures were used to ensure validity and reliability, the study relied on the opinions of the respondents, and opinions may not necessarily present facts.

Practical implications – This study highlighted some of the effects of coping on mental well-being of the South African construction workforce. The findings provide insight to some areas of concern relating to OccS management to improve the overall WB of the workforce.

Social implications – The construction industry relies on a healthy and active workforce. To ensure sustainability of the workers and to ensure that each worker returns home safe to their family, it is important to address workers mental health especially at work where workers spend majority of their time. This is important in an industry that employs the poor and marginalised.

Originality/value – This study addressed both the knowledge and population gap. Majority of the study have focused on construction professionals who constitute about 30% of the entire workforce. The current study examined stress across all professions. Furthermore, the study used the psychological stress theory to examine coping and its impact on the workforce.

Keywords Construction workforce, Coping, Occupational stress, Psychological well-being, WHO-5

Paper type Research paper

Introduction

Occupational stress

The term occupational stress is used to define a process involving a transaction between an individual and his or her work environment (Lazarus, 1966). Negative environmental factors, known as stressors associated with a specific task, determine occupational stress (Cooper and Marshall, 1976). Job stressors, also known as job demands, may lead to physiological, behavioural or psychological manifestations of stress (strain) and subsequently result in poor well-being (ibid). Psychological well-being on the other hand can refer to an individual's subjective experience of positive psychological states, such as pleasure (hedonic), life fulfilment and a sense of purpose (eudaimonic) (Deci and Ryan, 2008). While this is a complex construct, according to the World Health Organisation (WHO) psychological well-being is "a state of mind in which an individual is able to develop their potential, work productively, and creatively, and is able to cope with the normal stresses of life" (WHO, 2021). Poor psychological well-being has been linked to occupational stress.

The psychological stress theory

To explore this relationship, it is imperative to establish the theoretical underpinnings of this causal link. The current understanding of occupational stress evolved from early stress theories, such as the psychological stress theory explored by the Lazarus group (Lazarus 1966: Lazarus and Folkman, 1984). According to this theory, there are two fundamental concepts to psychological stress; appraisal and coping. The concept of appraisal is based on the notion that emotional processes, including stress are dependent on actual individual expectancies because of a specific encounter (Lazarus and Folkman, 1984). This concept is necessary to explain the individual's vulnerability to stress.

There are two major kinds of appraisal used to analyse situations, namely, primary appraisal and secondary appraisal. Primary appraisal is usually the first encounter of a

stressful event (Lazarus and Folkman, 1984) whereby the individual appraises the situation in relation to how it affects his/her well-being. There are three components to be evaluated under primary appraisal: goal relevance – the degree to which a situation is a threat to individual well-being; goal congruence – the degree to which an incident is in accordance with personal goals; and type of ego involvement – aspects of personal commitment such as moral values, self-esteem, ego-ideal or ego-identity because of a stressful encounter. The encounter may be seen as positive, negative or unimportant. If a threat is perceived as a result of the job demands, it may lead to negative stress symptoms such as accidents, anger, frustration, disappointment and common mental disorders. Secondary appraisal reciprocally influences primary appraisal, whereby the individual establishes what abilities and resources are available to cope with the situation, which resulted in either harm, threat or challenge. Similarly, the secondary appraisal has three components, namely, blame or credit, coping potential and future expectations. Blame or credit emanates from an individual's judgement of who is accountable for a particular situation. Coping potential refers to the individual's assessment of the prospects for generating certain cognitive or behavioural processes that will influence a specific encounter positively. Future expectations refer to the evaluation of the future encounter in relation to goal congruence or incongruence. Although it is difficult to specify the factors that determine stress, the psychological stress theory is used in the current study as the most suitable theoretical framework to guide the research based on the proposed construct.

Occupational stress coping. The most notable aspect of the psychological stress theory is coping, and most approaches to coping research follow Lazarus and Folkman. Coping is closely related to the concept of cognitive appraisal and also to stress-relevant person–environment transactions (Lazarus and Folkman, 1984; Cox, 1978). "Coping is constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus and Folkman, 1984:141). Folkman and Lazarus (1980:223) defined coping as "the cognitive and behavioural efforts made to master, tolerate, or reduce external and internal demands and conflicts among them". The definition implies that coping actions are not classified according to their effects, such as the distortion of reality, but in relation to specific characteristics of the coping process. Secondly, the coping actions encompass both the behavioural and cognitive reactions in an individual. Thirdly, coping usually consists of independent, unrelated events organised successively, forming an interconnection of coping episodes. Lastly, coping processes can be distinguished by their focus on different elements of a stressful situation. Therefore, the coping processes may try to alter the person–environment realities behind stress, known as problem-focused coping, or they could also relate to internal elements and try to change a negative emotional state or change the appraisal of the demanding event, and this is referred to as emotion-focused coping (Lazarus and Folkman, 1984; Folkman and Lazarus, 1980).

Occupational stress in construction

While stress and more specifically, occupational stress may be universal, its prevalence among certain groups is a critical concern. The construction industry has one of the highest suicide rates of all industries. According to World Health Organization (2016), the construction and extraction occupation category had a suicide rate of 52.5 per 100,000 for males (male-dominated industry) in contrast to the suicide rate of 19.4 per 100,000 of the general male population. The rate of suicide to date is still staggering in construction. Poor mental health issues result in most injuries and accidents, lost working days, absenteeism, low employee morale, high staff turnover rates, increasing medical expenses and high

suicide rates of all industries (ILO, 2014; Mates in Construction, 2020; Wahab, 2010; PricewaterhouseCoopers, 2014). Construction work is very stressful because of psychologically and physiologically demanding tasks performed in hazardous work environments (Xiang *et al.*, 2013). This demands subsequently lead to depression, stress (acute, chronic, PTSD), anxiety, substance abuse disorders and sometimes suicide (Hosseini *et al.*, 2010). When workers perceive unsafe working conditions, they worry about their well-being and become increasingly anxious, where they believe exposure to work hazards may result in diseases or injury. Therefore, mental ill-health among the construction workforce is a major concern, and its pervasiveness is a result of the industry's reluctance to change its culture, structures, work processes and practices inherent to construction product delivery (Farmer and Stevenson, 2017; Tijani *et al.*, 2020; Sherratt, 2018).

