Managing Mental Health

in the Multicultural Construction Workforce

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Statement of authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

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Declarations

This thesis was edited by Elite Editing, and editorial intervention was restricted to Standards D and E of the *Australian Standards for Editing Practice*.

Papers arising from this PhD research

Journal papers

Published

1. Liu, Q, Feng, Y, London, K & Zhang, P 2022, 'Influence of personal characteristics and environmental stressors on mental health for multicultural construction workplaces in Australia', *Construction Management and Economics*, DOI: 10.1080/01446193.2022.2127154.

This paper examined the role of personal characteristics and environmental stressors in construction workers' mental health in a multicultural environment. It addressed Objective 1 of this research.

2. Liu, Q, Feng, Y & London, K 2021, 'Theorizing to improve mental health in multicultural construction industries: an intercultural coping model', *Buildings*, vol. 11, no. 12, p. 662.

This paper is a review paper that presented the development of a conceptual framework for managing mental health in a multicultural construction workforce. It theoretically addressed Objective 2 of this research.

Under review

1. Liu, Q, Feng, Y, London, K & Zhang, P, 'Environmental stressors and coping strategies in multicultural construction workplaces', *Construction Management and Economics*.

This paper investigated the role of intercultural coping strategies in influencing the relationship between environmental stressors and psychological outcomes in a multicultural construction workplace. It addressed Objective 3 of this research.

Working paper

1. Liu, Q, Feng, Y, London, K & Zhang, P, 'Developing intercultural coping in a multicultural construction environment: An empirical analysis in the Australian construction industry'.

This paper empirically examined the concept and role of intercultural coping in managing mental health in a multicultural construction workplace. It empirically addressed Objective 2 of this research.

Conference papers

1. Liu, Q, Feng, Y, London, K & Zhang, P 2022, 'Stressors in the multicultural construction working environment', in *Proceedings of the 22nd CIB World Building Congress*, 27–30 June 2022, Melbourne, Australia.

2. Liu, Q, Feng, Y, London, K & Zhang, P 2020, 'Conceptual model for managing mental health in the culturally diverse construction workforce', in *Proceedings of the 36th Annual ARCOM Conference*, Association of Researchers in Construction Management, UK, 7–8 September 2020, pp. 595–604.

3. Liu, Q, Feng, Y, London, K & Tang, L 2019, 'Mental health issues in the culturally diverse construction workplace: a literature review', in *Proceedings of the 24th International Symposium on Advancement of Construction Management and Real Estate,* Springer, Singapore, pp. 2229–2238.

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List of abbreviations

ABS   Australian Bureau of Statistics

AVE   Average Variance Extracted

CFA   Confirmatory Factor Analysis

GHQ   General Health Questionnaire

HTMT   Heterotrait-monotrait Ratio

LOC   Locus of Control

LVS   Latent Variables Scores

MINI   Mini International Neuropsychiatric Interview

OSI   Occupational Stress Indicator

PLS   Partial Least Squares

SEM   Structural Equation Modelling

SPSS   Statistical Package for Social Sciences

TABP   Type A Behaviour Pattern

TBBP   Type B Behaviour Pattern

VIF   Variance Inflation Factors

WHO   World Health Organization

WHS   Work Health and Safety

WMH   World Mental Health

Abstract

Owing to the intricate nature of the construction industry, construction workers are exposed to a range of stressors that have resulted in significant mental health problems. Simultaneously, there has been a growing trend of cultural diversity within the construction industry. Accordingly, mental health in multicultural construction workplaces has emerged as an important issue. Although existing interventions have provided valuable insights into addressing mental health problems, they have not adequately responded to the multicultural nature of the contemporary construction work environment. To achieve the sustained enhancement of psychological well-being, there is a need for effective management of mental health for the multicultural construction workforce.

The purpose of this study is to improve the mental health of construction workers in multicultural construction workplaces. Specifically, the aim of this research is to (1) examine the effects of personal and environmental determinants on construction workers' mental health outcomes, (2) develop a positive coping approach in multicultural construction workplaces, (3) investigate the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces and (4) develop a model for managing mental health of workers in multicultural construction workplaces. To achieve these research aims, a quantitative approach and a survey research design were employed. An online questionnaire was used to collect data from the Australian construction industry. The structural equation modelling (SEM) technique with partial least squares estimation (PLS) was adopted for data analysis. The key findings of this study are as follows.

First, construction workers' mental health is not only influenced by stressors related to work environment, but also individual traits. Increased levels of cultural stressors tend to aggravate the adverse effect of work stressors on mental health. Work stressors are more likely to cause mental ill health for the individuals characterised by higher level of aggressive, competitive, ambiguous and impulsive personalities; whilst cultural stressors are less likely to cause mental ill health for those individuals.

Second, this study developed a positive coping approach, namely, intercultural coping. The results of this study confirmed that there is a positive relationship between intercultural coping and mental health. Intercultural coping features three dimensions: affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping. Hence, mental health outcomes of construction workers can be improved by their affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping.

Third, the results confirmed the effectiveness of different types of coping strategies in managing different types of stressors in multicultural construction workplaces. A worker who is open to cultural dissimilarity tends to suffer less the adverse effect of cultural stressors on mental health. A worker with cognitive complexity is less susceptible to the adverse impact of work stressors on mental health. Whereas, a worker who is performance-oriented is more vulnerable to the impact of work stressors on mental health.

Fourth, the model developed in this study presents a detailed and comprehensive perspective on managing mental health in a multicultural construction context. Overall management of mental health can be achieved by (1) reducing the identified work and cultural stressors of

mental ill health in the workplace, (2) modifying vulnerable personal traits and matching personal traits with job demands, (3) improving intercultural coping and (4) designing effective intercultural coping strategies for specific types of stressors.

The findings of this study contribute to the knowledge of mental health management by identifying the direct and interactive effects of person–environment determinants on mental health outcomes. The development of a positive coping approach, namely, intercultural coping, provides a new perspective on managing mental health. This study also uncovered the moderating effect of intercultural coping strategies on the relationship between stressor and psychological outcome. Furthermore, a model for managing mental health of workers in multicultural construction workplaces was established, which may serve as a framework for construction organisations to devise effective mental health interventions.

Keywords: Construction workers, coping, culture, intercultural competence, mental health, multicultural workplace, stressors.

Chapter 1: Introduction

1.1 Research background

The construction industry is notorious for its challenging, stressful and dangerous working environment (Chan, Nwaogu & Naslund 2020). Mental ill health is a prevalent issue in the construction industry globally. Construction workers have suffered from various mental health problems, including anxiety, depression and stress (Lingard & Turner 2017). According to a report from MATES in Construction (2018), an average of one in five people in the Australian construction workforce experience a diagnosable mental health condition in any 12-month period. In 2017, Construction News revealed that 55% of construction workers in the United Kingdom (UK) have experienced mental health problems at some point in their life, with 42% developing these issues from their work environment (Alderson 2017). More recently, a study in Canada uncovered that 83% of construction workers have suffered mental ill health ranging from moderate to strong in degree (BCBuildingTrades 2020).

Severe consequences result from mental health issues in the construction workplace. Suicide rates in the construction sector are higher than those in other occupations (Milner & Law 2017). The construction industry is male-dominated, and male workers are at a higher risk of suicide than female workers (World Health Organization [WHO] 2014). Certain job-specific features of construction—such as job insecurity, underemployment and long periods of working away from home—also contribute to the suicide risk for workers (Martin et al. 2016). According to

statistics provided by the Suicide Mortality Review Committee (2016), the construction industry has the highest rate of suicide (6.9%) of all industries in New Zealand. Similarly, the suicide rate among low-skilled workers in the UK was 3.7 times the national average from 2011 to 2015 (Burki 2018). Additionally, the number of construction workers in Australia who commit suicide (24.6 per 100,000 persons) is six times more than that of fatalities resulting from accidents, and construction workers are more than twice as likely to commit suicide than other people (Lingard & Turner 2017; Milner 2016). Every year 190 Australian construction workers commit suicide, which equates to one death by suicide every second day (MATES in Construction 2020; Turner & Lingard 2020). Figure 1.1 shows the suicide rates for male construction and non-construction workers in Australia. Although suicide rates for both groups show a declining trend, the overall rate of suicide among construction workers is consistently much higher than among non-construction workers (Maheen, LaMontagne & King 2020). The high suicide rates in the construction sector underscore the significance of improving mental health for construction workers (Milner & Law 2017).
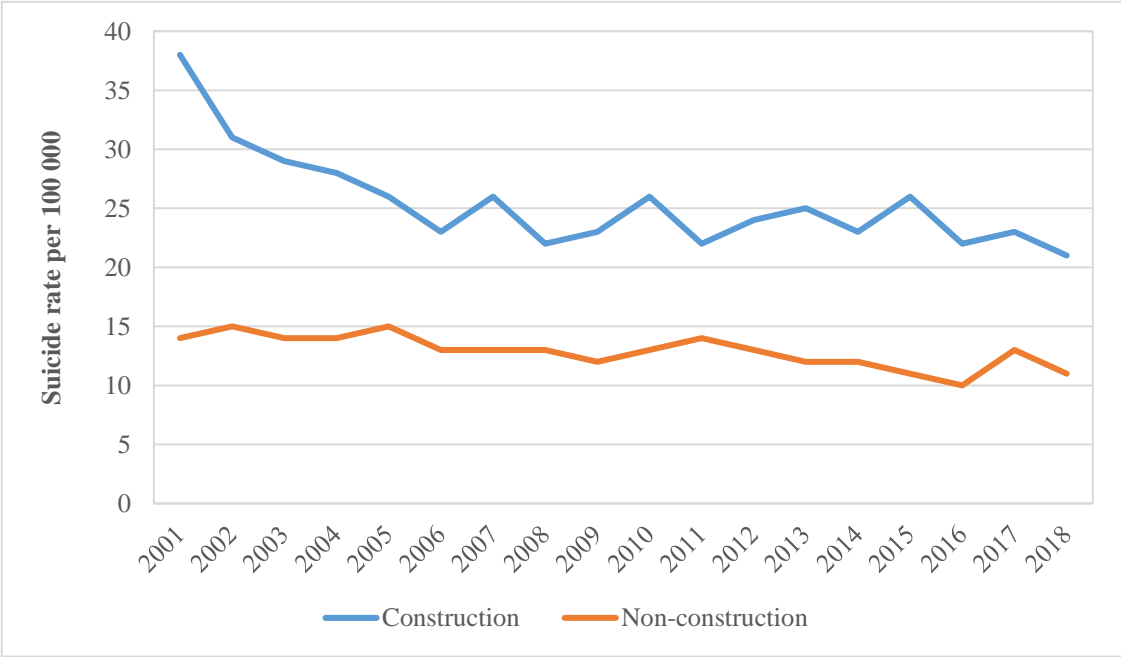
Figure 1.1: Age standardised suicide rates, male workers, construction and non-construction in Australia (per 100,000) (Maheen, LaMontagne & King 2020)

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The mental health problem is not only a social problem but has also led to considerable economic loss at an organisational and government level (Stevenson & Farmer 2017). For instance, in the UK, mental health issues led to 16 million lost working days in 2016 (Office for National Statistics 2017), a £40 billion loss to organisations and a £25 billion loss to government per year (Stevenson & Farmer 2017). For some decades, presenteeism caused by mental disorders in the workplace has reduced productivity and generated significant loss of profits (Kessler et al. 2005). Similarly, the total cost of mental health problems to Australia's economy has been estimated at $200–$220 billion per year and at least $15.8–$17.4 billion for workplaces as reported by the Australia Institute and Centre for Future Work in 2021 (Carter & Stanford 2021). However, despite the huge economic loss caused by mental health issues, there is still a lack of resources available for mental health (WHO 2017). Against this background, it is imperative to devise effective interventions to improve mental health performance in the construction industry.

1.2 Research problem

For several decades, there has been an increasing trend of workforce diversity around the world (Findler, Wind & Barak 2007). The labour market has undergone significant changes at the organisational level (Pasca & Wagner 2011). A multicultural workplace refers to a culturally heterogeneous workforce working in a single organisation or location (DeSimone & Harris 1998; Starren et al. 2013). In this environment, various groups of people are distinguished by factors including ethnicity, traditions, values, attitudes, habits, languages and religions (Kundu 2001). Accordingly, a multicultural workforce refers to construction workers that come from different countries, speak multiple languages and have diverse cultural backgrounds working together in an organization (Kuoribo et al. 2022). Multiculturalism has been a persistent

challenge in the construction industry globally (Kissi, Babon-Ayeng & Agyekum 2022; Kuoribo et al. 2022). The prevalence of multicultural workplaces in the construction industry is demonstrated by the multicultural composition of the population in many countries, such as Australia, the United States (US), the United Kingdom (UK), the United Arab Emirates (UAE), Canada and Singapore, and the growing number of migrant workers on construction sites (Chan, Javed et al. 2017). For instance, migrant construction workers account for about 30% of the total construction manpower in Singapore (Statista 2020), 24% in the US (Siniavskaia 2020), and 13% in the UK (Office for National Statistics 2018).

Multiculturalism is one of the defining characteristics of Australian social and economic life (Loosemore et al. 2011). Australia is an immigration country. Around half of the current population (45% or 10.6 million) was either born overseas (26% or 6.2 million) or has at least one parent who was born overseas (19% or 4.5 million) (ABS 2017b; Department of Home Affairs 2018). More than 300 languages are spoken in Australia and nearly 20% of Australians speak a language other than English at home (ABS 2017c). This has been reflected in the demographics of workplaces, as around 13% of employees are born in non-English speaking countries and 23% of them are born overseas. In Australia, over half of the working population has contact with people from a different cultural background in their current working life (AimBig 2022). The Australian construction sector reflects the multicultural status of Australian workplaces more broadly. The Australian construction industry is among Australia's largest and most culturally diverse workplace environments (Loosemore et al. 2011). International migrant workers are at record levels and continue to grow in the Australian construction industry (Loosemore, Alkilani & Hammad 2021).

Cultural diversity and its impact on mental health has become a growing issue in today's globalised world, where intercultural interactions are progressing rapidly (Gopalkrishnan & Babacan 2015). A considerable amount of research in the field of psychology has indicated that cultural diversity plays a significant role in various aspects of mental health, ranging from the ways in which individuals view and understand mental illness to patterns of coping (Gopalkrishnan 2018). Increased workforce diversity brings about new and complex demands regarding accommodating workers' requirements, interests and backgrounds in the working environment, and thus may have a significant impact on their mental health outcomes (Pasca & Wagner 2011). In this context, workers may experience acculturation, which is 'a process of cultural and psychological change that results from the continuing contact between people of different cultural backgrounds' (Berry 2006b, p. 27). Cultural factors such as acculturation, cultural abuse, migration, racism and cultural disintegration have become major sources of mental ill health (Marsella & Yamada 2000). Meanwhile, a variety of cultural conflicts are generated during intercultural contact (Cano et al. 2015). Mistreatment of cultural conflict can make workers unproductive and lead to severe consequences (e.g. tensions, confusion and miscommunications among workmates, and stressful situations), which adversely affect their mental and physical health and further increase workplace accidents (Loosemore & Lee 2002). The construction industry has been notorious for being culturally intolerant (Wong & Lin 2014). In a challenging work environment, work-related hazards may pose greater risks to workers' mental health when accompanied by acculturation (Pasca & Wagner 2011). For instance, racial segmentation on construction sites brings about adverse intercultural relations among workers (Loosemore et al. 2011). Poor organisational culture also impedes interactions among workers from different cultural backgrounds (Yost & Lucas 2002). Consequently, workers' mental health problems may be exacerbated.

In light of the above, the effect of a multicultural environment on mental health has emerged as an important issue in the construction workplace. Considering the growing popularity of culturally diverse workplaces and the significant effects of cultural factors on mental health, there is a need to effectively address the mental health issues in multicultural construction workplaces. This study addresses this need.

1.3 Knowledge gap

Mental health problems are caused by a range of stressors facing the construction workforce (Nwaogu et al. 2019). Identifying the stressors in the workplace is important for a better understanding of the sources of mental health problems and to develop targeted interventions. Existing literature has explored the stressors of mental health in various sectors. The stressors have been grouped into many categories, such as job stressors, organisational stressors, personal/interpersonal stressors and environmental stressors (Cooper & Marshall 1976; Leung & Chan 2012; Tijani, Jin & Osei-Kyei 2020). These stressors have been demonstrated to play a significant role in producing poor mental health.

Previous studies have made substantial progress in identifying and investigating the stressors of mental health in the construction industry. Nevertheless, they have focused on work-related stressors and investigated their direct relationship to mental health outcomes. Personal factors that have important impacts on mental health have been less explored in many studies of the construction sector; how personal characteristics affect mental health remains unclear. Moreover, cultural factors have been acknowledged to have significant effects on mental health (Marsella & Yamada 2000). Many culture-related variables are significant sources of mental health problems and act as specific stressors (Marsella & Scheuer 1993). However, little research has investigated the relationships between cultural stressors and mental health

outcomes in the construction workplace (see Section 2.3 of this thesis). Consequently, there is a paucity of empirical research on some types of stressors (e.g. personal characteristics, cultural stressors) that have important effects on the mental health of the construction workforce. Additionally, the scope of existing research has been limited to a relatively homogeneous work environment (e.g. Adhikary et al. 2018; Chan, Leung & Liang 2018; Liang, Leung & Zhang 2021). The issue of mental health of a heterogeneous population in the construction workplace remains unexplored.

According to the transactional theory of stress and coping, mental health outcomes are determined by the interaction between personal and environmental variables (Lazarus & Folkman 1984). The interaction of various stressors in a multicultural workplace may exert different effects on mental health, and the level of mental health outcomes may vary under different circumstances. Current studies (e.g. Ahmed, Leung & Ojo 2022; Leung, Liang & Chan 2017; Sun et al. 2022) have typically examined the direct impacts of stressors on mental health but have failed to explore the interactive effects of personal and environmental factors on mental health. An in-depth and comprehensive examination of the interaction of personal and environmental variables and how they jointly affect the mental health outcomes of construction workers in multicultural workplaces has not been carried out.

Coping has been recognised as an important psychological intervention in responding to stressors and ameliorating psychological well-being (Wong, Wong & Scott 2006; Yip, Rowlinson & Siu 2008). Coping refers to a person's cognitive and behavioural efforts to manage the demands of a particular person–environment transaction that has relevance to the person's well-being (Folkman et al. 1986). Individuals adopt different coping strategies to cope with daily stressors and more extreme stressors (Gopalkrishnan 2018). A better understanding

of how people cope with stressors in multicultural contexts contributes to the prevention of mental ill health and promotion of good mental health (USDHHS 2001). A few studies have explored the role of coping in mental health management in the construction industry. These studies have mainly investigated the coping behaviours used by construction personnel to manage mental health problems following the framework of problem-focused and emotion-focused coping based on the cognitive theory of stress and coping (Lazarus & Folkman 1984). Findings of these studies have shown that construction workers adopt both adaptive (helpful) and maladaptive (harmful) coping strategies. Adaptive coping (e.g. problem-focused coping) strategies are associated with positive psychological outcomes (Nwaogu, Chan & Tetteh 2022), while maladaptive (e.g. emotion-focused coping) coping could lead to a higher level of mental ill health (Langdon & Sawang 2018; Minchin et al. 2006). Moreover, the dual coping framework (problem- and emotion-focused coping) positions coping as a reactive approach that is triggered by stressful events (Wong, Reker & Peacock 2006). Thus, this framework may be inappropriate in seeking to promote good mental health and maintain psychological well-being in multicultural workplaces. A few empirical studies have focused on approaches to managing mental health for onsite construction workforces (Nwaogu, Chan & Naslund 2022). Although they have provided helpful interventions for managing mental health for construction workers, the interventions focused on mitigating the sources and stressors of mental health issues for construction personnel. The positive role of coping in enhancing mental health has been neglected. Hence, current interventions may be inadequate in responding to the psychological issues in a multicultural workplace where new risk factors and interactive effects emerge. Against this background, positive coping approaches that can effectively improve mental health should be developed for the multicultural construction workforce.

Individuals employ coping strategies to alleviate negative psychological or physical consequences resulting from stressful events (Song 2009). Coping strategies can affect the relationship between stressors and psychological outcomes (Livneh & Martz 2007). Coping has emerged as a principal variable for moderating the relationship between stressor and psychological outcome. Coping effectively with stressful situations may diminish their adverse consequences for mental health (McCrae 1984). According to person–environment fit theory, good mental health is obtained through the congruence between personal skills and environmental demands (Edwards, Caplan & Harrison 1998; Lofquist & Dawis 1969). Therefore, adopting adaptive coping strategies can affect the person–environment fit and result in positive outcomes for individuals. However, despite the importance of adaptive coping, scarce research has been conducted to identify adaptive coping strategies and how they influence the relationship between environmental stressors and mental health outcomes in a multicultural construction workplace.

Therefore, in the context of construction workplaces, the gaps in our knowledge are (1) how determinants (e.g. work stressors, cultural stressors and personal characteristics) directly and jointly affect the mental health outcomes of construction workers in multicultural workplaces, (2) a positive coping approach for multicultural construction workplaces, and (3) how positive coping influences the relationships between environmental stressors (i.e. work stressors and cultural stressors) and mental health outcomes in multicultural construction workforces. This study will address these knowledge gaps.

1.4 Research aims and objectives

The purpose of this study is to improve the mental health of construction workers in multicultural construction workplaces. The specific objectives of this study are:

1. To examine the effects of personal and environmental determinants on construction workers' mental health outcomes.

2. To develop a positive coping approach in multicultural construction workplaces.

3. To investigate the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces.

4. To develop a model for managing mental health of workers in multicultural construction workplaces.

1.5 Unit of analysis and scope of research

The research aims and objectives are to investigate the management of mental health for construction workers in the multicultural work environment. The research objectives suggest an individual level of analysis. The construction worker is the unit of analysis in this study. The construction workforce in the present study refers particularly to the physical workers who perform a wide range of general tasks on construction sites during the entire process of construction projects, including labourers, operators, tradespersons and foremen. Construction professionals who are primarily engaged in mental activities, including managers, engineers, consultants, surveyors and contractors, are not targeted in the research design.

This research focuses on national culture rather than organisational or project culture. National culture is (1) a system of shared beliefs, values and behaviours, (2) in a specific society at a particular period of time, and (3) dynamic according to internal and external circumstances. This study focuses on a multicultural context. A multicultural workplace refers to a culturally heterogeneous workforce working in a single organisation or location (DeSimone & Harris 1998; Starren et al. 2013), where various groups of people are distinguished by such factors as

their ethnicity, traditions, values, attitudes, habits, languages and religions (Kundu 2001). Specifically, this study was conducted in the Australian construction industry. This is because (1) Australia is a representative multicultural country (Department of Home Affairs 2018), and (2) the Australian construction industry is among Australia's largest and most culturally diverse (Loosemore et al. 2011) and becoming more so (Loosemore et al. 2021). Construction sites with culturally homogenous populations in Australia were excluded from this research.

This study focuses on the mental health outcome of ill health (poor mental health), which refers to psychological distress stemming from symptoms of anxiety, stress or depression. A low level of psychological distress suggests moderate mental ill health, while a high level of psychological distress indicates severe mental ill health (Cuijpers et al. 2009). Diagnosed psychiatric illnesses such as schizophrenia, bipolar disorders and obsessive-compulsive disorders and the consequences resulting from them, such as suicide, are beyond the scope of this research. The mental health of the multicultural workforce on Australian construction sites is the topic of this study.

1.6 Research method

This research used a quantitative research approach and a survey research design. Data were collected from construction workers in the Australian construction industry by using a questionnaire survey. The structural equation modelling (SEM) technique with partial least squares estimation (PLS) was adopted to analyse the data. The results and findings of this study were discussed and interpreted on the basis of relevant theories and empirical studies. Figure 1.2 describes the research method of this study:

A quantitative research approach
A survey research design

Data collection

Data collecting instrument
Work stressors, cultural stressors, TABP, external LOC, affective intercultural coping, behavioural intercultural coping, cognitive intercultural coping and mental health outcomes

Data collection method
Online questionnaire survey

Validity and reliability of the research instrument
Comprehensive coverage of the constructs, extensive literature review and a pre-testing of the research instrument

Sampling frame
The 35000 active worker members of Incolink

Minimum sample size: 58

Sampling technique
Purposive sampling

Ethical considerations
Ethical issues regarding the research participants, researchers and funding bodies

Data collection procedure
(1) Contacting the construction organization Incolink
(2) Sending an invitation letter to the active worker members
(3) Respondents to read the participant information sheet and answer the online questionnaire

Methods of data analysis

Structural equation modelling (SEM)

Selection of PLS-SEM approach
Partial Least Square (PLS) - Structural Equation Modelling (SEM) approach

PLS-SEM procedure
(1) PLS models specification (i.e. measurement models and structural models)
(2) Data examination (i.e. examining data distribution and multicollinearity)
(3) PLS model estimations (i.e. conducting confirmatory factor analysis and path analysis)
(4) PLS-SEM results assessment (i.e. assessing results of measurement models and structural models)

Results and findings
Interpretations of the empirical results

Figure 1.2: Research methodology

1.7 Significance of the research

The findings of the study may be of great benefit to the stakeholders concerned in both social and economic dimensions. This research provides a comprehensive framework for managing mental health in multicultural construction workplaces through identifying the relationships between person–environment determinants of mental health, developing a positive coping approach and revealing the effects of positive coping strategies on the relationship between stressors and psychological outcome. The aim of this study is in line with the United Nations' third Sustainable Development Goal, namely, to ensure good health and promote well-being.

Specifically, this research may benefit a multicultural society by offering positive interventions to prevent mental ill health and promote good mental health. Hence, the prevalence of mental illness, the suicide rate and the economic loss caused by mental health issues may decrease. Construction organisations will also benefit from this research because the results will help them to devise appropriate interventions to reduce the sources of mental illness and to formulate targeted training for workers to develop positive coping behaviours. The adverse impacts brought about by mental ill health to the performance and productivity of construction organisations can be diminished. Additionally, this research will directly benefit construction workers in multicultural workplaces. By cultivating positive competences and employing positive coping strategies, construction workers can achieve a sustained improvement in their psychological well-being. Furthermore, the results of this study may provide direction for future research investigating the effective management of mental health in similar contexts.

1.8 Thesis structure

This thesis has seven chapters. This first chapter has provided a detailed introduction to the research, including the research context, research problem, knowledge gap, research aim and

objectives, unit of analysis and scope of research, research method and significance of the research.

Chapter 2 provides a detailed review on mental health issues in the workplace, the relationship between culture and mental health, stressors of mental health and coping based on the research problem and objectives. This Chapter focuses on reviewing and summarising the current research progress and achievements that cover these pertinent aspects, which provides support for the development of hypotheses (Chapter 3) and operationalisation of research variables (Chapter 4).

Chapter 3 elaborates the theoretical basis of this study to identify the crucial determinants of mental health in a multicultural construction workplace; conceptualise intercultural coping; and clarify the relationships between determinants, intercultural coping and mental health outcomes. This is followed by the proposing of hypotheses and the development of a conceptual model for this research.

Chapter 4 introduces the research methodology, including the rationale for selecting a specific research design, approach and method, as well as the descriptions of data collection and data analysis methods.

Chapter 5 presents the results of the empirical research, including the assessment of measurement models and structural models.

Chapter 6 provides the discussion and implications of the empirical results in relation to the impacts of environmental stressors and personal characteristics on mental health outcomes, dimensions of intercultural coping and the moderating effects of intercultural coping strategies.

Chapter 7 concludes this research by presenting the key findings, contributions to knowledge and practice, limitations of the research and recommendations for further studies.

Chapter 2: Literature review

2.1 Introduction

This chapter reviews the literature on mental health issues, the relationship between culture and mental health problems, stressors and coping. Section 2.2 provides an overview of mental health issues and introduces studies on mental health in the construction industry. Section 2.3 focuses on illustrating the relationship between culture and mental health issues in a multicultural workplace. Section 2.4 introduces the concept of stressors and theories of stress. Section 2.5 provides an understanding of coping and reviews the research on coping in the construction sector. Section 2.6 summarises the research gaps from this review.

This study adopted a series of critical review methods to describe how the research was conducted. The critical literature review attempts to review, analyse and interpret typical literature on a particular subject in a cohesive manner towards the creation of new ideas or models (Torraco 2005). By integrating insights from diverse research fields, it intends to advance theoretical knowledge and conceptual models (Snyder 2019). Electronic literature searching was conducted using the Scopus database. Keywords on mental health (e.g. mental health, stress, depression, anxiety and psychological outcomes) and multicultural context (e.g. multiculturalism, diverse culture and cultural diversity) in the construction sector were included in the initial search separately. There was no limitations on the timeframe of the publications and only those in English language were included. After excluding the publications that were

not pertinent to the research topic, 161 articles were eligible for critical analysis. A detailed review on the key aspects of the research topic were provided, followed by summarising current research progress and identifying research gaps.

2.2 Mental health issues in the work environment

2.2.1 The concept of mental health

The World Health Organization (WHO) has proposed that there can be 'no health without mental health' (Prince et al. 2007). Mental health is essential to individuals, families and societies (WHO 2004). Conventionally, mental health has been conceptualised from the perspective of defect (mental illness or mental disorder) in accordance with clinical symptomatology (e.g. on the basis of disease). Advanced talk and medicine therapies have been applied to treat various mental illnesses. Nevertheless, many interventions are ephemeral and only partially helpful, and individuals and communities still suffer from mental illnesses (Keyes 2009). Focusing only on the defective leads to overlooking the complicated nature of mental health, which includes positive factors (e.g. a sense of happiness) and mental resources (e.g. self-esteem) as well as the capability to solve stressful situations (WHO 2004). In the 21st century, a science of mental health promotion has been proposed to complement the science of mental illness treatment. Mental health was considered a syndrome of symptoms and defined as a complete state comprising the absence of mental illness and the presence of subjective well-being. Thus, a mentally healthy individual should manifest high levels of emotional, psychological and social well-being and be free of recent mental illness (Keyes 2009). Likewise, Warr (1987) indicated that mental health is an individual's location on a continuum from 'extremely unhealthy' to 'extremely healthy'. The mental health conditions of most people vary between the two states. Mentally healthy people are characterised by five components: affective well-being, competence, autonomy, aspiration and integrated functioning. In a like

manner, the WHO defines the concept of mental health as 'a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community' (WHO 2001). This definition emphasises the importance of an individual's abilities, coping behaviours and effective functioning in facilitating good mental health from a positive perspective, and corresponds with the concept that mental health not only entails the absence of mental illness but also takes into account the states and capacities of the individual and for society (WHO 2004). In contrast, mental ill health (or poor mental health) is a broad term that includes both mental illness and mental health problems (Chan, Nwaogu & Naslund 2020; Everymind 2022). Accordingly, to achieve good mental health, construction workers must be capable of coping with stressful situations using effective strategies, working productively and attaining good work performance.

2.2.2 Influence of mental health problems

As elaborated above, good mental health benefits the well-being and effective functioning of individuals and the community. Conversely, mental ill health (poor mental health) prevents people from achieving their full potential, being productive at work and contributing to their community (Chan, Nwaogu & Naslund 2020; Herrman & Jané-Llopis 2012). Common mental health problems in the construction workplace include anxiety, depression and stress (Langdon & Sawang 2018; Scott-Young, Turner & Holdsworth 2018). Anxiety refers to the fear of a perceived inability to achieve satisfactory outcomes in approaching situations (Lovibond & Lovibond 1995). Anxiety disorders have become the most common psychological disorders in Australia, from which 14.4% of Australians suffer (ABS 2007). Depression is considered to be a loss of self-esteem and incentive and relates to a low perceived likelihood of accomplishing one's major life goals (Lovibond & Lovibond 1995). Around 300 million people globally have

experienced depression (WHO 2017). Stress is viewed as a state of constant arousal and pressure with a low threshold for becoming frustrated and disappointed, and is similarly reported to have influenced a considerable population worldwide (Ajayi, Jones & Unuigbe 2019).

Mental health problems have implications for physical health. Mental ill health aggravates vulnerability to physical morbidity and reduces life expectancy (Robson & Gray 2007). Studies have demonstrated that cardiovascular and cerebrovascular diseases, respiratory disease and cancers are more prevalent in people with severe mental illness compared with the general population (Brown 1997; Brown et al. 2000). The New York City Department of Health and Mental Hygiene (2003) disclosed that people who were in psychological distress were three times more likely to suffer from poor physical health. They generally experienced a variety of chronic disease that carry a higher risk of early death, including high blood pressure, high cholesterol, diabetes, asthma and obesity. Mental health problems have also been found to be contributors of occupational injuries and accidents (Chan, Nwaogu & Naslund 2020). Mental disorders may lead to drowsiness and poor judgement and hinder vigilance and alertness, thereby resulting in increased risk of workplace injury (Palmer et al. 2014). Park et al. (2001) found that workers with depressive symptoms were linked to an increase incidence of workplace injuries, and had a three times greater risk of injury than their non-depressed counterparts. Depression has also been found to cause fatigue, which is an important risk factor affecting workplace safety and well-being (Chan, Nwaogu & Naslund 2020; Sadeghniiat-Haghighi & Yazdi 2015).

2.2.3 The measurement of mental health outcomes

Appropriate measurement of mental health outcomes is essential for the identification of mental ill health and development of mental health interventions. Mental health outcomes can be measured by different psychiatric diagnoses, such as non-specific psychiatric assessment, major depression and anxiety disorders (Hoeymans et al. 2004). Measuring the level of psychological distress is one important indication of the mental health and well-being of a population (Australian Bureau of Statistics [ABS] 2017a). Below is a review of the most commonly adopted and validated measures of mental health outcomes in the general population (King 2018).

2.2.3.1 General Health Questionnaire

The General Health Questionnaire (GHQ) is a psychological health screening tool in the form of a self-completed questionnaire that was developed by Goldberg in the 1970s (Goldberg et al. 1997). It has been widely used in various cultures and settings (Pevalin 2000). It aims to evaluate psychological distress and general psychological well-being, including anxiety, depression, somatic symptoms and social dysfunction (Okubo et al. 2011). The GHQ was originally designed as a 60-item questionnaire (GHQ-60). Currently, a series of shortened versions are available, including GHQ-30, GHQ-28, GHQ-20 and GHQ-12. The measurement scale asks about a particular symptom or recent behaviour of the respondent. The question is rated based on a four-point scale ('less than usual', 'no more than usual', 'rather more than usual' or 'much more than usual') (Montazeri et al. 2003). GHQ is usually adopted in research to create a score on a continuous scale for the severity of psychological distress of an individual or population. Several cut-off values have been validated and can be used to determine probable mental health conditions (King 2018). GHQ is copyrighted.