Coping in the construction industry

To cope with the demands emanating from physically and mentally demanding tasks, construction workers resort to either maladaptive (negative) or adaptive (positive) coping strategies. Coping is known to have a mediating or moderating effect on stress and psychological well-being. It is closely related to the concept of cognitive appraisal and the stress-relevant person–environment transactions postulated under the psychological stress model (Lazarus and Folkman, 1984; Cox, 1978). Adaptive coping operates as a mental health protective factor, which is effective in combating stressors. These protective factors are linked to marital status (positive); high job control; high job support; low job demand; low workplace discrimination; family-friendly job opportunities; workplace justice; better welfare; and positive socioeconomic measures. The protective factors make it easy for construction workers to positively manage stress at work and outside work. Contrarily, in construction, increased job demand, reduced work support and reduced job control have been linked with maladaptive coping strategies such as alcohol consumption, drug abuse, avoidance behaviour and substance abuse (ADSA) (Chang *et al.*, 2020). Construction workers are at risk of resorting to maladaptive coping strategies because of the job characteristics that do not encourage openness about mental health issues. As a result of the macho culture, physically demanding tasks coupled with long working hours are making it hard for active coping strategies and the high illiteracy rate, especially among its blue-collar workers, which is also linked to unhealthy lifestyle habits.

In tandem with the psychological stress theory, this study examined the role of different coping strategies on occupational stress and psychological well-being among the construction workforce. Psychological stress emanating from the work environment results in poor psychological well-being, construction accidents and the loss of human resources. The lack of development in the field of cross-cultural research in relation to occupational stress in the South African construction industry makes it hard to address the issues of stress and mental ill-health among the workers (Sunindijo and Kamardeen, 2017; Burki, 2018; Kamardeen and Loosemore, 2016; Milner *et al.*, 2015). Most stress and mental health studies in construction have been conducted in developed countries (Tijani *et al.*, 2020; Chan *et al.*, 2020; Sun *et al.*, 2021; Golzad *et al.*, 2023), while those conducted in South Africa are minimal and mostly focus on construction professionals (Bowen *et al.*, 2013; Bowen *et al.*, 2014; Bowen *et al.*, 2018; Bowen *et al.*, 2018; Bowen and Zhang, 2020; Cattell *et al.*, 2017; Haydam and Smallwood, 2016; Raliile and Haupt, 2023). Furthermore, foreign approaches to addressing psychological issues by applying psychometric measures and literature from developed countries may not be relevant to the South African context (August *et al.*, 2023; Laher and Cockcroft, 2013; Clarke *et al.*, 2020). South Africa has a different demographic population of people of similar ethnicities with different cultures, beliefs and values

(Mostert, 2006). In South Africa, in addition to the stressful nature of the construction industry similar to other countries, work–life balance as well as maintaining balanced mental health is increasingly becoming difficult for employees (Finestone and Snyman, 2005; Mostert, 2006; Bowen *et al.*, 2018; Raliile and Haupt, 2023). South African companies are known to be culturally diverse and heavily integrated into the global economy, and this comes with a burden to create a sustainable, international and competitive advantage through human capital (ibid). Also, there is a shortage of skilled workforce, and the remaining skilled workers carry a heavy burden of work (Jinabhai, 2005; Raliile and Haupt, 2023).

Although occupational stress emanating from construction activities can be manageable and treated like any other occupational health and safety risk when addressed at an organisational level, the challenge lies in identifying how workers cope, given the diversity of the population. Therefore, it is imperative to address occupational stress and well-being issues in relation to specific mediators and moderators to gain an in-depth understanding of how workers cope with stress and how different coping strategies affect well-being. It is hoped that the focus on specific cross-cultural studies investigating the extent of coping mechanisms and their prevalence will assist in the development of effective stress management tools and contribute to the understanding of how workers appraise occupational stress. Further, to ensure sustainable and resilient delivery of infrastructure projects, workers should be able to perform optimally to grasp the concepts of design, technology and engineering. Therefore, it is essential to ensure the sustainability of the workforce by ensuring that workers use effective coping strategies.

Methodology

In this cross-sectional study, quantitative data were collected from construction companies in South Africa. A cross-sectional study was adopted due to the limited duration for conducting the study. A quantitative research design was preferred in tandem with the positivist philosophy and objective of hypothesis testing because the study was concerned with "the truth" about the social world, through observable and measurable facts to formulate universal law-like generalisations. The population of the study was the construction workforce working on construction sites. The workforce consisted of three categories, construction project professionals, construction labourers and artisans, representative of all workforce categories on construction sites. The study focused on contractors only because of the lack of studies focusing on this area in South Africa. Questionnaires were sent via Google Forms to a list of identified contractors on the Master Builders South Africa (MBSA) database, a leading national representative body in the building and construction industry in South Africa with over 4,000 members. Further questionnaires were distributed physically to construction personnel on sites across South Africa. This sampling method maximised the responses because the study was conducted within a limited period of six months. Convenience sampling was used based on the proximity and familiarity of the sample population to the researcher as well as the experience of the companies and their compliance with statutory requirements. Further, some respondents were recommended by other participants – a variant of snowballing sampling technique. After receiving the questionnaires, data were screened for missing data, disengaged responses, extreme values and outliers. After data screening, total of 201 questionnaires from over 50 contractors and their sub-contractors – CIDB Grades 1–9, working on large projects at the time were suitable for analysis, and a response rate of 56% was achieved. The sample size met the minimum recommended sample size of 200 subjects appropriate for EFA and SEM (Hair *et al.*, 2017). The questionnaire included the constructs coping with both adaptive and maladaptive coping, occupational stress (OccS) and the psychological well-being using WHO-5 Well-being Index Measure.