2.2.3.2 The Self-Reporting Questionnaire 20

The Self-Reporting Questionnaire 20 (SRQ-20) is a 20-item mental ill health screening tool developed by the WHO (Sartorius & Janca 1996). The content of the SRQ-20 is similar to that of the GHQ. The SRQ-20 assesses common mental disorders, including anxiety, depression and psychosomatic complaints (Beusenberg, Orley & WHO 1994). The SRQ-20 is a simple instrument used to evaluate mental health conditions at a community level and has been validated by many studies (Harpham et al. 2003; Netsereab et al. 2018). The scale asks respondents about symptoms and problems related to neurotic disorders. Each question is asked on a binary ('yes' / 'no') scale, where code '1' represents the presence of a symptom, and code '0' represents the absence of a symptom. The SRQ-20 has been applied to many sociodemographic groupings and different settings across various cultures. The cut-off scores of the SRQ-20 vary in different settings (Netsereab et al. 2018). Therefore, using the SRQ-20 in a specific setting requires validating the instrument in that setting. This questionnaire is freely available for use.

2.2.3.3 The Mini International Neuropsychiatric Interview

The Mini International Neuropsychiatric Interview (MINI) is an abbreviated structured diagnostic interview developed jointly by psychiatrists and clinicians in the US and Europe for mental health disorders. The MINI has been validated for use in a variety of settings. Taking nearly 15 minutes to administer, it aims to achieve a short but accurate structured psychiatric interview for clinical trials and epidemiological studies (Sheehan et al. 1998). The MINI can be delivered either independently or as a secondary assessment tool for mental disorders. It is often utilized as a second-stage diagnostic instrument to further investigate concerns that arose in early stages of testing (Li et al. 2017). A structured interview is crucial as part of the comprehensive assessment to minimise under- and overdiagnoses. The MINI assists in

identifying psychiatric and stigmatised disorders by contributing to better understandings of mental health conditions (Pettersson et al. 2018). This assessment tool follows a binary ('yes' / 'no') scale.

2.2.3.4 The 36 item Short Form survey

The 36 item Short Form survey (SF-36) is a multipurpose, abbreviated health assessment tool with 36 items. It is a self-reported questionnaire that covers eight areas related to physical and mental health (Ware & John 2000). The items represent a broad range of operational indicators of health, including behavioural function and dysfunction, well-being and psychological distress, and favourable and unfavourable self-assessment of health status (Ware, Kosinski & Keller 2001). It is designed for use in the general population regardless of age, health status or treatment group. The SF-36 as well as a shorter version, SF-12, are available for public use. The full SF-36 can be used to assess overall health status or only the mental health section of the survey can be selected according to the research objectives (King 2018). Scores generated from the SF-36 have been recommended as appropriate for the assessment of different medical interventions (Garratt et al. 1993). The SF-36 has been applied in various countries and has generated considerable data (Shiely, Bayliss & Keller 1997).

2.2.3.5 Kessler Psychological Distress Scales

The Kessler Psychological Distress Scales are available as the six-item K6 and the ten-item K10. They measure non-specific psychological distress and have been broadly used in community epidemiological surveys (Kessler et al. 2002). Compared with other screening scales such as the GHQ-12, the Kessler Scale shows superior specificity and sensitivity with regard to identifying significant levels of psychological distress in adults (Furukawa et al. 2003; Kessler et al. 2003). Therefore, the Kessler has been translated into 14 languages and included

in all the national surveys in the WHO's World Mental Health (WMH) Initiative. In many countries such as the US, Canada and Australia, the Kessler has also been administered as part of recurring national household surveys (Sunderland et al. 2011). The Kessler Scales help in identifying common mental disorders or subclinical cases in the general population. They have been validated to be an excellent screening instrument with good psychometric properties. The scale has demonstrated excellent internal consistency and reliability (Kessler et al. 2002). The Kessler questionnaire was developed to yield a global measure of psychological distress, including questions about the level of nervousness, depression, agitation and psychological fatigue in the previous four weeks (Coombs 2005). Each question is measured on a five-point Likert scale scoring from 0 ('none of the time') to 4 ('all of the time'). Scores of all the items are summed, yielding an overall score indicating the level of psychological distress. The K6 is preferable for use because of its lower response burden (Cairney et al. 2007). The K6 and K10 questionnaires are freely available for use.

2.2.4 Mental health issues in the construction industry

An increasing number of studies have emerged in the past decade or so to further the understanding and addressing of mental health issues in the construction workplace. Love, Edwards and Irani (2010) conducted an exploratory study to investigate the nature of self and social supports and the mental health of professionals in the construction industry. They concluded that supports were significant in cultivating good mental health for construction professionals. Boschman et al. (2013) assessed the psychosocial workplace, mental health complaints and the relationship between them in two distinct groups of construction professionals, the result of which was that for each occupation most workers screened positive for symptoms of mental disorders. Sunidijo and Kamardeen (2020) identified the stressors and psychological symptoms of Australian graduate students working in the construction industry.

Results showed that graduate construction students experienced higher levels of mental disorders such as stress, anxiety and depression than students working in other industries. Moreover, their degree of depression was higher than that of construction professionals. Wang et al. (2017) described the six most common mental disorders and assessed their impact on construction professionals' management of construction. Their findings are beneficial for construction managers to perceive and address psychological illness at an early stage. Maqsoom et al. (2018) analysed the work-related stressors that influenced the productivity of construction management personnel and found that career development was the most significant factor. Adopting qualitative methods, Bowen, Zhang and Edwards (2021) identified that frustration, anxiety, anger/irritability were the most frequent and intensive effects of psychological strain among South African construction professionals.

While these studies have presented insights into mental health in the construction industry, they have focused on mental health issues among construction professionals, with little research on the state of mental health among the construction labour workforce. This is despite the fact that construction workers suffer from more psychological problems than the general adult population, and these problems result in numerous cases of suicide (Langdon & Sawang 2018). A few studies have attempted to address this research imbalance by examining mental health outcomes among construction workers. Langdon and Sawang (2018) explored the stressors, coping mechanisms and mental health for the construction labour workforce. They found that construction workers who adopted maladaptive coping strategies when facing stressors had increased feelings of mental distress. Pidd et al. (2017) examined the relationship between substance use, psychological well-being and the workplace psychosocial environment among young construction workers. Their findings revealed that young construction workers were a high-risk group for harmful substance use and poor mental health, and that their levels of

psychological distress were substantially higher than their non-construction peers. Thus, the findings of existing research indicate that mental health problems are prevalent among both construction professionals and construction workers.

Even though many efforts have been devoted to investigating the mental health issue of the construction workforce, studies typically examine mental health outcomes and the relationship between risk factors and psychological outcomes. An in-depth and comprehensive examination of the interaction of critical stressors and how they jointly affect the mental health outcomes of construction workers is unknown. An appropriate and validated measurement should also be adopted for the identification of mental health outcomes. Additionally, the scope of research has been limited to a homogeneous work environment; the mental health of construction workers and how they are affected by the stressors in a multicultural workplace remains unclear. In sum, there is a dearth of research on the combined impacts of key stressors on mental health in a multicultural construction workplace.

2.3 Culture and mental health

2.3.1 Culture

Culture has been widely defined in a variety of ways. Kroeber and Kluckhohn (1952) compiled the different definitions of culture and listed over 150 definitions. Culture refers to 'the collective programming of the mind that distinguishes the members of one group or category of people from others' in the study of Hofstede, Hofstede & Minkov (2010, p. 6). Rosenblatt (2011) defines culture as an interpretative scheme or codified pattern of meaning, informing or constraining behaviours. Ralston et al. (1993) maintain that culture is the beliefs and values that are broadly shared in a given society during a specific period of time. This definition highlights the importance of context and time to culture research (Sandhu & Khan 2018). Similarly, the

American Heritage Dictionary (2022) defines culture as 'the totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought considered as the expression of a particular period, class, community, or population'. Furthermore, Marsella and Yamada (2000, p. 12) adopt a psycho-behavioural definition of culture: 'shared, learned meanings and behaviours that are transmitted from within a social activity context for purposes of promoting individual/societal adjustment, growth, and development'. This definition reveals the internal (e.g. beliefs, values, attitudes, symbols, levels of consciousness) and external (e.g. activity contexts, roles, artefacts, institutions) representations of culture. The shared beliefs and behaviours are dynamic and contingent on changing internal and external circumstances. From the various definitions of culture, it can be seen that culture is (1) a system of shared beliefs, values and behaviours, (2) in a specific society at a particular period of time, and (3) dynamic according to internal and external circumstances.

2.3.2 Impact of culture on mental health

In the past few decades, the mental health professions have paid increasing attention to the importance of the relationship between culture and mental health. Culture plays a significant role in various aspects of mental health, ranging from the ways in which individuals perceive mental health and illness to treatment-seeking behaviours and therapeutic relationships (Gopalkrishnan 2018). A new conceptual and methodological framework has emerged wherein cultural factors are recognised as a fundamental determinant of mental health outcomes (Marsella & Yamada 2000).

Many studies in the psychological field have demonstrated that cultural factors can affect and produce mental ill health (Leighton & Murphy 1961; Marsella 1987). For instance, culture determines the coping resources and strategies used to tackle stressors; culture determines the

language systems that help people to perceive, analyse and organise responses to daily life; and culture determines the patterns of experience and interpretation of mental disorders.

In accordance with general systems theory, which links stressors at the socioenvironmental level with mental ill health at the individual level, Marsella, Austin and Grant (2005) proposed a conceptual framework to explain the role of cultural factors in the generation of mental health problems. This conceptual model illustrates the potential pathways between particular cultural factors and the mental health and well-being of individuals. Cultural issues at different levels are associated with different types of psychological problems. For instance, cultural issues at the community or work levels are linked to social stress and confusion; cultural issues at the individual level are connected to behavioural problems (e.g. depression, suicide, psychosis alcohol, substance abuse).

Many culture-related phenomena have been positioned as sources of mental health problems, including acculturation, cultural abuse, migration, racism and cultural disintegration (Marsella & Yamada 2000). All of these phenomena have an impact via specific stressors and stress variables (Marsella & Scheuer 1993). A cultural context can be a major stressor by imposing demands that are beyond the resources and abilities of individuals or groups (Marsella 1998). Acculturation has been recognised as a major stressor that frequently results in maladjustment and maladaptation and induces mental ill health (Berry 1997; Matsudaira 2006; Schmitz 2003). It refers to 'a process of cultural and psychological change that results from the continuing contact between people of different cultural backgrounds' (Berry 2006b, p. 27). Long-term acculturation can lead to two distinct adaptations: psychological and sociocultural adaptation (Ward 1996). Psychological adaptation is related to an individual's psychological and physical well-being, while sociocultural adaptation involves how an individual is capable of managing

daily life in the acculturation process (Schmitz 1992). During the process of acculturation, individuals or groups may come under great pressure if their own cultural values, behaviours or practices are denied, defamed or depreciated. In this circumstance, demanding and repressive patterns of anxiety, resentment and depression are provoked (Marsella & Yamada 2000). The experience of difficult or problematic acculturation can produce acculturative stress. Acculturative stress is a stress reaction responding to life situations that are grounded in the acculturation process, as manifested by uncertainty, anxiety and depression (Berry 1976; Berry 2006a). Acculturative stress points to the need for a multicultural approach to study stress and coping, as well as suggesting new sources of stress not captured in traditional theories of stress and coping (Wong, Wong & Scott 2006).

Moreover, the absence or availability of cultural resources and supports may affect mental health. People from different cultural contexts hold different cultural values. These specific cultural beliefs may help to interpret and accept many adverse circumstances in daily life. The availability and use of the cultural beliefs may serve as critical resources or supports in mitigating the effects of adverse events on mental health (Marsella 1985). Additionally, social support systems, flexible belief systems, active communication systems and positive personal competences can serve as effective resources and supports for culture-related stressful events (Marsella & Scheuer 1993).

2.3.3 Mental health issues in a multicultural workplace

With workforce diversity emerging as a pressing issue and trend in the workplace, it has attracted growing attention of researchers in the management of multicultural workforces in the construction sector. Migrant workers are especially prevalent in industries that are precarious and dangerous (Starren et al. 2013). A multicultural work environment is a culturally

heterogeneous workplace, where workers are distinguished by their ethnicity, traditions, values, attitudes, habits, languages and religions etc. (DeSimone & Harris 1998; Kundu 2001; Starren et al. 2013). A multicultural workforce can lead to positive effects in organisations. For example, it can help to enhance innovation and creativity in work teams, reinforce organisational cultural, increase productivity and promote the global reputation of the enterprise (Jackson & Van de Vijver 2018; Joubert 2017). An inclusive work environment serves as a valuable resource for learning, renewing and transforming, which facilitates effective collaboration and maximizes individual potential to achieve organisational goals (Pless & Maak 2004). Moreover, a culturally tolerant workplace featuring mutual respect and trust, acceptance and tolerance for difference contributes to the safety and health of working individuals (Jackson & Van de Vijver 2018).

However, the negative effects of a multicultural workforce have been particularly considered in terms of the psychological well-being of individuals (Starren et al. 2013). The growth in the multicultural workforce may produce complex and new demands with regard to the interests, background and requirements. Mental health problems can thus be generated in this circumstance (Pasca & Wagner 2011). Distinct cultural differences may have negative impacts on the individuals involved in an organisation, such as lower productivity, cultural conflicts, low morale and absenteeism (Steele & Sodhi 2006). The mistreatment of cultural differences can make employees unproductive and lead to severe results such as conflicts, tensions, confusion and miscommunication between workers, as well as stress that can adversely affect their psychological and physical states and further lead to increased workplace accidents (Loosemore & Lee 2002). Consequently, cultural stressors can be generated in a multicultural work environment. Cultural stressors are recognised as conflicts and difficulties that originate from the process of intercultural contact (Pan et al. 2007). Numerous scholars have indicated

that cultural stressors play a key role in producing psychological disorders, especially among ethnic minorities (Cano et al. 2015; McCord, Draucker & Bigatti 2019; Stein, Gonzalez & Huq 2012). Cultural stressors have been termed in a variety of ways, such as 'acculturative stressors' (Dawson & Williams 2008; Pan et al. 2007), 'culturally-based stressors' (Stein, Gonzalez & Huq 2012) and 'bicultural stressors' (LaFromboise, Coleman & Gerton 1993). Given the crucial impact of the multicultural environment on mental health, it is imperative to conduct research in this field.

The construction sector is among the most culturally diverse workplaces in Australia (Loosemore, Alkilani & Hammad 2021). Because of the high demand for labourers, the construction industry has absorbed a large proportion of migrant workers into its workforce (Loosemore & Chau 2002). Most of these immigrants have suffered from mental disorders such as stress, anxiety or depression (Pasca & Wagner 2011). Al-Maskari et al. (2011) investigated the prevalence of depression of migrant construction workers in the United Arab Emirates. Their findings identified high rates of depression and suicidal ideation among the sample population, although the rates of mental issues of migrant workers from different countries presented significant variations. Rock et al. (2016) pointed out that owing to the high prevalence of psychological health issues, migrant construction workers may adopt negative coping behaviours such as use of alcohol or other drugs to relieve stressors, which could lead to a vicious cycle. Thus, appropriate interventions to improve the mental health of construction workforce should be implemented. Possible interventions include ameliorating the working conditions of migrant workers and regulating their working hours (Al-Maskari et al. 2011). However, the research relating to mental health has centred on migrant construction workers, each group of which is homogeneous in terms of national background, without investigating the mental health of heterogeneous workforce who constantly interact with different cultures.

Moreover, Wong, Teo and Cheung (2010) have called for the study of the mental health management in the construction workforce to include not only migrant construction workers but also local workers, after establishing a theoretical framework of site operatives' stress experience from a cultural perspective.

2.4 Mental health stressors

2.4.1 The concept of stressors

Stressors are events and circumstances that cause strain or stress reactions (Kahn & Byosiere 1992). The stressful events can result in adverse physiological outcomes such as emotional tensions, physical symptoms and decrements in role performance (Selye 1975). Stressors can be micro-stressors, which are ongoing problems persisting for an extended period of time, and single critical or traumatic events (Kanner et al. 1981). Stressors have been grouped into various categories, such as job stressors, organisational stressors, personal/interpersonal stressors, environmental stressors, traumatic events and stressful change processes (Cooper & Marshall 1976; Leung & Chan 2012; Sonnentag & Frese 2013; Tijani, Jin & Osei-Kyei 2021).

Stressors can influence an individual over different durations. Stress reactions (or strains) can occur instantly (short-term reactions) or may take a longer time to develop (long-term reactions) (Sonnentag & Frese 2013). The experience of stressors can have an impact on the affective reactions of an individual. For short-term reactions, adverse affective states such as disturbed moods can appear. These negative outcomes mainly derive from particular aversive events and taxing situations (Ilies et al. 2007; Rodell & Judge 2009). In the long term, stressors can have a detrimental effect on mental health and well-being. Numerous research findings have demonstrated that stressful work conditions are related to a higher level of psychological

distress (Leitner & Resch 2005), depression (Schonfeld 1992), burnout (Maslach, Schaufeli & Leiter 2001) and psychosomatic illnesses (Parkes, Mendham & von Rabenau 1994).

2.4.2 Theoretical models of stress

Many theories and models have been developed to describe the process from stressors to stress reactions. There are two main types of stress models: (1) models that focus on the stress process, and (2) models that focus on the relationship between stressors and strains. The first grouping of models explains what happens when an individual encounters stressors, and the second grouping specifies configurations of stressors that are linked to strains (Sonnentag & Frese 2013). The present study focuses on models that have been widely adopted and validated in previous theoretical and empirical research, and that will benefit future research and practice.

2.4.2.1 Theoretical models of stress process

Lazarus and Folkman's (1984) transactional stress model and Edwards's (1992) cybernetic model are the most broadly used models focusing on the stress process. These models explain what happens when an individual is exposed to stressors.