The WHO-5 measure for subjective well-being, sometimes referred to as psychological well-being, was used because it is easy to interpret and understand and because it is a validated measure used across all disciplines to measure the subjective well-being of the general population. This was the validated measure used due to its general applicability. The author designed other questionnaires because of the lack of generally applicable psychometric measures designed for the construction workforce. Exploratory factor analysis (EFA) was conducted to assess whether the questions measured what the researcher intended to measure. Own questionnaires were developed based on existing literature and the psychological stress theories. The use of validated instruments may not necessarily apply in cross-cultural studies, especially for coping and occupational stress, due to diverse cultural practices and the perceptions around mental problems. After EFA was conducted, confirmatory factor analysis and structural equation modelling were used to test the hypothesised relationships. IBM Statistical Package for Social Sciences (SPSS) v28 was used for descriptive statistics and EFA, and IBM Amos v28 for CFA and SEM. Process macro v4.2 was also used to test the mediation and moderation relationships.

Descriptive statistics was used to analyse and to interpret the WHO-5 results in conjunction with the WHO-prescribed scoring system. The WHO-5 comprises of five items: "I have felt cheerful and in good spirits", "I have felt calm and relaxed", "I have felt active and vigorous", "I woke up feeling fresh and rested" and "My daily life has been filled with things that interest me". Based on the six-point Likert scale, the respondents were presented with a statement "Please indicate for each of the five statements which is the closest to how you have been feeling over the last two weeks". Further, composite reliability, average variance explained and Cronbach's alpha were used to determine the reliability and validity of the constructs.

This study received ethical clearance from the General Human Research Ethics Committee (GHREC) (Ethical Clearance Number: UFS-HSD2021/2006 / 22) at the University of the Free State. Informed consent was granted from the respondents before conducting the study, and all research protocols were followed according to the requirements of the GHREC.

Results

The analysis of the data collected and the findings are presented in this section. Data were analysed using IBM SPSS version 28. Tables were used to present data and key findings.

Respondents

The respondents of the study were the construction workforce working for construction companies across South Africa. The sample consisted of construction workers/labourers, artisans and construction project professionals (CPP), all grouped under the phrase "the construction workforce". Table 1 presents the profile of the respondents of the study.

In Table 1, the findings revealed there were more male respondents (81.6%) than female respondents (18.4%) from the sample. The results differ from those of the usual gender distribution of the construction workforce in South Africa, which usually has fewer than 12% female workers (MBAWC, 2018). Most respondents were between the age groups 25 and 34 years (43.3%). The second most prevalent age group was between 35 and 44 years (32.3%), followed by 45–54 years (11.9%), then 18–24 years (8.0%) and lastly, 55–64 years (4.5%). In contrast to other occupations, the construction workforce consists of older workers as a result of the ageing workforce and lack of interest from the youth to seek employment in the sector. The average age of construction workers is 42.5 (BLS, 2019). However, from Table 1, most respondents were between 25 and 34 years of age. This can be

Table 1. Respondents' profile

	Frequency	%
Gender		
Male	164	81.6
Female	37	18.4
Total	201	100.0
Age		
18 to 24	16	8.0
25 to 34	87	43.3
35 to 44	65	32.3
45 to 54	24	11.9
55 to 64	9	4.5
Total	201	100.0
Education level		
Primary/elementary school	24	11.9
Secondary/high school	119	59.2
Technical/vocational qualification	19	9.5
University degree	35	17.4
No formal schooling	4	2.0
Architect	4	2.0
Construction manager	7	3.5
Health and safety manager/officer	10	5.0
Project manager	5	2.5
Quantity surveyor	11	5.5
Civil engineer	6	3.0
Forman/supervisor	15	7.5
Artisan	15	7.5
Construction worker/labourer	124	61.7
Other (site clerk and storage managers)	4	2.0
Architect	4	2.0
Total	201	100.0

Source: Authors' own work

attributed to recent changes because of the COVID-19 pandemic as employment trends resulted in the youth experiencing the highest employment between February 2020 and March 2021 (32.5% to 35%), while older workers experienced a decrease from 45% to 41%. Therefore, the findings represent the current employment-to-population ratios in the industry. The data for this study were collected from site personnel working for contractors and are representative of the construction workforce. Construction workers (labourers) and artisans make up about 55% to 70% of its workforce, while construction professionals are between 30% and 45%. When categorising the working groups into CPPs and artisans/labourers, the percentage distribution is 29%:71%. Therefore, the sample represents the population of interest adequately.

Exploratory factor analysis

The questionnaire for data collection on occupational stress and coping was developed by the researcher based on literature and the psychological stress model. To test for construct validity and to determine the number of factors necessary to explain the interrelationships

among the set of variables measuring the constructs OccS and coping, EFA was used. Therefore, EFA assisted in the identification of variables deemed suitable for measuring the factors of concern.