2.4.2.1.1 The transactional theory of stress and coping

Lazarus and Folkman's (1984) transactional model of stress and coping is one of the most influential models that describe the stress process. It has been developed and refined by Lazarus and colleagues over a long period (Folkman & Lazarus 1985; Folkman et al. 1986; Lazarus & Folkman 1984, 1987). This model identifies the antecedents (personal and environmental variables), mediating/moderating process (appraisal and coping) and outcomes (immediate and long-term physical and psychological consequences) of this cognitive process. In particular, this model centres on chronic external conditions as stressors and on the cognitive factors that

interact with the stressors to cause short-term physiological and psychological consequences (Kahn & Byosiere 1992). Psychological stress is defined as 'a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being' (Lazarus & Folkman 1984, p. 21). This definition emphasises the crucial role of cognitive appraisal in the stress process (Krohne 2002). Three key stress-related relationships occur between the personal and environment: harm or loss, threat and challenge. These relationships describe a balance of forces in which environmental demands exceed the person's resources (Lazarus & Launier 1978).

Appraisal process pertains to an individual's classification and assessment of an event regarding the individual's well-being (Sonnentag & Frese 2013). Appraisal is affected by a person's values, beliefs and aims and the situation the person encounters is assessed with regard to the importance of it for the person (Stein et al. 1997). Appraisal takes two fundamental forms: primary appraisal and secondary appraisal (Lazarus 1966). Primary appraisal occurs when something of relevance to the person's well-being transpires, and stressors are immediately identified and responded to. Secondary appraisal concerns the selection of coping strategies after evaluating the person's available resources (Krohne 2002; Lazarus & Launier 1978). The coping process then starts following the primary and secondary appraisals.

Coping is a main determinant in the relationship between negative events and adaptational outcomes such as depression, psychological symptoms and physical diseases. It is recognised as a person's cognitive and behavioural efforts to manage the demands of a particular person–environment transaction that has relevance to the person's well-being (Folkman et al. 1986). This definition suggests three essential features: first, coping is process-oriented; second, coping is context-specific; third, coping is not necessarily effective (Folkman et al. 1986). Thus,

coping strategies must be utilised within a specific context under the influence of the dynamic relationship between personal and environment variables (Logan 2019). Different types of coping can produce desirable, undesirable or irrelevant consequences. Undesirable or irrelevant outcomes do not mitigate psychological disorders but may require supplementary coping strategies. However, desirable outcomes ameliorate mental health conditions and the termination of coping processes (Folkman 1997). Hence, effective coping is essential to generate favourable mental health outcomes.

2.4.2.1.2 Cybernetic model

Edwards (1992) proposed a cybernetic model of stress, coping and well-being based on major theories of organisational stress (e.g. Carver & Scheier 1982; Kahn et al. 1964; McGrath 1976). In this model, stress is defined as 'a discrepancy between an employee's perceived state and desired state, provided that the presence of this discrepancy is considered important by the employee' (Edwards 1992, p. 245). Consequently, stress develops when there is a discrepancy between a person's perception and the person's desire. The cybernetic model suggests that perceptions are affected by three types of factors. The first category includes the physical and social environment and personal characteristics of the individual. These are filtered by the person's perceptual processes, which result in a distorted and simplified perception of reality (Neisser 1976). The second determinant of perceptions is individuals' own cognitive construction of reality, meaning that they do not passively absorb external stressors but, rather, actively constructs their own subjective reality (Weick 1979). The third factor is social information, which refers to the attitudes, behaviours and beliefs of other people in the worker's social settings (Salancik & Pfeffer 1978). Stress—the discrepancy between an individual's perceived state and the individual's desired state—affects two classes of outcomes: psychological and physical well-being and coping behaviours. Coping may directly affect the

individual and event and the duration of the stressful event. Coping can affect stress through changing the perceptions, desires and importance of the stressful events, and enhancing well-being (Edwards 1992).

2.4.2.2 Theoretical models of the relationship between stressors and strains

Theoretical models focusing on the relationship between stressors and strains specify configurations of stressors that are linked to strains (stress reactions). Person–environment fit theory proposed by Harrison (1978), the job demand–job control model developed by Karasek (1979) and the vitamin model of Warr (1987) are the major models in this field (Sonnentag & Frese 2013).

2.4.2.2.1 Person–environment fit theory

Person–environment (P–E) fit theory is based on Lewin (1951) and Murray's (1959) theorising of motivational processes. Lewin (1951) posited that the interaction between the person and the environment is essential to understanding individuals' affective, behavioural and cognitive reactions. Person–environment (P–E) fit theory suggests that stress arises from the consequences of the misfit or incongruence between environmental stressors and personal characteristics (Edwards, Caplan & Harrison 1998; Harrison 1978; Lofquist & Dawis 1969). Hence, it is the joint influences of person and environment that induce stress reactions.

The model describes two types of fit between the person and the environment. The first type of fit refers to the degree to which the person's abilities and skills match the demands of the situation (demands–abilities fit). The second type of fit is the degree to which the environment offers supplies to meet the person's needs (needs–supplies fit). When misfit or incongruence

occurs in either type, the individual's psychological well-being will be damaged (Harrison 1978).

Two fundamental distinctions are reflected in the P–E fit model: (1) the differentiation between the person and the environment, and (2) the differentiation between the objective and subjective perception of the person towards the environment. The objective environment refers to events as they exist independently of the individual's perception. The subjective environment refers to the perception of the person's objective environment. There is a causal relationship between the person's objective environment and subjective environment. The objective person refers to the values, qualities, competences and needs of the person (i.e. who they really are). The subjective person means the perception of the person's objective self (Harrison 1978). There may be discrepancy between the person's subjective perception and the objective reality. The concept of contact with reality refers to the discrepancy between the objective environment and the person's perception of it. The concept of accuracy of self-assessment refers to the discrepancy between the objective person and the person's subjective perception of it (French, Rogers & Cobb 1974). This theory indicates that the P–E fit consists of objective and subjective P–E fit. Objective P–E fit is the match between the objective person and objective environment, while subjective P–E fit is the congruence between the subjective person and subjective environment. P–E theory suggests that good mental health develops when there are low discrepancies or no discrepancies among those relationships.

2.4.2.2.2 Job demand–control model

The job demand–control model postulates that interaction between job demands and job control determines mental strain (Karasek 1979). Job demands refer to the amount of work placed on the worker. Job control is also referred to as job decision latitude, which is defined as the

worker's skill discretion and decision authority (Sonnentag & Frese 2013). This model suggests that job strain can be described in a 2×2 matrix: jobs high on demands and high on decision latitude ('active' jobs), jobs high on demands and low on decision latitude ('high-strain' jobs), jobs low on demands and low on decision latitude ('passive' jobs) and jobs low on demands and high on decision latitude ('low-strain' jobs) (Sonnentag & Frese 2013). Thus, the level of mental strain individuals experience at work is determined by the extent to which they have control over the demands. The combination of high demands and low decision latitude (i.e. 'high-strain' jobs) is recognised to be the most harmful for workers' mental health and well-being, while 'active jobs' characterised by high demands and high decision latitude are considered to be most beneficial for the worker (Karasek 1979). In this model, high control is assumed to weaken the adverse effects of high demand on mental strain.

On the basis of the job demand–control model, a job demand–job resource model was developed by Demerouti et al. (2001). They stated that besides job control, other resources such as support, reward, involvement and feedback can also moderate the adverse impacts of job demands on psychological health. Additionally, a triple-match model of De Jonge and Dormann (2006) based on job demand–control theory assumes that the negative effects of stressors are more likely to be alleviated when resources are tailored to the particular content of the stressor.

2.4.2.2.3 The vitamin model of the environment and mental health

Warr (1987) proposed a vitamin model of the environment and mental health, which assumes that mental health is influenced by the environment in a similar way to how vitamins affect physical health. This model emphasises the important role of environmental features in influencing mental health. An absence of job characteristics is likely to damage mental health,

while their presence past a certain point tends to produce a constant beneficial effect on mental health. Moreover, specific features of work beyond a required level can impair mental health.

Two different types of environmental features at work can influence mental health. The first type is postulated to have a constant effect on an individual's mental well-being. The increase of workplace features such as safety, salary and task significance leads to the increase of good mental health, but the effect remains constant beyond a certain point. Vitamins C and E have a similar effect. The label 'CE' is also an abbreviation of 'constant effect'. The second type of environmental feature in the workplace is posited to have a curvilinear relationship with mental health. Analogous to vitamins A and D, which are toxic at very high levels, certain features of work (e.g. job autonomy, task feedback, skill utilisation) benefit mental health at a low level but impair mental health in a high concentration (Sonnentag & Frese 2013). The label 'AD' also stands for 'additional decrement'. In both cases, low levels of environmental features are detrimental to mental conditions, but increases above a certain point yield no additional benefit (Warr 1987).

The theoretical models of stress reviewed above provide different perspectives for understanding the relationship between stressors and mental health outcomes. The transactional stress model and the cybernetic model focus on the stress process. Both theories emphasize the significant roles of personal characteristics and environment in influencing the perception or appraisal of an individual in regard with the individual's coping and well-being. They also assume that there exist reciprocal effects between coping and the environmental-personal factors. Person–environment fit theory, job demand–control model and the vitamin model focus on the relationship between stressors and strains. Person–environment fit theory emphasises that the misfit between the person and the environment results in psychological strains. Job

demand–control model concentrates on how job characteristics affect individuals' psychological well-being. The vitamin model describes the different effects of different types of work characteristics on employees' mental health outcomes. All theoretical models of stress emphasise the crucial role of environmental variables on individuals' psychological outcomes. Some theories (e.g. the transactional stress model and person–environment fit theory) indicate the importance of the interaction between personal characteristics and environmental features in determining mental health. Moreover, some theories (e.g. the transactional stress model, cybernetic model and job demand–control model) highlight the role of the individual's appraisal and coping in regulating and affecting the relationship between stressor and psychological consequence. These models of stress laid a solid foundation for subsequent research on psychological stress. Based on these theoretical models of stress, particularly, the transactional stress model, this study attempts to investigate the interactions between personal characteristics and environmental factors, as well as between coping and stressors in influencing psychological outcomes.

2.4.3 Stressors of mental health in the construction industry

Construction industry has been recognized as a demanding work environment (Djebarni 1996; Loosemore et al. 2010). The nature of the construction industry is highly competitive, with low profit margins, tight deadlines and constrained budgets (Lingard & Sublet 2002). A project-based structure, fragmentation, male-dominated worksites and a procurement system further shape the structure and culture of this industry (Sang, Dainty & Ison 2007), and lead to a number of stressors. Stressors tend to bring about mental ill health and protracted exposure to mental illness is inclined to generate suicidal ideation (Langdon & Sawang 2018).

Many studies have explored the stressors of mental health problems in the construction industry. The stressors in this sector have been grouped into various categories. Table 2.1 presents the classifications of stressors of the reviewed studies. Sutherland and Davidson (1989) initiated the classification of stressors among construction managers. They divided the sources of managers' stress into career development, relationships in organisations, role in organisations, organisational structure and climate, job characteristics and organisational interface with external parties. Building on previous studies, research by Leung et al. (2005; 2008; 2017) divided the stressors afflicting construction professionals into five classifications: personal stressors, interpersonal stressors, task stressors, organisational stressors and physical stressors. Personal stressors are defined as individual behaviours (e.g. type A behaviour). Interpersonal stressors refer to interactions between colleagues. (e.g. poor workgroup relationships). Task stressors mainly derive from work overload and role conflict and ambiguity. Organisational stressors are associated with the formalisation and centralisation of the organisation. Physical stressors refer to the physical working environment. The research findings of Leung et al. (2005; 2008; 2017) and Sutherland and Davidson (1989) have provided beneficial understandings of stress research in the construction sector; however, their research has centred on construction professionals. Construction site workers—who are a high-risk group for poor mental health and whose levels of psychological distress tend to be substantially higher than their peers'—deserve greater attention in research on stress (Pidd et al. 2017).

Adopting a meta-analysis, Sun et al. (2022) identified 14 work-related stressors, of which role conflict, role ambiguity, job insecurity and interpersonal conflict were the most important sources of poor mental health in the construction industry. Similarly, a systematic review by Chan, Nwaogu and Naslund (2020) found eight categories of risk factors in the construction workforce: job demand, lack of job control, family, welfare and socioeconomic factors, work

hazard, coping behaviour, lack of work support and workplace injustice. They concluded that the most common stressors were associated with job demand and job control, such as long working hours, heavy workload and organisational structure and climate. Lingard and Turner (2017) explored the determinants of workers' health from a multi-level system perspective including individual, family, workplace and industry levels, which suggested the need to address workers' health issues from a comprehensive perspective with a multi-level strategy. Additionally, Fordjour, Chan and Tuffour-Kwarteng (2021) identified the work-related stressors in Ghana's construction workforce through a mixed methods approach. Their findings revealed seven groupings of work-related stressors: high task demands, high role demands, poor relationships, poor work conditions, lack of autonomy, lack of feedback and unfair treatment. These studies have paved the way for the identification and investigation of stressors in the construction industry. Nevertheless, existing studies have typically focused on work-related stressors and their relationship with mental health. There is a paucity of empirical research on other types of stressors that have important effects on the mental health of the construction workforce. In particular, the role of cultural stressors in contributing to mental health conditions in a multicultural workplace has been neglected. A recent study by Ahmed, Leung and Ojo (2022) explored the key stressors of ethnic minority construction workers. Through focus group discussions, they identified nine key stressors from four dimensions, including personal stressors (migration, discrimination and communication problems), task stressors (long working time and time pressure), organizational stressors (insecure job, employment problems and pay difference) and physical stressors (poor working environment). Although their study highlighted the importance of cultural stressors on mental health of construction workers, they did not explore how cultural-related stressors impact on psychological outcomes and how they interact with other stressors for culturally diverse workforce.

Table 2.1: Classifications of stressors in the construction industry

Stressors	Sources
Career development	Sutherland and Davidson (1989)
Relationships in organisations	
Role in organisations	
Organisational structure and climate	
Job characteristics	
Organisational interface with external parties	
Personal stressors	Leung et al. (2005; 2008; 2017)
Interpersonal stressors	
Task stressors	
Organisational stressors	
Physical stressors	
Individual-level stressors	Lingard and Turner (2017)
Family-level stressors	
Workplace-level stressors	
Industry-level stressors	
Job demand	Chan, Nwaogu and Naslund (2020)
Lack of job control	
Family	
Welfare and socioeconomic factors	
Work hazards	
Coping behaviours	
Lack of work support	
Workplace injustice	
High task demands	Fordjour, Chan and Tuffour-Kwarteng (2021)
High role demands	
Poor relationships	
Poor work conditions	
Lack of autonomy	
Lack of feedback	
Unfair treatment	
Role conflict	Sun et al. (2022)
Organizational injustice	
Role ambiguity	
Job insecurity	
Interpersonal conflict	

Stressors	Sources
Role overload	
Low job support	
Low reward and recognition	
Low job control	
Work underload	
Cognitive demand	
Lack of career development	
Safety concerns	
Lack of training	
Migration	Ahmed, Leung and Ojo (2022)
Discrimination	
Communication problems	
Long working hours	
Time pressure	
Job insecurity	
Employment problems	
Pay difference	
Poor working environment	

Personal characteristics play an essential role in the stress process (Hendrix, Ovalle & Troxler 1985). Besides environmental determinants, the intrinsic characteristics of the individual can lead to mental health problems (Cooper & Marshall 1976). Literature in occupational psychology suggests that personal characteristics can also affect the occurrence and severity of mental ill health (Kamardeen & Sunindijo 2017). However, personal factors have been excluded from many studies on mental health in the construction sector (Cattell, Bowen & Edwards 2016). A few studies in the field of construction have recognised the significance of personal factors. Previous studies by Leung and her colleagues (e.g. Leung & Chan 2012; Leung, Chan & Yu 2009; Leung, Chan & Yuen 2010; Leung, Liang & Chan 2017; Leung, Skitmore & Chan 2007) identified the crucial personal characteristics associated with stress among construction personnel. However, their research failed to discover a significant

correlation between personal characteristics and stress. They thus suggested that further study of personal traits should be conducted to facilitate a better understanding of the overall pattern of stressors in the construction industry. Through a systematic review of mental stressors, Tijani, Jin and Osei-kyei (2021) identified the personal characteristics that contribute to mental ill health. Nevertheless, this study only hypothesised the interaction of personal stressors with gender-related stressors without empirically testing this hypothesis. Furthermore, Kamardeen and Sunindijo (2017) investigated the combined influence of six personal characteristics of construction professionals (i.e. gender, age, occupation, income, marital status and type A behaviour pattern) on mental health problems (i.e. anxiety, depression and stress). However, this research did not include environmental stressors and their interaction with personal characteristics. The transactional theory of stress and coping suggests that mental health outcomes are determined by the interactions between personal and environmental variables (Lazarus & Folkman 1984). Consequently, how personal characteristics affect mental health and how they interact with other stressors to influence mental health in a multicultural construction context remains unclear. Therefore, further research on determinants of mental health in a multicultural construction workplace is necessary.

2.5 Coping

2.5.1 The concept of coping

The understanding of mental health symptoms is grounded in the psychological theory of stress and coping (Folkman et al. 1986; Lazarus & Folkman 1984). Individuals generally intend to cope with stressful situations when they face different types of mental health issues. Coping research pertains to how individuals respond to actual stressors in real-life situations and how the effects of stressors accumulate (Skinner & Zimmer-Gembeck 2007). Many scholars have asserted the significance of coping in psychological research owing to its moderating role

between stressors and health outcomes, its effects on health consequences and its complicated relationship with psychological variables (Aldwin 2007; Kuo 2014). Mental disorders have been found to be significantly affected by negative appraisals of stressors and maladaptive coping behaviours (Lazarus & Folkman 1984). It is assumed that individuals who frequently experience uncontrollable situations tend to be passive in coping behaviours, which results in depression and demoralisation (Folkman et al. 1986). Considerable research has emphasised the central role of coping on mental health outcomes and the contribution of effective coping strategies to psychological well-being (Abbeduto et al. 2004; Kuo 2014; Roussi & Vassilaki 2001; Wong & Wong 2006).