Data inspection for occupational stress and coping

To conduct EFA, data inspection techniques were conducted to determine the sample adequacy required for EFA. The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test for sphericity were used to test for sample adequacy. Based on the results in Tables 2 and 3, the sample met the size and variance requirements for conducting EFA based on the recommended thresholds for KMO (above 0.60) and Bartlett's test for sphericity ($p < 0.05$) (Hair *et al.*, 2017).

Factor extraction and rotation

The preferred factor extraction method was principal component analysis (PCA) because the research instrument of this study was designed by the author. PCA is data-driven and provides an empirical summary of the data. There was no underlying theory about the factor structure available precluding factor analysis (FA) in for the current study. Therefore, no prior assessment of the factor structure of the primary data existed. Only one solution was extracted for each of the constructs OccS, maladaptive coping and adaptive coping. There was no need for factor rotation for this construction. The solutions were, therefore, considered unidimensional and adequate evidence of convergent and discriminant validity was provided for the constructs.

For OccS, the correlation values of six components (depression, anxiety, stress, post-traumatic stress disorder and burnout) were above the recommended cut-off value of 0.30 and < 0.90. For coping, the correlation values for the six components (sport/exercising, spending time with friends, talking to someone, hobbies, sleeping and relaxing and walking in nature) measuring *adaptive coping* and the three components (alcohol consumption, cigarette smoking, cannabis smoking) for *maladaptive coping* were above the recommended

Table 2. KMO and Bartlett's test CMDs

Kaiser–Meyer–Olkin measure of sampling adequacy		0.804
Bartlett's test of sphericity	Approx. chi-square	421.066
	df	15
	Sig.	0.000

Source: Authors' own work

Table 3. KMO and Bartlett's test coping

Kaiser–Meyer–Olkin measure of sampling adequacy		0.767
Bartlett's test of sphericity	Approx. chi-square	535.033
	df	36
	Sig.	0.000

Source: Authors' own work

cut-off value of 0.30 and less than 0.90. The other components were dropped, and the retained components were deemed the most suitable for testing the hypothesised relationships.

The WHO-5 Well-Being Index

The WHO-5 was used to measure the subjective well-being of the individuals. It is a validated well-being measure, and there was no need to conduct EFA. However, CFA and validity and reliability for the instrument were conducted along with other three constructs of the study. Table 4 presents the descriptive statistics for the overall score. According to the WHO-5, well-being is determined by calculating the raw score, which is calculated by totalling the numerical values of the five answers – in this case, the five means – where the raw scores range from 0 to 25, 0 representing the worst possible and 25 representing the optimum quality of life. The raw score is multiplied by 4 to obtain a percentage score ranging from 0 to 100 whereby, 0 represents the worst possible, whereas a score of 100 represents the optimum quality of life.

From Table 4, the total score was determined by adding $4.04 + 3.95 + 3.87 + 3.85 + 3.77$, which equated to 19.48. Furthermore, $19.48 \times 4 = 77.92$. Therefore, the WHO-5 score = 77.92. The score is above the cut-off score, which is determined as ≤ 50. Scores < 50 are indicative of poor well-being. Therefore, it may be inferred that the workers had an overall good well-being, although not optimum well-being.

Confirmatory factor analysis (CFA)

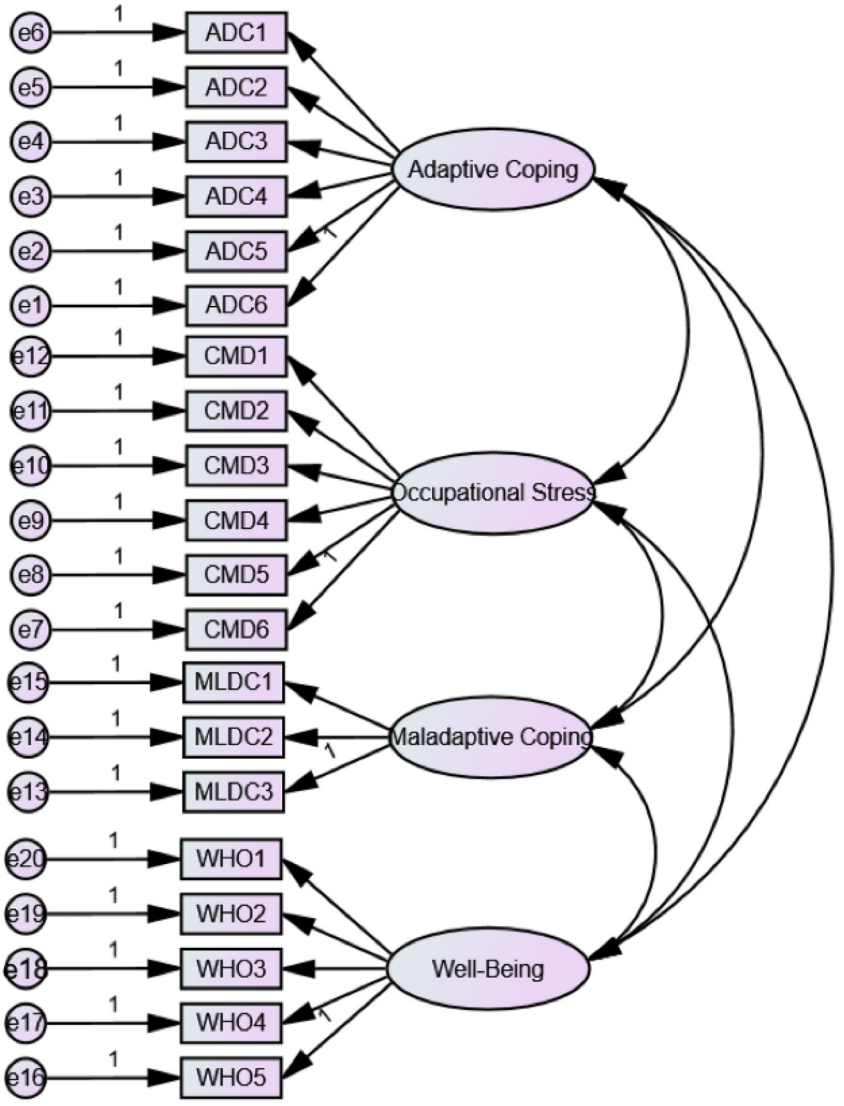
CFA was performed in AMOS v28. The model was assessed for convergent validity and discriminant validity. Contrary to CFA, EFA is based on reasoning, which is *a posteriori*, in that it is data-driven, while CFA is based on reasoning, which is *a priori*, in that it is based on theoretical considerations (Figures 1 and 2). Therefore, assessing reliability and validity is a further check on how well the measurement items fit the theory *a priori*. The reliability and validity statistics are based on the factor loadings from the CFA and are shown in Table 5.

From Table 5, the standardised factor loadings of all items were > 0.40, which is the minimum recommended for a sample size of 200 (Hair *et al.*, 2017). The recommended threshold values for the parameters are AVE ≥ 0.5. However, AVE = 0.40 can be accepted if the CR > 0.60 for the construct (Hair *et al.*, 2017). The recommended threshold for CR between 0.60 and 0.70 is appropriate (ibid). Although 0.60 is sometimes used as a lower cut-off value, 0.50 is considered acceptable (ibid). Cronbach's alpha and composite reliability for all variables are > 0.70, so it shows that the variables had good reliability.

Table 4. WHO-5 Well-being Index measure

	N	Mean	SD
I have felt cheerful and in good spirits	201	4.04	1.296
My daily life has been filled with things that interest me	201	3.95	1.379
I woke up feeling fresh and rested	201	3.87	1.412
I have felt calm and relaxed	201	3.85	1.244
I have felt active and vigorous	201	3.77	1.341

Source: Authors' own work

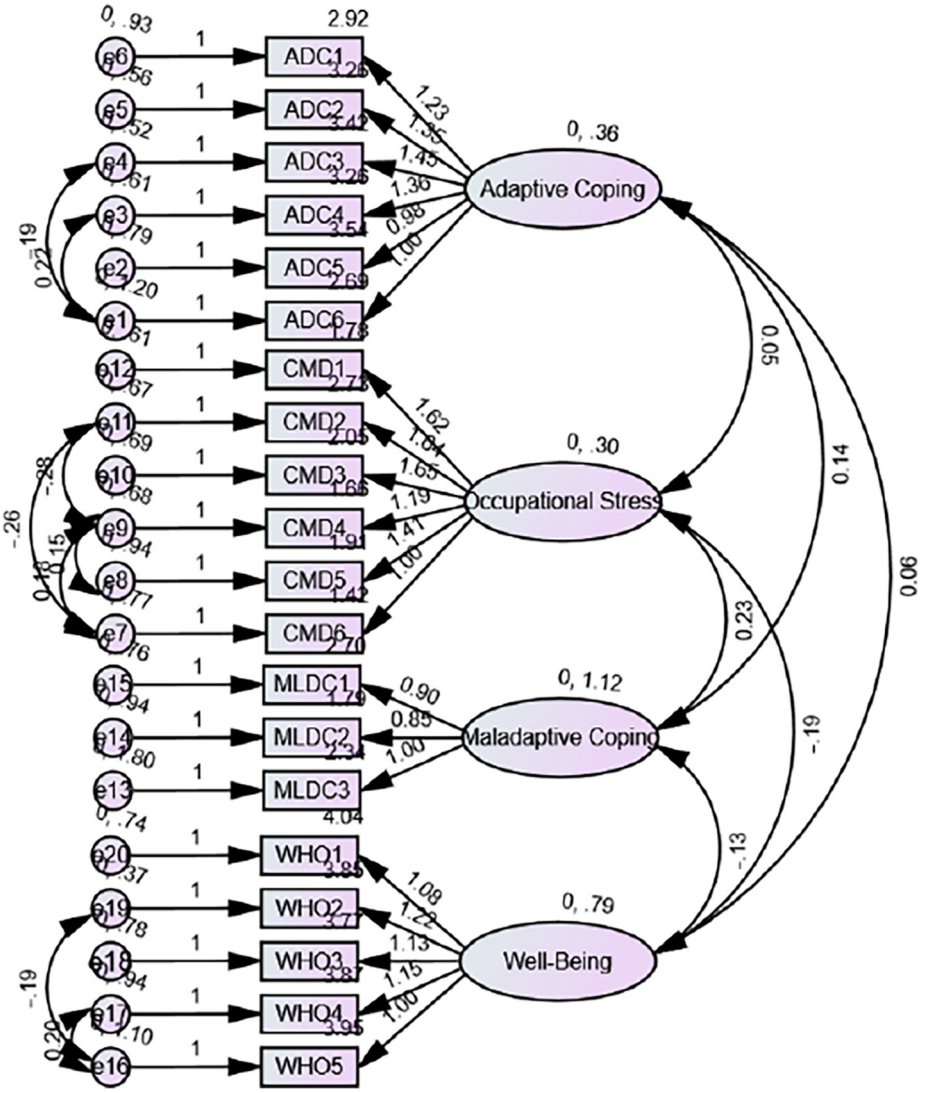


Source: Authors own work

Figure 1. CFA preliminary model

Testing the hypothesised relationships: structural equation modelling

To test the hypothesised relationships *adaptive coping (ADC) and maladaptive coping (MLDP) mediate/moderated the relationship between occupational stress (OccS) and well-being (WB)*, structural equation modelling was used to test the relationships between the constructs indicated in Figure 3. However, before conducting the moderation and mediation relationships, direct relationships were tested.