The concept of coping is derived from stress theory and the psychoanalytical theory of defence mechanisms (Livneh & Martz 2007). Despite its significance in psychological well-being, coping lacks a standardised definition (Koehler et al. 2009). One of the most well-known definitions of coping was offered by Lazarus and Folkman (1984, p. 141): 'the person's constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person's resources'. This definition emphasises the central role of coping in the interaction of environmental and personal stressors (Krohne 2002). Holahan, Moos and Schaefer (1996, p. 25) consider coping 'a stabilising factor that can help individuals maintain psychosocial adaptation during stressful periods. It encompasses cognitive and behavioural efforts to reduce or eliminate stressful conditions and associated emotional distress'. Similarly, Snyder and Dinhoff (1999, p. 5) defined coping as 'a response aimed at diminishing the physical, emotional, and psychological burden that is linked to stressful life events and daily hassles'. The definitions of Holahan, Moos and Schaefer (1996) and Snyder and Dinhoff (1999) underscore the positive effect of coping behaviours in diminishing stressful conditions and improving psychological well-being and

health status in the long term. Cognitive, behavioural and affective coping responses are directed at different stressors, while they all attempt to regulate mental status in the face of stressful situations (Koehler et al. 2009). Drawing on the concept of regulation under stress, Skinner and Wellborn (1994, p. 113) refer to coping as 'how people mobilize, guide, manage, energize, and direct behaviour, emotion, and orientation, or how they fail to do so' in stressful situations. In a similar manner, Compas et al. (2001, p. 89) define coping as 'conscious and volitional efforts to regulate emotion, cognition, behaviour, physiology, and the environment in response to stressful events or circumstances'. Their definitions establish connections between coping and psychological and physiological processes (Skinner & Zimmer-Gembeck 2007). From these various definitions of coping, it is evident that coping is characterised by (1) affective, behavioural and cognitive responses to internal and external stressors; and (2) regulation of psychological process to alleviate psychological distress.

2.5.2 Coping theory

Considerable research has been conducted to investigate the role of coping in psychological well-being. The psychodynamic models of coping developed by Sigmund Freud (1930) were the earliest works in coping studies. His models focus on the role of the ego's defence mechanism, which attempts to alleviate adverse feelings and distressing impulses (Menninger 1954). Freud proposed the concept of the 'overtaxed ego', which consists of external stressors and threats as well as internal stressors that negatively affect mental conditions (Freud 1989 [1940]). Following Sigmund Freud's work, Anna Freud (1946) explicated the notion of the ego's defence mechanisms, wherein the ego attempts to exert control over anxiety and negative emotions. Early psychodynamic theories on defending and coping postulated that coping was determined by stable personality features and manner of perceiving (Livneh & Martz 2007).

Following the psychodynamic models of coping, Haan (1977) developed a tripartite model of the ego process, including coping, defence and fragmentation. The ego process is identified as a primary strategy to deal with daily life stressors. In Haan's model, coping is viewed as 'an attempt to overcome difficulties on equal terms; it is an encounter wherein people reach out and within themselves for resources to come to terms with difficulties' (Haan 1993, p. 260). Defence refers to a means of adapting to the environment or protecting oneself with strong beliefs (Haan 1993). Fragmentation is manifested as a failure to adapt, such as becoming mentally deranged (Radnitz & Tiersky 2007). Therefore, behaviours associated with mental ill health are recognised as fragmented in this model. Ideally, the person copes with stressful situations and continues self-consistency. Under less favourable circumstances, the person defends against intrinsic and extrinsic stressors to keep self-integration. Otherwise, when suffering from extreme pressures, the person is unlikely to maintain self-consistency, and fragmentation ensues. Coping is recognised as a conscious construct and becomes more predominant in the adaptation process with cognitive development (Haan 1977).

Psychodynamic models of coping have paved the way for the formation of cognitive theories of coping. Cognitive theories of coping underline the cognitive process, which plays a crucial role in the relationships between external stimuli and corresponding responses (Radnitz & Tiersky 2007). The transactional theory of stress and coping developed by Lazarus and Folkman (1984) is the most widely and frequently applied cognitive theory of coping in the health and well-being field (Zhang & Long 2006). Coping is defined as a person's cognitive and behavioural efforts to manage the demands of a particular person–environment transaction that has relevance to the person's well-being (Folkman et al. 1986). When coping with stressful situations, an individual consciously or subconsciously appraises, chooses and participates in specific cognitive procedures and actions, which are termed 'coping strategies' (Endler &

Parker 1989; Lazarus & Folkman 1984). The central role of the environment and cognitive appraisal of conditions have been gradually recognised (Lazarus & Launier 1978). Coping is thus viewed as a cognitive process derived from situational appraisal. Upon determining the situation to be stressful or problematic, the individual proceeds to select available coping strategies (Livneh & Martz 2007). The transactional model describes the complete cognitive process—from stressors and appraisal to coping responses to stressors—as well as the immediate and long-term psychological consequences. This transactional theory of stress and coping has prepared the ground for an examination of the relationship between stressful antecedents, coping processes and psychological outcomes, and made a major contribution to the theoretical and practical development of coping research. Following the transactional models of coping, studies have continued to investigate the nature of coping and expanded the understanding of coping to encompass more context-specific models (Livneh & Martz 2007).

This review of theories of coping shows that models of coping have evolved from psychodynamic models that emphasise the ego defence mechanism to transactional models of coping, which focus on the cognitive process. The transactional model of stress and coping developed by Lazarus and Folkman (1984) has dominated cognitive coping research since its inception. Efforts have been added to cognitive theories of coping to explore the relationship between stressors, coping and adaptational outcomes (Livneh & Martz 2007).

2.5.3 Coping styles

Folkman and Lazarus (1980) proposed taxonomies of coping styles based on a range of coping behaviours. One of the earliest and most prevalent classifications of coping styles identified problem-focused coping and emotion-focused coping (Folkman & Lazarus 1980). Problem-focused coping aims to change the problematic relationship between person and situation that

lead to mental issues. This type of coping includes four strategies: planful problem solving, positive reappraisal, confrontive coping and instrumental support seeking. On the other hand, emotion-focused coping attempts to regulate the negative emotions of an individual and maintain moderate levels of arousal. The four sub-classifications of emotion-focused coping are acceptance of responsibility, escapism, self-controlling and distancing (Folkman 1984; Folkman et al. 1986). Plentiful research has tested the two coping styles with empirical studies, most of which indicate that emotion-focused coping behaviours are associated with higher levels of mental health disorders, and that problem-focused coping is more effective than emotion-focused coping when dealing with stressful events in the construction workplace (Enshassi et al. 2018; Langdon & Sawang 2018; Yip, Rowlinson & Siu 2008).

Some researchers have also identified other styles of coping. Consistent with Folkman and Lazarus's (1980) model, Billings and Moos (1981) proposed a three-factor model of coping that includes active behavioural, avoidance and active cognitive styles. Heaney et al. (1995) identified three coping styles: (1) coping behaviours focused on controlling the situation, (2) coping behaviours focused on altering the meaning of situation and (3) coping behaviours focused on dealing with the psychological symptoms. Moss (1993) categorised coping into approach orientation coping and avoidance orientation coping, which are similar to problem-focused coping and emotion-focused coping, respectively. Through factor analysis, Endler and Parker (1990) discovered three fundamental coping functions: task-oriented, emotion-oriented and avoidance-oriented coping. From the resource-congruence model, Wong, Reker & Peacock (2006) identified three major coping styles: creative coping, reactive coping and protective coping. These coping responses emphasise the generation of effective coping to be congruent with the controllability of the stressful events. In addition, some coping inventories, such as the COPE (Coping Orientation to Problems Experienced) Inventory (Carver, Scheier & Weintraub

1989) and the Coping Strategy Indicator (Amirkhan 1990), proposed supplementary coping styles, including interpersonal coping and seeking social support.

2.5.4 Coping in the construction industry[1]

Several efforts have been made to examine the relationships between coping behaviours and mental health issues in the construction industry. Most studies on coping in construction are based on the cognitive theory of stress and coping developed by Lazarus and Folkman (1984), and analyse workers' coping behaviours with reference to problem-focused coping and emotion-focused coping. Enshassi et al. (2018) investigated the prevailing coping measures used by construction professionals. In terms of problem-focused coping, planned and constructive review problem solving, need for social contributory support and confronted coping were found to be the three most frequently used methods. As for emotion-focused coping, the principal strategies were accepting responsibility, avoidance and seeking emotional support.

Chan, Leung and Liang (2018) developed a stressor–coping–stress model based on the expectancy theory in stress management for Hong Kong expatriate construction professionals in mainland China. They found that Hong Kong expatriate construction professionals employed planned problem solving and instrumental support seeking (problem-focused coping) as well as emotional support seeking, escapism, emotional discharge, acceptance, positive thinking and religious support (emotion-focused coping). They concluded that Chinese expatriates preferred to employ emotion- rather than problem-focused coping measures.

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[1] The content of this section is extracted from the publication: Liu, Q, Feng, Y & London, K 2021, 'Theorizing to improve mental health in multicultural construction industries: an intercultural coping model', *Buildings*, vol. 11, no. 12, p. 662.

Yip, Rowlinson and Siu (2008) examined the degree to which the different types of coping strategies (e.g. rational problem solving, resigned distancing and passive wishful thinking) moderate the relationship between role overload and burnout among professional construction engineers. Rational problem solving was discovered to be the most significant of all the coping strategies. Similarly, Haynes and Love (2004) found that project managers who adopted problem-focused coping such as active coping had better psychological well-being than those who preferred emotion-focused coping such as cognitive avoidance coping and self-controlling coping. Bowen, Edwards et al. (2014) revealed that both adaptive coping measures (including physical exercise) and maladaptive coping measures (such as alcohol consumption, smoking and use of narcotics) were used by construction professionals. They thus suggested that proper and targeted coping strategies should be proposed and employed by construction organisations.

The research findings of Langdon and Sawang (2018) indicated that emotion-focused coping behaviours, such as self-blame, disengagement and acceptance, are related to higher levels of mental distress for construction workers. Additionally, substance use can only be recognised as a temporary coping strategy because it is a maladaptive coping strategy. They recommended that construction organisations provide more positive coping measures to enhance mental health for workers. Liang, Leung and Cooper (2018) examined 15 coping behaviours of construction workers. Unlike the construction professionals, construction workers used more emotion-focused coping strategies; chief among them was emotional discharge. In contrast, Nwaogu, Chan and Tetteh (2022) revealed that problem-focused coping forms were most frequently used by construction tradesmen, among which positive reappraisal coping reduced the likelihood of developing mental ill health symptoms. Moreover, their research found that accepting

responsibility, a type of emotion-focused coping, appeared to protect against negative psychological outcomes in the face of stressful situations.

While existing studies on coping in the construction industry have presented helpful understandings, most have focused on construction professionals. Very little research has explored construction workers' coping behaviours and their effects on mental health. Construction workers, however, are involved in monotonous and repetitious project tasks, which lead to musculoskeletal disorders and psychological illnesses (Boschman et al. 2013). It is necessary to increase research on coping that is targeted at onsite workers (Langdon & Sawang 2018). Moreover, most studies have adopted the framework of problem-focused and emotion-focused coping based on the cognitive theory of stress and coping. This coping framework is focused on a reactive approach to dealing with stressors (Wong, Reker & Peacock 2006). The research findings show that construction workers adopt both adaptive and maladaptive coping strategies. Maladaptive coping (e.g. emotion-focused coping) has been related to increased risk of injury at work (Minchin et al. 2006) and psychological distress (Langdon & Sawang 2018). Therefore, this framework may be inappropriate in addressing mental health problems in the construction workplace. Given the widespread usage of negative coping strategies among construction workers and the ineffectiveness of most coping measures, researchers have called for effective management of mental health for the construction workforce.

2.5.5 Mental health interventions in the construction industry

Previous studies in the construction domain have primarily focused on identifying the mental health conditions and major stressors of mental ill health (see Section 2.2.4 and 2.4.3), with

little empirical research on interventions to address the mental health problems of onsite construction workforce (Nwaogu, Chan & Naslund 2022).

In the construction domain, few interventions have addressed mental health problems. MATES in Construction was developed in 2008 as a suicide prevention and early intervention program for construction workers in the Australian construction industry. This intervention was demonstrated to be effective in improving awareness of suicide and mental health, psychological help-seeking behaviour and participation in treatment (Gullestrup, Lequertier & Martin 2011). However, although the intervention program enhanced mental health awareness, it did not reduce mental health issues or suicide (Nwaogu, Chan & Naslund 2022). To reduce mental health problems and improve the psychosocial working environment, Cedstrand et al. (2021) conducted a co-created occupational health intervention in a Swedish construction company, for which researchers collaborated with a project management team to develop interventions. The results showed that the co-created intervention helped to increase participants' awareness of sources of mental illness and how to handle them. Through investigating the precursors to job burnout of construction engineers in different departments, Yip and Rowlinson (2009) suggested that targeted interventions should be developed for different types of construction engineers. Specifically, interventions to mitigate qualitative overload and improve promotion prospects were more effective for engineers working in consulting organisations, while interventions to reduce long working hours, role conflict and job insecurity were more appropriate for engineers in contracting organisations. Moreover, the findings of Omeje et al. (2021) revealed that cognitive behavioural intervention (a method of stress management training) could effectively reduce stress and dysfunctional ideation at work for construction trade artisans. A recent study by Nwaogu, Chan & Naslund (2022) identified measures for improving the mental health of supervisory personnel on construction sites and

examined the associations between those measures and sources of stress. However, they uncovered inconsistent associations between different measures and stressors. The positive or negative associations between measures and stressors did not indicate the effectiveness of the measures for psychological outcomes.

Existing studies have provided helpful interventions to address mental ill health in the construction sector. However, these interventions have focused on mitigating the sources and stressors of mental ill health for construction professionals from the negative side. The transactional theory of stress and coping suggests that mental health outcomes are determined by the interaction between situational and personal variables, and emphasises the central role of coping in affecting mental health performance (Lazarus and Folkman 1984). Some intervention programs have intended to increase coping skills for construction workers. Nevertheless, they have typically positioned coping as a reactive approach triggered by stressful events. Therefore, there is a paucity of studies focused on developing positive coping approaches to promote construction workers' mental health, particularly in a multicultural context.

2.6 Summary

Over the past 20 years, mental health research has shifted in focus from the science of treating mental illness to the science of promoting mental health. The importance of an individual's abilities, coping behaviours and effective functioning have been emphasised as facilitating good mental health.

The review of the concept of culture shows that culture is a system of shared beliefs, values and behaviours in a specific society at a particular period of time and can be dynamic based on

internal and external circumstances. Research in the past few decades has demonstrated that cultural factors, particularly cultural stressors, are major sources of mental ill health and that the absence of cultural resources can aggravate poor mental health. Previous studies of the impact of culture on mental health in the construction industry have focused on migrant construction workers in a homogeneous group. There is a lack of research on the heterogeneous workforce who constantly interact with different cultures.

The theoretical models of stress (e.g. the transactional model of stress and coping and the P–E fit model) suggest that the interaction between a person's characteristics and environmental variables determines their mental health outcomes, and the congruence between person and environment contributes to positive mental health outcomes. Research on the stressors of mental health problems in the construction industry has identified various types of stressors. However, they have typically focused on work-related stressors. Other types of stressors (e.g. personal characteristics and cultural stressors) have been less explored, particularly in a multicultural construction workplace. Additionally, the impact of the interactions between different types of stressors on mental health outcomes remains unclear.

Coping is also an inseparable part of stress processes. It plays a significant role in influencing the relationship between stressors and mental health outcomes. The concept of coping encompasses affective, behavioural and cognitive responses to internal and external stressors. The transactional theory of stress and coping has been the most influential and widely adopted cognitive coping theory. Studies of mental health in construction typically identify coping styles as problem-focused coping and emotion-focus coping according to Lazarus and Folkman's transactional model. However, these coping functions are focused on a reactive approach to tackling stressors, and most studies show that emotion-focused coping is associated with a

greater level of psychological distress. Additionally, previous studies have focused on mitigating the stressors of mental ill health, which may not suffice to promote good mental health. Therefore, effective coping measures based on a positive approach should be proposed for construction workers.

Previous research has made valuable contributions identifying the mental health outcomes, risk factors and coping behaviours that are prevalent in construction workforces. Nonetheless, studies have yet to (1) explore the interactive effects of different types of stressors on mental health outcomes, (2) propose positive coping mechanisms to improve psychological well-being and (3) examine the role of positive coping mechanisms in reducing the negative effects of environmental stressors on mental health outcomes in a multicultural construction workplace. This study aims to do precisely this.

Chapter 3: Theoretical framework

3.1 Introduction

The theoretical framework for this research is presented in this chapter. According to theories of stress and coping (i.e. the transactional theory of stress and coping, person–environment fit theory and cybernetic model), occupational stress model, acculturative stress theory, type A personality theory, attribution theory, positive psychology and intercultural competence model, 19 hypotheses were developed to address the objectives of the research. The research variables and hypotheses were integrated in a graphical conceptual framework that guided the execution of the research.

3.2 Determinants of mental health in a multicultural construction environment

Theories of stress (i.e. the transactional theory of Lazarus and Folkman, P–E fit theory and cybernetic model) (see Section 2.4.2), indicate that the interaction between personal variables and environmental variables determines mental health outcomes. Individuals' characteristics play a crucial role in the perception of the stressful situation and the decision as to how they will respond to the stressor. Thus, the same environmental stressors in a workplace may result in various psychological outcomes for workers owing to their differing personal characteristics.