Source: Authors own work

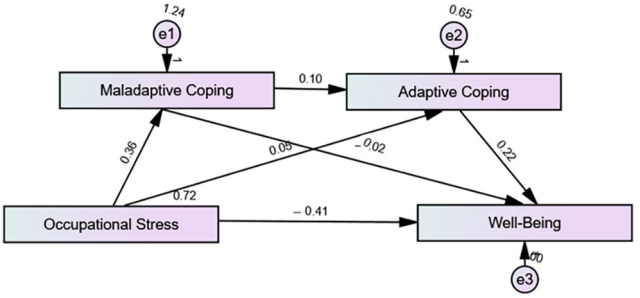
Figure 2. CFA final model

For the hypothesised relationships based on path analysis, there was no significant relationship between occupational stress and adaptive coping (β = 0.083, p = 0.502). The hypothesised relationship between occupational stress and maladaptive coping was supported (β = 0341, p < 0.000). Further, maladaptive coping was significantly and positively associated with adaptive coping (β = 0.190, p < 0.047). Also, the hypothesized relationship

Table 5. Reliability and validity

	Constructs	Item correlation	Factor loading	CR	AVE	Alpha
	Common mental disorders (CMDs)					
1	Depression	0.683	0.756	0.782	0.446	0.825
2	Stress	0.528	0.628			
3	Anxiety	0.653	0.735			
4	PTSD	0.588	0.644			
5	Burnout	0.621	0.677			
6	Suicidality	0.488	0.546			
	Maladaptive coping					
1	CopingMLC1/MLDP	0.532	0.724	0.543	0.462	0.710
2	CopingMLC2/MLDP	0.559	0.69			
3	CopingMLC3/MLDP	0.525	0.622			
	Adaptive coping					
1	CopingAC1	0.568	0.622	0.765	0.426	0.807
2	CopingAC2	0.630	0.728			
3	CopingAC3	0.611	0.728			
4	CopingAC4	0.689	0.761			
5	CopingAC5	0.465	0.539			
6	CopingAC6	0.448	0.491			
	WHO Well-being Index					
1	WHO1	0.683	0.804	0.805	0.747	0.863
2	WHO2	0.737	0.81			
3	WHO3	0.686	0.666			
4	WHO4	0.709	0.761			
5	WHO5	0.597	0.813			

Source: Authors' own work



Source: Authors own work

Figure 3. Structural equation model

between occupational stress and well-being was negatively significant ($\beta = –0.411$, $p < 0.000$). However, maladaptive coping and well-being were not significantly associated ($\beta = –0.019$, $p < 0.767$). Lastly, adaptive coping was significantly associated with well-being. Based on these findings, the hypothesised relationships for *H2*, *H3*, *H4* and *H6* were supported.

However, *H1* and *H5* were rejected because the *p*-value is not significant and did not support the hypothesised relationships.

Mediation test

The mediation relationships were conducted by treating occupational stress as an independent variable and well-being as the dependent variable. Adaptive coping and maladaptive coping were treated as mediating variables. Mediation analysis was performed by using the total effects, direct effects and indirect effects based on bootstrap procedures (5,000 samples) and bias-corrected bootstrap confidence interval (95%) Model 6 in Process macro v4.2. The results are provided in Table 7.

Table 6. Hypothesised direct relationships

H. no.	Comments	Paths	Regression estimate	*P*	Remarks
H1	Positive significant	Occupational stress → adaptive coping	0.083	0.502	*H1* rejected
H2	Positive significant	Occupational stress → maladaptive coping	0.341	***	*H2* supported
H3	Positive significant	Maladaptive coping → adaptive coping	0.190	0.047	*H3* supported
H4	Negative significant	Occupational stress → well-being	−0.411	***	*H4* supported
H5	Negative significant	Maladaptive coping → well-being	−0.019	0.767	*H5* rejected
H6	Positive significant	Adaptive coping → well-being	0.217	0.013	*H6* supported

Notes: Model fitness: $x2/df = 1.684$; CFI = 0.928; RMSEA = 0.058; NFI = 0.842; RFI = 0.808; IFI = 0.929; TLI = 0.912 and CN = $p < 0.05$
Source: Authors' own work

Table 7. Mediation analysis

H. no.	Path	Total effects	Direct effects	Indirect effects	Remarks
H7	OccS > MLDC > WB	−0.400***	−0.411***	−0.005 (ns)	*H7* rejected because indirect effect is not statistically significant
H8	OccS > ADC > WB	−0.400***	−0.411***	0.008 (ns)	*H8* rejected because indirect effect is not statistically significant
H9	OccS > MLDC > ADC > WB	−0.400***	−0.411***	0.006*	*H9* is supported because the indirect effect is statistically significant

Notes: ns = non-significant; *< 0.05; **< 0.01; ***< 0.001
Source: Authors' own work

The result in Table 7 indicates that based on the hypothesised relationship, adaptive coping did not mediate the effects of OccS and WB (β = –0.005, $p > 0.05$) and maladaptive coping (β = 0.008, $p > 0.05$) as mediators between occupational stress and well-being, also did not have any significant relationship between OccS and WB. However, when both maladaptive coping and adaptive coping acted as mediators, there was partial mediation (β = 0.006, $p < 0.05$) based on the statistically significant indirect relationship.

Moderation test

The moderation analysis was conducted by treating occupational stress as an independent variable and well-being as the dependent variable. Adaptive coping and maladaptive coping were treated as moderating variables. Moderation analysis was performed in Process macro v4.2 using Model 1 for each moderation relationship. The results are provided in Table 8.

The results in Table 8 indicate that the relationship between OccS and WB was moderated by ADC (β = 0.222, $p < 0.05$), and therefore, *H10* was supported. Additionally, the slope analysis in Figure 4 was analysed to further explain the interaction. The slope diagram explains low (2.50) to medium (3.00) to high (4.00) adaptive coping practices. Individuals with low adaptive coping practices were more susceptive to decreased well-being when faced with occupational stress the individuals who had used higher adaptive coping strategies. On the contrary, MLDC did not moderate the relationship between OccS and WB (β = 0.133, $p > 0.05$). Based on the result, low (1.00) and medium (2.00) had a significant relationship, except for high MLDC practices. Therefore, based on the path diagram in Figure 5, maladaptive coping affected the individuals with higher well-being more than individuals with moderate well-being who highly adopted MLDC when faced with OccS.

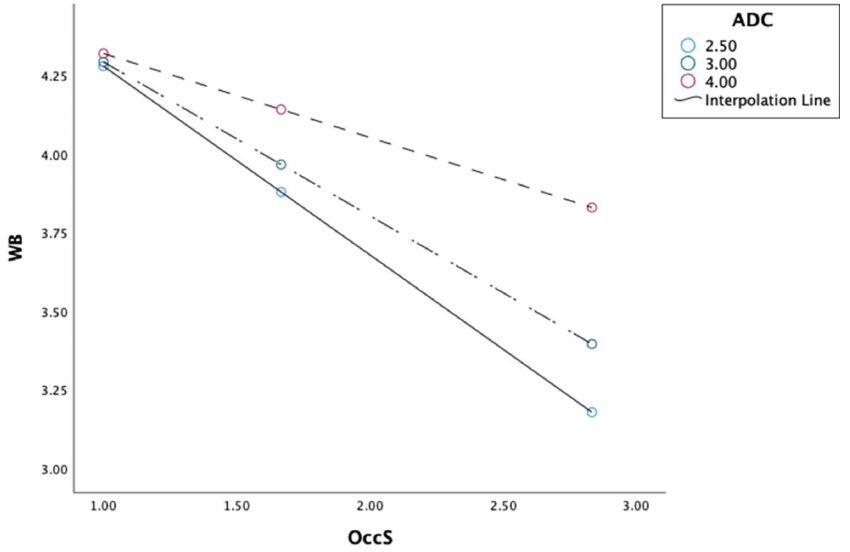
Discussion

The results in Table 6 show that of the six hypothesised direct relationships, four hypotheses were supported, and two were rejected. Contrary to the expectation, *H1* revealed a non-significant relationship between occupational stress and adaptive coping. According to the psychological stress theory, the coping strategies an individual adopts determine how well one will handle a stressful situation (Lazarus and Folkman, 1984). It may be inferred that the adaptive coping strategies investigated in the study were not effective in the occupational stressors experienced by the workers. The study focused on social support (talking to friends/loved ones; talking to someone), active coping (sports/exercise; hobbies), spiritual coping (spending time in nature) and avoidance coping (sleeping), which may temporarily be adaptive in some instances. Therefore, further studies should focus on a combination of problem-based coping and emotional-based coping.

Table 8. Moderation test

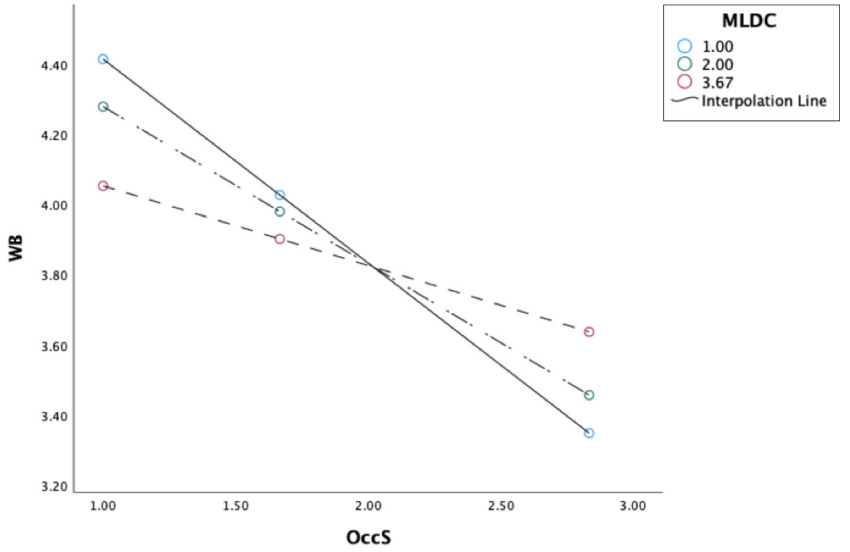
H. no.	Path	Estimate	S.E.	*T*	*P*	Remarks
H10	OccS*ADC > WB	0.222	0.090	2.463	0.015	Supported
H11	OccS*MLDC > WB	0.133	0.0689	1.923	0.055	*H10* not supported (high MLDC is not a significant path)

Source: Authors' own work



Source: Authors own work

Figure 4. Adaptive coping (ADC) as a moderator between occupational stress (OccS) and well-being (WB)