Identifying the determinants of mental health is of significance to the stress and coping process (Murphy 2000). The transactional theory of stress and coping suggests that mental health outcomes are determined by the interactions between personal and environmental variables (Lazarus & Folkman 1984). Similarly, person–environment fit theory suggests that mental illness arises from the consequences of the misfit or incongruence between environmental stressors and personal characteristics (Edwards, Caplan & Harrison 1998; Lofquist & Dawis 1969). The cybernetic model of stress, coping and well-being also indicates that an individual's perception towards well-being is affected by the environment and personal characteristics (Edwards 1992). Based on these theoretical models of stress, personal and environment factors have been identified as the major types of determinants of mental health. Therefore, to better understand the generation of mental ill health and develop effective interventions, it is essential to explore the effects of personal and environmental determinants on mental health outcomes. Stressors refer to 'events which generate excessive and undesirable constraints or demands on the individual' (Bhagat et al. 1985, p. 203). Existing studies on the construction industry have typically focused on work-related stressors; other crucial stressors have been investigated less. In a multicultural environment, stressors generally emerge from workplace factors (e.g. job demands), social and environmental factors (e.g. discrimination) and individual characteristics (e.g. type A behaviour pattern) (Pasca & Wagner 2011). In terms of environmental stressors, apart from work stressors that are common to workers (e.g. heavy workloads, tight timeframes), interacting with different cultures brings additional stressors (e.g. conflicts in cultural values, uncertainty about differences) (Zhang & Long 2006). Literature on the construction sector has identified the environmental and personal determinants of mental health in a multicultural construction workplace. Environmental stressors chiefly include work stressors and cultural stressors, and personal characteristics chiefly include type A behavioural pattern and locus of

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control. An overview of the major constructs and their corresponding sub-factors is shown in

Table 3.1.

Table 3.1: Major constructs identified in this study

Major constructs	Sub-factors	References
Work stressors	Career development Factors intrinsic to a job Organisational structure and climate Relationships at work Role in organisation	Cooper and Marshall (1976); Al-Maskari et al. (2011); Tijani, Jin and Osei-kyei (2021); Leung et al. (2005); Love, Edwards and Irani (2010); Leung and Chan (2012); Leung, Chan and Yu (2009); Wu et al. (2018); Cheng et al. (2005); Chan, Nwaogu and Naslund (2020); Leung, Liang and Chan (2017); Ng, Skitmore & Leung (2005)
Cultural stressors	Racial discrimination Language barriers Cultural value conflicts	Wu et al. (2018); Chan, Wong et al. (2017); Wong and Lin (2014); Loosemore et al. (2011); Ling, Dulaimi and Chua (2013); Aveiga et al. (2011)
Personal characteristics	Type A behaviour pattern Locus of control	Robertson et al. (1990); Leung and Chan (2012); Leung, Chan and Yuen (2010); Leung, Liang and Chan (2017); Leung, Skitmore and Chan (2007); Tijani, Jin and Osei-kyei (2021); Feng et al. (2017); Loosemore and Lam (2004)
Affective intercultural coping	Dissimilarity openness Tolerance for ambiguity Cultural empathy	Lloyd and Hartel (2010); Gudykunst and Kim (1997); Ayoko and Härtel (2000); Härtel and Fujimoto (2000); Gudykunst (1993); Karim (2003)
Behavioural intercultural coping	Intercultural communication competence Emotion management skills Conflict management skills	Gudykunst and Kim (1997); Lloyd and Hartel (2010); Ayoko and Härtel (2000); Tang and Kirkbride (1986); Brew and Cairns (2004)
Cognitive intercultural coping	Cognitive complexity Goal orientation	Dodd (1987); Karim (2003); Skaalvik (1997); Lloyd and Hartel (2010)

3.2.1 Environmental stressors[2]

Environmental stressors are stressful events that are generated by the work environment. Stressful situations are identified as potentially injurious, hazardous or threatening (Lazarus & Folkman 1984). In an organisation, occupational stressors lead to adverse psychological and physical outcomes (Spector 2002), which are perceived as any discomfort by individuals who are not able to cope with the demanding and stressful situation using their own capabilities and resources in the work environment (Rahman et al. 2014).

3.2.1.1 Work stressors

Work stressors refer to the negative situational factors associated with a particular job (Cooper & Marshall 1976, p. 11). A variety of job-related determinants of mental health have been identified in the construction industry, such as role overload (Love & Edwards 2005; Yip, Rowlinson & Siu 2008); work overload, role ambiguity, unpaid overtime, lack of promotion, demands from clients (Campbell 2006; Love, Edwards & Irani 2010); information delays (Ajayi, Jones & Unuigbe 2019); long working hours, role conflict and insecurity, job insecurity and low job satisfaction, control and responsibility (Sang, Dainty & Ison 2007); responsibility (Naoum et al. 2018); and physical work conditions (e.g. weather and construction sites) (Campbell 2006). Of all these work-related stressors, heavy workload, long working hours, poor organisational structure and climate are the most commonly identified stressors in the construction industry (Chan, Nwaogu & Naslund 2020). Previous studies have indicated that work stressors can contribute to mental ill health. Accordingly, the first hypothesis is proposed:

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[2] The content of this section is extracted from the publication: Liu, Q, Feng, Y & London, K 2021, 'Theorizing to improve mental health in multicultural construction industries: an intercultural coping model', *Buildings*, vol. 11, no. 12, p. 662.

Hypothesis 1 – Work stressors have a negative impact on the mental health of construction workers.

The occupational stress model identified five work-related factors or classifications (Cooper & Marshall 1976), into which the common work stressors identified in the construction industry fit well (Johnson et al. 2005; Motowidlo, Packard & Manning 1986; Rahman et al. 2014). Cooper and Marshall's (1976) model has been applied broadly in health-related fields of research, confirming its validity and reliability. The five major work-related variables recognised in this framework are factors intrinsic to a job, role in organisation, career development, relationships at work and organisational structure and climate (Cooper & Marshall 1976, pp. 14–22). The variable of 'factors intrinsic to a job' refers to the working conditions of a particular job—chiefly, workload and working hours. The construction industry is characterised by intensive tasks, tight deadlines, overtime work and overwhelming workloads (Al-Maskari et al. 2011). Work overload or overtime work are the most common occupational stressors for construction workforces (Tijani, Jin & Osei-kyei 2021). Intensive tasks to be completed in a tight timeframe for a construction project lead to an overwhelming workload (Leung et al. 2005). On average, reflecting the intricacy of construction projects and the culture of construction companies, construction workers have to work over 60 hours per week in Australia (Love, Edwards & Irani 2010). The heavy workload and long work hours lead to increased depression and suicidal ideation (Al-Maskari et al. 2011). Many studies have shown that poor mental health is directly associated with these inherent aspects of work (Breslow & Buell 1960; French & Caplan 1972; Kornhauser 1965).

The second work-related variable is 'role in organisation', which relates to an individual's role at work. Role conflict and role ambiguity are the two most common factors in this field and

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arise owing to the complexity of construction projects (Leung & Chan 2012). Role conflict arises when workers are designated multiple competing tasks or tasks they are not willing to perform (Leung, Chan & Yu 2009). Because of the complex nature of construction projects, workers may be confused or uncertain about their responsibilities in an organisation (Leung & Chan 2012). Both role conflict and role ambiguity have been associated with lower psychological well-being (Wu et al. 2018).

The variable of 'career development' is associated with job insecurity, under-promotion, incongruent status and thwarted ambition, which were found to have significantly negative relationships with mental health (Cheng et al. 2005). The demanding nature of the construction industry may render workers insecure and unsatisfied, leading to more strain (Chan, Nwaogu & Naslund 2020). The factor of 'relationships at work' refers to the nature of relationships with co-workers, supervisors and subordinates. Existing research shows that 'relationships at work' are identified as a common stressor among construction workers (Tijani, Jin and Osei-kyei 2021). A construction project is complicated and fragmented, and thus requires close teamwork. Poor relationships at work bring about interpersonal strain and decreased job satisfaction, which is a crucial source of mental illnesses (Leung, Liang & Chan 2017). It has been suggested that maintaining good relationships with team members is beneficial to a person's health (Cooper 1972).

Another major source of occupational stress is 'organisational structure and climate', which is viewed as the hierarchical configuration of an organisation that leads to desirable or stressful working experiences, such as involvement in the job or organisational rules and procedures (Cooper & Marshall 1976). The construction industry has a poor organisational culture and configuration caused by the immensity of organisational processes (Ng, Skitmore & Leung

2005). Construction employees working in centralised companies may lack opportunities to become engaged in the decision-making process (Joiner 2001). Consequently, the absence of participation in decision-making processes could lead to higher levels of psychological hazards (French & Caplan 1972).

3.2.1.2 Cultural stressors

In a multicultural work environment, the process of intercultural contact can bring about various conflicts, including through a change of beliefs and values, relative status, specific practices and language exchange. These acculturation experiences may become significant stressors in daily life (Riedel, Wiesmann & Hannich 2011). Consequently, coping with culture-related stressors is inevitable for workers in a culturally diverse work environment (Berry et al. 1987; Wu et al. 2018). Cultural stressors have also been termed 'acculturative stressors' (Joiner, Thomas & Walker 2002). According to the model of acculturative stress developed by Berry et al. (1987), acculturative stressors may arise from the experience of intercultural contact. Acculturative stressors refer to the conflicts and difficulties that originated from the process of intercultural contacts (Joiner, Thomas & Walker 2002). Empirical studies have indicated that cultural stressors can generate psychological disorders, especially among ethnic minorities (Cano et al. 2015). Berry et al. (1987) indicated that the early stages of intercultural contact are normally accompanied by a set of negative outcomes—anxiety, depression and stress; feelings of isolation and marginality; and confusion of self-identity—that bring about a reduction in an individual's mental health. The second hypothesis is proposed:

Hypothesis 2 – Cultural stressors have a negative impact on the mental health of construction workers.

Considerable research has been conducted to identify the cultural variables that are associated with mental health issues. Through an integrated literature review, McCord, Draucker and Bigatti (2019) identified six categories of cultural factors: racial discrimination, family culture conflict, acculturative and bicultural stress, intragroup rejection, immigration stress and context of reception. Nair et al. (2013) indicated that discrimination and language hassles are the two most prevalent cultural stressors among Mexican American youth. These factors were found to be positively related to increases in internalising and externalising symptoms, respectively. Research of Schwartz et al. (2015) examined three primary cultural stressors (discrimination, negative context of reception and bicultural stress) among immigrant adolescents and pointed out that these cultural stressors have not only immediate but also far-reaching impacts on psychological adjustment and outcomes. Through a qualitative study (interviews) and literature review on the mental health of immigrant students, Li, Li and Niu (2016) discovered nine culture-related stressors such as language problems, cultural conflicts between home and school, racial discrimination and cultural stereotyping. These studies from the field of psychology have provided useful insights on cultural variables in the multicultural construction work environment.

However, currently only a limited number of studies have explored the role of culture-related stressors on health and safety in the construction industry. Wu et al. (2018) identified the major safety challenges experienced by ethnic minority construction workers, among which cultural barriers, particularly language barriers, were highly significant. Chan, Wong et al. (2017) also found that language barriers were one of the most urgent safety issues for construction workers. Wong and Lin (2014) demonstrated severe racial discrimination and prejudice on Hong Kong construction sites owing to cultural diversity in the workplace. This discrimination and prejudice had a negative impact on the well-being of ethnic minority workers. Loosemore et al.

(2011) disclosed that operatives and managers were concerned about the risk to safety posed by the prevalence of racial discrimination on Australian construction sites, which was viewed as a negative outcome of intercultural interactions. Furthermore, Ling, Dulaimi and Chua (2013) demonstrated salient national cultural differences among migrant workers from different countries and suggested that culture-targeted strategies were needed to manage diversity among workers with different backgrounds. Aveiga et al. (2011) also revealed that conflicts between cultural groups on construction sites negatively affected various aspects of construction work.

These studies have provided helpful insights on cultural stressors in the construction industry. However, they have focused on the effects of cultural stressors on physical safety, without investigating the mental health of the construction workforce. The mental health of workers is as important as their physical safety, and so should be given equal consideration (Rees-Evans 2020). The extant literature has identified racial discrimination, language barriers and cultural value conflicts as the most prevalent cultural determinants of mental health problems in the multicultural construction workplace.

In a multicultural work environment, it is inevitable that workers will experience acculturation. Acculturation has a significant impact on mental health (Matsudaira 2006). The model of acculturation developed by Berry (1992; 1997) contended that moderating factors (e.g. differences in language or cultural values, or discrimination) influence the process of psychological acculturation and eventual adaptation. For instance, greater cultural dissimilarities (e.g. in language or values) bring about greater negative psychological outcomes (Ward & Kennedy 1992). Larger cultural differences may bring about negative attitudes in the group and cause more conflicts, resulting in poor psychological adaptation (Berry 1997).

Similarly, racial discrimination was recognised as an added risk factor that could lead to more mental health problems in a group (Berry 1997).

Integrative models of mental health have also indicated that cultural stressors can not only result in mental ill health by themselves, but also interact with various other factors to produce the issue (Zvolensky et al. 2016). The construction industry has become known for its cultural intolerance and racism (Wong & Lin 2014). This cultural environment may make harsh working conditions more stressful, thereby leading to a higher level of mental ill health for construction workers. Through a systematic review of stressors in the construction industry, Chan, Nwaogu and Naslund (2020) identified the potential pathways through which crucial stressors lead to mental ill health. They further suggested that to devise effective interventions in mental health, the interactions among all stressors for mental ill health should be examined. Therefore, to better understand the interactive effects of environmental stressors that workers experience in the multicultural workplace, the following hypothesis was proposed:

Hypothesis 3 –The impact of work stressors on mental health outcomes becomes stronger when there is a higher level of cultural stressors.

3.2.2 Personal characteristics[3]

Personal characteristics play an essential role in the process of coping with stress (Hendrix, Ovalle & Troxler 1985). Personal factors, which are recognised as an individual's personal characteristics, are the antecedents of psychological disorders among workers (Leung, Skitmore

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[3] The content of this section is extracted from the publication: Liu, Q, Feng, Y, London, K & Zhang, P 2022, 'Influence of personal characteristics and environmental stressors on mental health for multicultural construction workplaces in Australia', *Construction Management and Economics*, DOI: 10.1080/01446193.2022.2127154.

& Chan 2007). Personality is the unique mixture of thoughts, feelings and behavioural patterns that influences how an individual deals with stressful events (Kamardeen & Sunindijo 2017). People may respond to or cope with the same stressful events differently because of individual differences. Besides environmental determinants, the intrinsic characteristics of the individual can also lead to mental health problems (Cooper & Marshall 1976). Specifically, the Occupational Stress Indicator model identified type A behaviour pattern and locus of control as the individual difference factors that are linked with mental health outcomes at work (Robertson et al. 1990). Both characteristics can either affect psychological outcomes directly or moderate the relationship between stressors and psychological outcomes (Cooper & Baglioni 1988; Robertson et al. 1990).

Type A behaviour and locus of control are two of the most exhaustively researched personality constructs related to psychological health and work behaviour (Furnham 1999; Greenberg & Baron 1992; Kirkcaldy, Shephard & Furnham 2002). Studies in psychology have revealed that individuals with type A behaviour pattern and external locus of control tend to have higher mental ill health compared with counterparts who have type B behaviour pattern and internal locus of control (Kirkcaldy, Cooper & Furnham 1998; Kirkcaldy, Shephard & Furnham 2002). Previous literature on the construction industry has identified the type A behaviour pattern as a key personal characteristic that is associated with mental ill health (e.g. Leung & Chan 2012; Leung, Chan & Yu 2009; Leung, Chan & Yuen 2010; Leung, Liang & Chan 2017; Leung, Skitmore & Chan 2007; Tijani, Jin & Osei-kyei 2021). However, these studies have failed to empirically discover the significant impacts of type A behaviour pattern on mental health in the construction workforce. Studies have also revealed that locus of control is a crucial predictor of health and safety issues in the construction sector (Feng et al. 2017; Loosemore & Lam 2004). However, no empirical studies have been conducted to examine the effects of locus of

control on mental health among construction workers. It is for these reasons that this study focused on the two crucial personal characteristics of type A behaviour and internal/external locus of control.

3.2.2.1 Type A behaviour pattern

Friedman and Rosenman's (1959) type A personality theory is an influential theory in the health psychology domain that uncovers the relationship between behavioural traits and health conditions. Type A behaviour pattern (TABP) refers to 'an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the opposing efforts of other things or other persons' (Friedman & Rosenman 1974, p. 67). The overt manifestations of TABP include an accelerated pace of life, impatience with slowness, explosive and fast speech, focusing on multiple tasks at a time, discontent with life, an inclination to compete and challenge others even in non-competitive situations, an uncontrollable hostility and impatience with others (Matthews 1982). This behavioural pattern is characterised by extreme aggressiveness, easily aroused hostility, a sense of urgency, as well as a competitive drive for success (Friedman & Rosenman 1974). The type B behaviour pattern (TBBP) is the complete opposite, featuring a lack of drive, absence of aggressiveness, tendency not to compete, reduced sense of urgency, lack of ambition and lack of commitment to deadlines (Friedman & Rosenman 1959).