Source: Authors own work

Figure 5. Maladaptive coping (MLDC) as a moderator between occupational stress (OccS) and well-being (WB)

Further, occupational stress had a positive significant relationship with maladaptive coping. This aligns with most literature findings (Langdon and Sawang, 2018; Minchin *et al.*, 2006; Schulte and Hser, 2014). The three maladaptive coping strategies investigated were alcohol consumption, cigarette smoking and cannabis smoking. These drugs have been linked with several mental disorders, such as depression and anxiety. They may distort perception and affect the workers' performance. In the construction industry, most workers resort to maladaptive coping as psychostimulants avert the effects of common mental disorders resulting from work stressors (Bowen *et al.*, 2014). According to the psychological stress theory, coping actions are not classified according to their effects, such as the distortion of reality, but in relation to specific characteristics of the coping processes to avert any perceived threats. This is a challenge for the industry, which relies heavily on manpower and a call for serious intervention to educate workers on how to cope with work demands positively. Worth notice was also the realisation that maladaptive coping may be averted by resorting to adaptive coping strategies based on the significant relationship (*H3*).

From the findings, it was not surprising that occupational stress negatively affected the well-being of the workers. Lazarus and Folkman (1984) posited that job demands lead to physiological, behavioural or psychological manifestations of stress and, subsequently poor well-being. However, the findings further revealed that adaptive coping was significantly and positively associated with well-being. Therefore, it may be inferred that adaptive coping minimises the effects of occupational demands on individual workers. In addition, surprisingly, there was no significant relationship between maladaptive coping and well-being. The opposite would have been expected based on the literature. In this case, it may be inferred that coping is the cognitive and behavioural efforts made to master, tolerate or reduce external and internal demands and conflicts among them, as posited by Lazarus. Based on the Lazarus theory, it is unclear if workers resorting to substances may have constituted a temporary positive factor as there is some anecdotal evidence among construction workers that the use of some drugs, such as cannabis, gives them strength (Haupt *et al.*, 2019). Further, the findings of the study were based on subjective well-being. Therefore, to understand the extent of the effects of maladaptive coping on well-being, a holistic approach, which encompasses both hedonic and eudemonic well-being, should be investigated.

For the hypothesised relationships of the study: *adaptive coping and maladaptive coping mediate the relationship between OccS and well-being*, there was no significant relationship, suggesting that neither adaptive coping nor maladaptive coping mediated the effects of common mental disorders and well-being. However, it was only when both maladaptive and adaptive coping were mediators that the relationship was significant, and a partial mediation occurred. Therefore, it may be inferred that both maladaptive coping and adaptive coping partially mediated the relationship between occupational stress and well-being. Workers who resorted to maladaptive coping and then adaptive coping had mediated the effects of occupational stress as opposed to those who had applied either adaptive or maladaptive coping.

To further understand the relationships between occupational stress and well-being, coping was introduced as a moderator. The hypothesised relationships were (*H10*) adaptive coping moderates the effects of occupational stress on well-being. The second moderation relationship was hypothesised as (*H11*) maladaptive coping moderates the effects of occupational stress on well-being. For *H10*, adaptive coping buffered the effects of occupational stress on well-being based on the positive and significant relationship. This is in line with several literature findings and with the psychological stress theory. Adaptive coping operates as a mental health protective factor, which is effective in combating stressors

(Cox, 1978). Coping processes may try to alter the person–environment realities behind stress, or they could also relate to internal elements and try to change the appraisal of the demanding event (Lazarus and Folkman, 1984; Folkman and Lazarus, 1980). Contrarily, for *H11*, there was no significant relationship between maladaptive coping as a moderator for occupational stress and well-being. Both OccS and MLDC affect well-being negatively, and the lack of significance could be attributed to the negative effects. However, it is difficult to know and to assess how different degrees of stress in comparison to MLDC affect well-being, although the findings did reveal that the moderation is significant at low to medium levels of MLDC use/practices.

Conclusion

This study investigated the direct relationships between coping, occupational stress and well-being; coping as a mediating effect between occupational stress and well-being; and the moderating effects of coping on occupational stress and well-being. It is hoped that the findings of this article will help inform industry practitioners on how to improve safety culture in organisations. Mental health is the Achilles heel of the construction industry, and awareness of these issues will contribute to a sustainable workforce and a productive industry. For adaptive coping, the study only focused on active coping, avoidance coping, social support and spiritual coping. Further studies should focus on the combination of emotional-focused coping and problem-focused coping strategies. Future research should investigate well-being holistically to identify other areas of concern. The current study only focused on wellness in relation to subjective well-being due to the ease of administering the WHO-5 Well-being Index. Future research should also focus on using a mixed-method approach and other psychological well-being health scales to gain an in-depth understanding of the workers' mental health. It is also recommended that a country-specific scale should be used due to cross-cultural differences. Further, the sampling method used in the study faces challenges associated with self-report questionnaires, such as response bias, social desirability, introspective ability, understanding and limitations with rating scales. This study is important as it informs areas of concern regarding different coping strategies used by the construction workforce and how they affect workers' well-being. Important emerging issues from the study were the lack of mediation between the hypothesised relationships for adaptive coping and maladaptive coping when each was tested. This may be attributed to the types of coping strategies investigated. Also, maladaptive coping did not buffer the effects of occupational stress and well-being. This is interesting and calls for further investigation. Another issue is the insignificant relationship between maladaptive coping and well-being. Although it is widely accepted that maladaptive coping affects well-being, this was not the case. Therefore, it is imperative to investigate the perceptions of the workers towards substances because the study only focused on subjective well-being in relation to the WHO-5 Well-being Index.

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