There is a strong relationship between TABP and psychological illnesses. Type A individuals tend to do fast-paced, fierce and demanding jobs, which have been found to be associated with high levels of job stress, conflict and psychosomatic health problems (Jamal 1990). Similarly, Burke and Weir (1980) discovered that TABP was linked to a higher level of work overload

and an increased number of perceived stressful work encounters. Hallberg, Johansson and Schaufeli (2007) revealed that type A people demonstrate constant impatient and irritable behaviours, which lead to emotional exhaustion and burnout. Shin, Shin and Cho (2016) collected data on manufacturing workers through a survey and found that the level of psychological distress was significantly higher for TABP workers than TBBP workers. In the construction industry, TABP is one of the critical personal stressors. Construction workers with TABP are vulnerable to mental ill health (Tijani, Jin & Osei-kyei 2021). Leung, Zhang and Skitmore (2008) found that construction professionals (e.g. estimators, architects and project managers) are more prone to TABP because they work in a competitive environment. Construction workforces in which type A personalities predominate are inclined to overwork, behave in a hostile manner, act competitively and endeavour to succeed, resulting in their physical and emotional stress (Leung, Chan & Cooper 2015). In contrast, Kamardeen and Sunindijo (2017) revealed that construction professionals with TBBP enjoyed a lower level of work stress than those with TABP. From these theoretical and empirical studies, the following hypothesis was developed:

Hypothesis 4 – TABP has a negative impact on the mental health of construction workers.

3.2.2.2 Locus of control

The concept of locus of control originated from Rotter's (1954) social learning theory and is defined as 'the extent to which people perceive contingency relationships between their actions and their outcomes' (MacDonald 1973, p. 169). It relates to an individual's perception of their mastery over their situation, or how much autonomy they feel they have in that situation (Loosemore & Lam 2004). According to Heider's (1958) attribution theory, two categories of attributions are identified: (1) internal attribution, which holds that behaviours are caused by

internal characteristics instead of external circumstances and (2) external attribution, which holds that behaviours are caused by some event or situation beyond the person's control instead of internal characteristics (Feng et al. 2017). Following attribution theory, individuals can generally be identified with one of two distinct types in terms of locus of control. Individuals who believe their lives are under their own control are referred to as possessing 'internal locus of control' and those who think that external factors shape their lives are recognised as having 'external locus of control' (Rotter 1966).

Locus of control has been recognised as one of the crucial determinants of health and safety management (HSC 1993). An individual of external locus of control was reported to have a higher level of stress than that of a person with internal locus of control, as did type A individuals (Hendrix, Ovalle & Troxler 1985). Fusilier, Ganster and Mayes (1987) investigated the relationships among stressors, locus of control and psychological symptoms and discovered that people with external locus of control reacted more intensely to stressors than those with an internal locus of control. Kirkcaldy, Furnham and Cooper (1994) found that subjects with high degrees of type A behaviour and high internal locus of control were least stressed, while subjects with an external locus of control tended to be overcontrolled, stressed out or helpless. Moreover, subjects with type B behaviour and internal locus of control were found to be psychologically and physically healthy. Accordingly, the hypothesis is proposed:

Hypothesis 5 – External locus of control (LOC) has a negative impact on the mental health of construction workers.

As postulated by existing theories (e.g. the transactional theory of stress and coping and P–E fit theory), mental health outcomes are determined by the interplay between personal and

environmental variables (Harrison 1978; Lazarus & Folkman 1984). Common environmental stressors may have a differential influence on the mental health of an individual (Kelloway & Day 2005). Employees in a multicultural workplace must not only respond to potential stressors from work, but also to additional stressors derived from intercultural interactions. The psychological adaptation may be mitigated or aggravated through the individual's different perceptions or behavioural patterns towards the stressors (Pasca & Wagner 2011). According to previous studies in social psychology, both behaviour-orientation factor TABP and personality-like factor LOC can moderate the relationship between environmental stressors and psychological outcomes (e.g. Day & Jreige 2002; Newton & Keenan 1990; Roberts, Lapidus & Chonko 1997). Newton and Keenan (1990) found that both TABP and LOC had significant moderating effects on the relationships between job demands and psychological strain. Findings of Day and Jreige (2002) also indicated that TABP moderated several of the job stressor–psychosocial outcome relationships. In addition, Roberts, Lapidus and Chonko (1997) examined the moderating role of LOC on situational stressors and felt stress, and found that individuals with an external LOC felt more stress when encountering work stressors. Therefore, it can be inferred that TABP and external LOC can moderate the relationship between environmental stressors and mental health outcomes in a multicultural construction workplace. The following hypotheses are proposed:

Hypothesis 6 – TABP moderates the relationship between work stressors and mental health outcomes.

Hypothesis 7 – TABP moderates the relationship between cultural stressors and mental health outcomes.

Hypothesis 8 – External LOC moderates the relationship between work stressors and mental health outcomes.

Hypothesis 9 – External LOC moderates the relationship between cultural stressors and mental health outcomes.

3.3 Intercultural coping

Adaptive coping plays a vital role in person–environment fit and good mental health. In this study, a positive coping approach (i.e. intercultural coping) was developed to effectively address mental ill health and promote good mental health in the multicultural construction workforce.

3.3.1 Positive psychology

As stated in Section 2.2.1, mental health refers to 'a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community' (WHO 2001). This definition emphasises the importance of an individual's abilities, coping behaviours and effective functioning in facilitating good mental health from a positive perspective; and reveals that good mental health not only entails the absence of mental illness but also values the states and capacities that serve the individual and society (WHO 2004).

The science of psychology originally focused on healing via disease models of human functioning. There was considerable research on mental illness and the adverse impacts of environmental stressors. Nevertheless, this focus on pathology neglected the possibilities of a fulfilled individual and a thriving community, and it overlooked the role of building strength in psychological treatment (Seligman 2002). Consequently, in the social and behavioural sciences, the major psychological theories have changed to focus on a new science of strength and competency (Seligman & Csikszentmihalyi 2014). Individuals are no longer viewed as passive

subjects responding to stressors. Instead, the individual is regarded as a decision maker who is capable of controlling situations and producing effective outcomes (Seligman 1992). Positive psychology aims to shift the focus from restoring the worst aspects of life to building positive qualities for a good life. A positive psychology approach, prioritising the building of strength for preventing and treating mental illness, has been acknowledged as a possible remedy for the ineffectiveness of traditional mental health interventions (Seligman 2002).

At the subjective level, the field of positive psychology concentrates on positive experiences such as satisfaction and well-being, sensory pleasures, flow, happiness and constructive cognition regarding the future (e.g. hope, faith and optimism). At the individual level, the field of positive psychology is about positive individual traits, such as the capacity for love and vocation, interpersonal skill, perseverance, wisdom and future-mindedness. At the group level, it involves the civic virtues and organisations that promote positive citizenship: civility, altruism, responsibility, tolerance and work ethic (Seligman & Csikszentmihalyi 2014). The study of the psychology of positive human functioning helps to better prevent and treat mental illness, as well as to develop qualities that enable individuals and communities to not just endure but to thrive. The general stance of positive psychology towards prevention and treatment claims that positive personal traits act as buffers against psychological disorders. Effective prevention and treatment of mental illness can be achieved through identifying, intensifying and focusing on capacities when people are in adverse conditions (Seligman 2002). Accordingly, Henry (2005) maintained that interventions to improve the mental health of workers should focus on developing positive competences and personal resources (Di Fabio 2017).

Therefore, according to the discipline of positive psychology, positive personal competences are crucial for individuals to effectively cope with stressors and foster good mental health.

3.3.2 Intercultural competence

Intercultural competence is playing and will continue to play an ever-growing role in the diversified workforce (Deardorff 2011). Intercultural competences refer to the targeted attitudes, skills, and knowledge that result in visible communication and behaviour that are both effective and appropriate in intercultural transactions (Deardorff 2006). This definition reveals that effectiveness and appropriateness are the two characteristics of intercultural competence. Intercultural competences are recognised as effective abilities to cope with psychological issues in the multicultural context (Starren et al. 2013), and exhibition of intercultural competence is beneficial to overcome challenges through effective verbal and nonverbal levels of behaviour (Spitzberg 1983). Features of intercultural competency include cognitive ability in terms of linguistic and cultural knowledge, as well as affective and behavioural skills such as human affection and the ability to cope with anxiety and uncertainty (Gudykunst 1998). Intercultural competence is generally recognised to have affective, behavioural and cognitive dimensions based on the tripartite distinction between 'cognition', 'affect', and 'behaviour' (Arasaratnam-Smith 2017). This tripartite distinction has been the most productive in models of intercultural competence (Borghetti 2017).

The intercultural competence model of Deardorff (2006) identified three components of intercultural competence, namely attitudes (affective aspect), skills (behavioural aspect), and knowledge (cognitive aspect). Attitudes target emotional reaction that is constituted by respect (valuing other cultures), openness (withholding judgement), curiosity (viewing difference as a learning opportunity) and discovery (tolerance for ambiguity). Skills embody the behavioural

response that comprises listening, observing, evaluating, analysing, interpreting and relating. Knowledge focuses on the cognitive, including awareness of specific knowledge and culture, and grasp of global issues and trends. Likewise, an intercultural competence classification system developed by Lloyd and Hartel (2010) also detected these same three dimensions of intercultural competence. Specifically, affective competence relates to the attitudes, feelings and traits of an individual in respect of cultures and people with whom they interact (Gudykunst & Kim 1997). Dissimilarity openness, tolerance for ambiguity and cultural empathy have been classified as affective intercultural competences. Behavioural competence refers to the effective set of skills to handle stressful events in the multicultural environment (Dodd 1987). Intercultural communication competence, emotion management skills and conflict management skills have been identified as the main behavioural competences. Cognitive competence pertains to the knowledge to perceive and comprehend information (Dodd 1987). Cognitive complexity and goal orientation have been categorised as cognitive competences.

As a personal resource, intercultural competence has been shown to have a positive impact on mental health (LaFromboise, Coleman & Gerton 1993). The positive psychology perspective suggests that a person with high intercultural competence will be able to develop positive intercultural relationships and successfully manage anxiety, uncertainty or biases in intercultural interactions (Cameron, Dutton & Quinn 2003; Leung et al. 2014). Besides, previous research indicated that an increase in intercultural competence could enhance the ability to cope with mental ill health (Gudykunst 1998). Intercultural competence was also found to have a significant impact on the psychological outcomes of migrant workers of different cultural backgrounds (Torres & Rollock 2007). Therefore, intercultural competence is considered to be an effective tool for coping in a multicultural work environment (Starren et al. 2013).

3.3.3 Conceptualising intercultural coping[4]

The theory of intercultural competence has implications for mental health management. Intercultural competence is based on a positive psychology approach to managing mental health, which serves as the theoretical basis for developing and applying intervention programs for mental health enhancement in the workplace. Additionally, the three dimensions of intercultural competence offer new perspectives on investigating coping behaviours at an individual level. Coping is a mechanism that entails active and conscious responses to specific stressful situations. It is generally a self-help strategy for individuals seeking to address mild mental health problems. However, most of the general coping responses adopted by individuals are not effective in dealing with mental health problems. Thus, it is essential to move from general coping into effective coping in a specific context.

A meta-analysis of studies in general contexts revealed that positive interventions can ameliorate well-being and alleviate mental illnesses (Sin & Lyubomirsky 2009). Therefore, developing positive capacities can significantly benefit workplace mental health (LaMontagne et al. 2014). Positive competencies and skills are acknowledged as important personal resources for coping that can reduce the possibility of stressful encounters (Schwarzer 2000). Accordingly, developing intercultural competence is essential to psychological well-being and empowers individuals to accomplish specific tasks (LaFromboise, Coleman & Gerton 1993). Intercultural competence is thus a type of positive personal resource for mental health management.

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[4] The content of this section is extracted from the publication: Liu, Q, Feng, Y & London, K 2021, 'Theorizing to improve mental health in multicultural construction industries: an intercultural coping model', *Buildings*, vol. 11, no. 12, p. 662.

Accordingly, to develop an effective coping mechanism, the positive resources of promoting mental health should be actively exerted and used as an initiative during the coping process. Only by integrating the initiative mechanism (coping) with positive resources (intercultural competencies) can an individual effectively address mental health problems. Therefore, this study incorporates intercultural competences into coping repertoire and proposes the term 'intercultural coping' as a positive coping approach to manage mental health in a culturally diverse environment. In accordance with the intercultural competence model (Deardorff 2006) and the tripartite distinction of intercultural competence (Arasaratnam-Smith 2017), intercultural competence has three dimensions, including affective, behavioural and cognitive dimensions. As illustrated in Section 2.5, coping includes a wide range of affective, behavioural and cognitive efforts targeted at both internal and external stressors (Livneh & Martz 2007). It is thus reasonably inferred that the concept of intercultural coping has three dimensions, namely, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping. The notion of intercultural coping is defined as an individual's affective, behavioural and cognitive competencies to prevent and respond to stressful events for a sustained enhancement of psychological well-being in a multicultural workplace (see Figure 3.1). The concept of intercultural coping may address the limitations of traditional coping functions in a culturally diverse work environment.
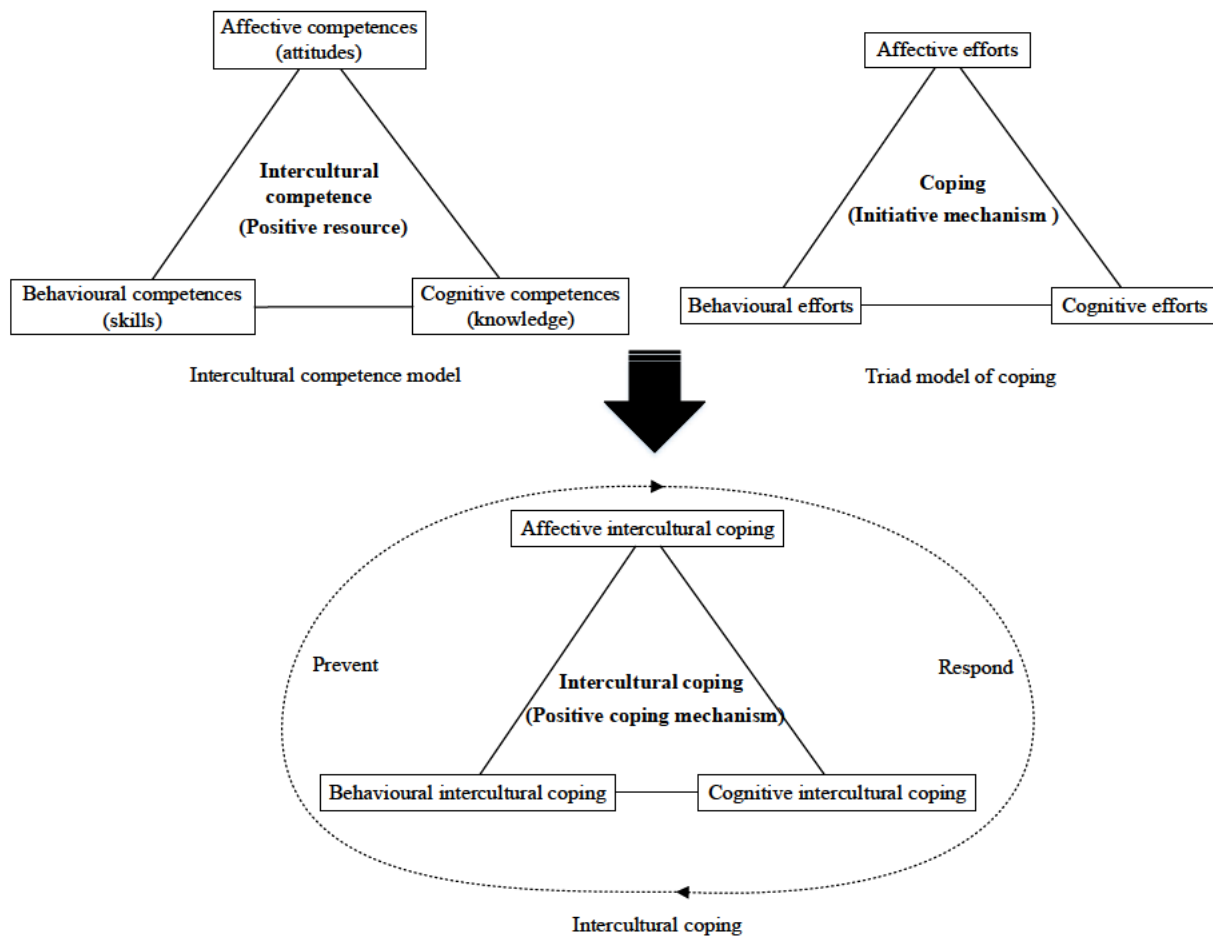
Figure 3.1: Integration of intercultural competence theory and coping theory for conceptualising intercultural coping

From the above reasoning, the following hypotheses were developed to guide the empirical examination of the impact of intercultural coping on mental health outcomes in a multicultural construction environment:

Hypothesis 10 – Intercultural coping has a positive impact on the mental health of construction workers.

Hypothesis 11 – Affective intercultural coping has a positive impact on the mental health of construction workers.

Hypothesis 12 – Behavioural intercultural coping has a positive impact on the mental health of construction workers.

Hypothesis 13 – Cognitive intercultural coping has a positive impact on the mental health of construction workers.

3.4 Moderating effect of intercultural coping strategies on the relationship between environmental stressors and mental health outcomes

The review of cognitive coping theory (i.e. the transactional theory of stress and coping) indicates that an individual's appraisal and coping regulate and affect the relationship between stressor and psychological outcome. An individual consciously or subconsciously appraises, chooses and participates in specific cognitive procedures and actions, which are termed 'coping strategies' (Endler & Parker 1989; Lazarus & Folkman 1984). Coping strategies serve as an important intervention in the relationship between stressors and mental health, altering the tangible and intangible outcomes of the stressor (Yip, Rowlinson & Siu 2008). The adoption of adaptive coping strategies (e.g. rational problem solving) can ameliorate mental health conditions (Folkman 1997), while maladaptive coping behaviours (e.g. self-blame, disengagement) can lead to an increased level of mental distress (Langdon & Sawang 2018). Individuals employ coping strategies to alleviate negative psychological or physical consequences resulting from stressful events (Song 2009). The effectiveness of coping strategies in alleviating the effects of stressors on psychological consequences hinges on the type of stressors and their situational features (McCrae 1984).

Moreover, person–environment fit theory (see Section 2.4.2) suggests that mental ill health arises from the consequences of the misfit or incongruence of environmental stressors and personal characteristics (Edwards, Caplan & Harrison 1998; Lofquist & Dawis 1969). The

person–environment misfit may be altered via coping efforts along three pathways: (1) extent of attentional focus, (2) changing the meaning of the situation and (3) changing the conditions of the person–environment relationship (Folkman & Lazarus 1991). The adoption of adaptive coping strategies can affect person–environment fit and result in positive outcomes for individuals. Therefore, the most significant consideration for choosing effective coping strategies is the 'fit' between the specific stressors and the coping strategies (Folkman & Moskowitz 2004).

Intercultural coping is thus proposed as a positive coping approach for construction workers that is targeted at the specific stressors in a multicultural construction workplace and aims to alleviate the negative effects of stressors on mental health outcomes. In view of the transactional theory of stress and coping developed by Lazarus and Folkman (1984), coping strategies could have a moderating effect on the relationship between environmental stressors and psychological outcomes. Accordingly, intercultural coping strategies are likely to serve as moderators between work stressors and psychological outcomes, as well as cultural stressors and psychological outcomes. Given constant levels of stressors, the employment of affective/behavioural/cognitive intercultural coping strategies may affect the relationship between environmental stressors (i.e. work stressors and cultural stressors) and psychological outcomes, changing levels of psychological distress. Therefore, the following hypotheses are proposed:

Hypothesis 14 – The relationship between work stressors and mental health outcomes varies with different levels of affective intercultural coping strategies (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy).

Hypothesis 15 – The relationship between work stressors and mental health outcomes varies with different levels of behavioural intercultural coping strategies (i.e. intercultural communication competence, emotion management skills and conflict management skills).

Hypothesis 16 – The relationship between work stressors and mental health outcomes varies with different levels of cognitive intercultural coping strategies (i.e. cognitive complexity and goal orientation).

Hypothesis 17 – The relationship between cultural stressors and mental health outcomes varies with different levels of affective intercultural coping strategies (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy).

Hypothesis 18 – The relationship between cultural stressors and mental health outcomes varies with different levels of behavioural intercultural coping strategies (i.e. intercultural communication competence, emotion management skills and conflict management skills).

Hypothesis 19 – The relationship between cultural stressors and mental health outcomes varies with different levels of cognitive intercultural coping strategies (i.e. cognitive complexity and goal orientation).

3.5 Conceptual framework

The hypotheses developed in Sections 3.2, 3.3 and 3.4 are integrated into a conceptual framework for this study. As shown in Figure 3.2, this conceptual framework displays the major constructs and the relationships between the constructs. Determinants are shown in green, intercultural coping dimensions are shown in yellow and mental health outcomes is shown in red.

First, this framework displays the main determinants (environmental stressors and personal characteristics) of mental health outcomes in a multicultural construction work environment.

Environmental stressors are identified as work stressors and cultural stressors, which have direct and interactive negative impacts on mental health outcomes (Hypotheses 1, 2 and 3). As previously elucidated, work stressors can be characterised by five dimensions: factors intrinsic to a job, role in organisation, career development, relationships at work and organisational structure and climate. Cultural stressors can be characterised by three dimensions, which include racial discrimination, language barriers and cultural value conflicts. The most prevalent personal characteristics in the construction sector are TABP and external LOC, which have negative impacts on mental health outcomes (Hypotheses 4 and 5). Moreover, both TABP and external LOC can moderate the relationships between environmental stressors and mental health outcomes (Hypotheses 6, 7, 8 and 9).

Second, the model describes the relationships between dimensions of intercultural coping (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) and mental health outcomes. Intercultural coping is hypothesised to have a positive impact on the mental health of construction workers (Hypotheses 10, 11, 12 and 13).

Third, the conceptual framework depicts the moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes. As shown in Figure 3.2, the impacts of work stressors on mental health outcomes are moderated by affective/behavioural/cognitive intercultural coping strategies (Hypothesis 14, 15 and 16). The impacts of cultural stressors on mental health outcomes are moderated by affective/behavioural/cognitive intercultural coping strategies (Hypothesis 17, 18 and 19).
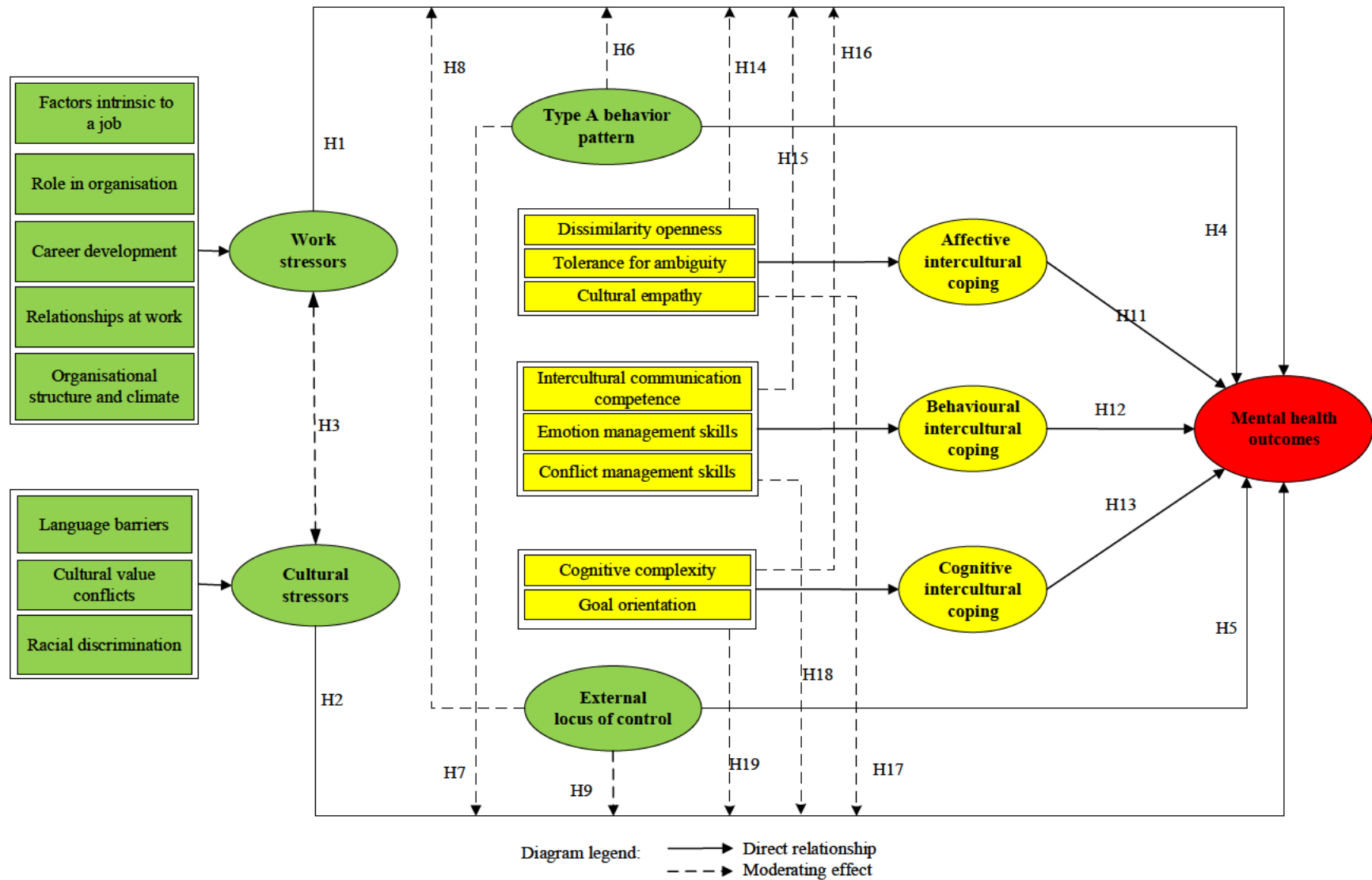
Figure 3.2: Conceptual framework

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3.6 Summary

This chapter has described the development of a conceptual model for managing mental health in a multicultural construction work environment. Informed by theories and models of stress and coping, the major determinants of mental health and how they jointly influence mental health outcomes are depicted in the conceptual model. By integrating coping theory and intercultural competence from a positive psychology perspective, the notion of intercultural coping is proposed. Intercultural coping aims to prevent and respond to stressful events so as to alleviate the negative effects of stressors on mental health and achieve sustained psychological well-being. In accordance with the implications of the transactional theory of stress and coping and person–environment fit theory, the conceptual model and its hypotheses illustrate the moderating effect of intercultural coping strategies on the relationship between environmental stressors and mental health outcomes.

Chapter 4: Research methodology

4.1 Introduction

This chapter reports the research methodology of this study. Section 4.2 elaborates the rationale for selecting the specific research design, approach and method of this study. Section 4.3 describes the detailed and comprehensive collection of data, including the development of a data collection instrument, data collection method, pilot study, sampling method and data collection process. Section 4.4 elaborates the methods of data analysis and model assessment procedure.

4.2 Research design

During the research journey, researchers need to follow a research design to find answers to the research questions as objectively, accurately, validly and economically as possible. A research design is a procedural-cum-operational plan that describes what and how different methods and procedures are to be applied during the research process (Kumar 2014). Creswell and Creswell (2017) have suggested that the plan for performing a research study includes a combination of philosophical assumptions selected for the study, research design associated with the philosophical assumptions, and the particular research methods involved the data gathering, analysis and elucidation. The present study developed a research design in accordance with these principles (Figure 4.1).
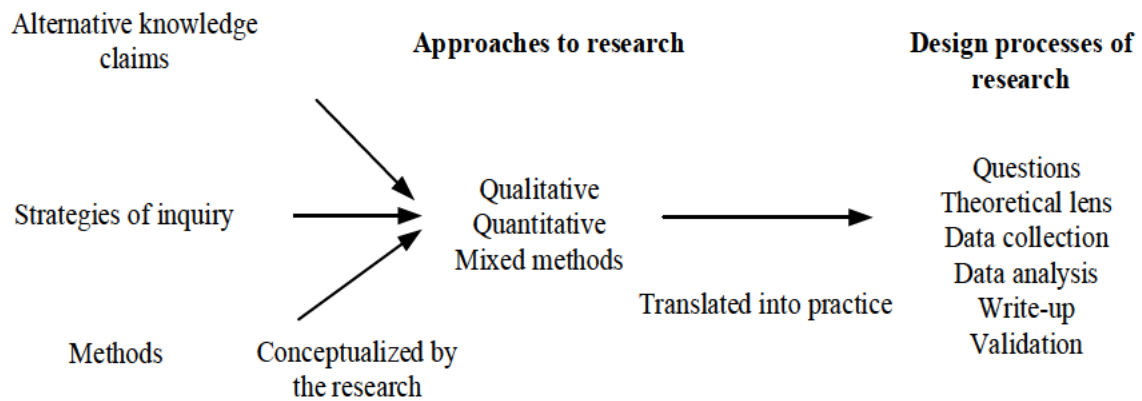
Figure 4.1: Knowledge claims, strategies of inquiry and methods leading to approaches and the design process (Creswell, 2003)

4.2.1 Research philosophy and paradigms

The selection of the philosophical foundation is the first step for a specific research study to be conducted (Fellows & Liu 2015), and helps the study to be performed in a scientific and logical way using the most appropriate research approaches (Creswell & Creswell 2017).

Worldview (also recognised as a paradigm) is the most important part of philosophical assumption (Li 2019). It has a direct impact on the assumptions that researchers make about the real world and their approaches to securing knowledge (Creswell & Clark 2017). There are four major worldviews in research: positivism, postpositivism, constructivism and pragmatism. Positivism maintains that knowledge is formed on the basis of natural phenomena. It is impartial in nature and cannot be altered by the subjective judgement of researchers (Macionis & Gerber 1999). As an extension of positivism, postpositivism holds that observations can be affected by the subjective view of the researcher and objectivity can be achieved by identifying the potential influences of biases and removing them (Seaman 1995). In contrast to positivism and postpositivism, constructivism holds that the reality of investigation can be shaped by the actors involved, and therefore is viewed as the product of researcher and research subjects (Bryman 2016). Positivism and postpositivism depend on quantitative methods, while constructivism

relates to qualitative approaches (Creswell & Clark 2017). The two distinct worldviews between positivism/postpositivism and constructivism further develop into the contrasting position between qualitative and quantitative research approaches. Pragmatism was developed to address this conflict between different paradigms and aims to solve the targeted problem with both qualitative and quantitative research methods. Mixed research methods were created accordingly.

From these worldviews, five principal branches of philosophy that are relevant to research are presented (Creswell & Clark 2017): (1) ontology studies the nature of reality, or the existence of a phenomenon; (2) epistemology deals with the nature of knowledge, the associations between cognition and reality and identification of the most justifiable approaches to reaching truths; (3) axiology focuses on the existence of researcher bias; (4) logical inference concerns the most valid method to obtain knowledge, such as by induction and deduction; (5) rhetoric explores the language of research. By referring to these five branches, researchers can identify the most appropriate methodology they should apply to solve their research problems in accordance with their worldview.

The present research study aims to improve mental health of construction workers in multicultural construction workplaces by investigating the relationships among personal and environmental determinants, intercultural coping and mental health outcomes. It is assumed that the intercultural coping approach, environmental stressors, personal characteristics and mental health outcomes are social realities undeniably existing and independent of the researcher, and can be understood via appropriate methods. Accordingly, the phenomena under study are amenable to positivism from both the positions of ontology and epistemology.

4.2.2 Strategies of inquiry

When conducting a research project, research design should be selected based on the researcher's assumptions about knowledge claims. Moreover, strategies of inquiry (also referred to as 'traditions of inquiry' or 'methodologies') that present specific directions for research are operationalised (Creswell 2003). In line with the different worldviews, three common strategies of inquiry are quantitative, qualitative and mixed methods in social research (Li 2019). The quantitative approach involves the collection of quantitative data, use of deductive reasoning to relate research to theory (i.e. theory identification, formulation of hypotheses, analysis of data, confirmation of hypotheses and revision of theories), explanation of social phenomena by combining the principles of the natural science approach and the positivism of the epistemological viewpoint, and exhibition of the concept of the social world as an objective and external phenomenon. The quantitative approach is the most prevalent methodology in the natural and social sciences (Bryman 2016). The qualitative approach is characterised by emphasis on words rather than qualifications in collecting and analysing data. It utilises inductive reasoning to connect research and theory (i.e. exploration of systems and formation of theories, observations), explains social phenomena from the constructivism of an epistemological position, and reflects the viewpoint of social reality as being the result of socialisation (Bryman 2016). The mixed methods approach combines and integrates quantitative and qualitative approaches in a single research study based on pragmatism, and contributes to the understanding of social phenomena that cannot be adequately examined by single methods (Venkatesh, Brown & Bala 2013).

There are four categories of research in relation to research objectives: exploratory, descriptive, explanatory and correlational (Kumar 2019). An exploratory study tends to explore phenomena and identify variables, as well as set out hypotheses for further study (Fellows & Liu 2015).

Descriptive research attempts to elaborate on an issue or phenomenon in a systematic way. Explanatory research examines and interprets the causal association between two facets of a situation. Correlational research aims to develop an association between two or more facets of a situation (Fellows & Liu 2015; Kumar 2019). The research aim and objectives of the present research indicate that it can be categorised as explanatory and correlational research, as it seeks to (1) examine the effects of personal and environmental determinants on construction workers' mental health outcomes (see Objective 1 in Section 1.4), (2) develop a positive coping approach in multicultural construction workplaces (see Objective 2 in Section 1.4), (3) investigate the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces (see Objective 3 in Section 1.4) and (4) develop a model for managing mental health of workers in multicultural construction workplaces (see Objective 4 in Section 1.4).

Researchers must consider whether the research design matches the research problems when choosing a research design (Creswell & Clark 2017). This study aims to develop a framework to improve psychological well-being in a multicultural construction workforce by exploring the impact of determinants (work stressors, cultural stressors, TABP, and external LOC) on mental health outcomes, intercultural coping, as well as the moderating effect of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes (see Section 1.4). A quantitative approach was selected for this study informed by positivism, and the correlational and explanatory types of study were pursued to achieve the research goals. A scale was developed to measure the variables so as to investigate the relationships between them.

4.2.3 Research methods

In quantitative research, surveys and experiments are the two major research designs. Investigating the relationships between and among constructs is essential to answering questions and hypotheses via surveys and experiments (Creswell 2014). An experiment focuses on establishing causal relationships or testing cause-and-effect hypotheses (Dane 1990). A typical experimental method consists of four steps: (1) participants, (2) material, (3) procedures and (4) measures (Creswell 2014).

The selection, assignment and number of participants are fundamental to the experiment design. The selection process for participants can be either random or non-random. The random selection of participants is called a 'true experiment'. It removes the possibility of systematic differences from various participants that may influence the outcomes, and ensures that any differences in outcomes result from the experimental treatment (Keppel & Wickens 2003). The non-random selection of participants is called a 'quasi-experiment'. Researchers generally choose a convenience sample in the quasi-experiment in which participants are naturally formed groups (e.g. a family unit, a classroom, an organisation) (Creswell 2014). A thorough discussion about the material used for the experimental treatment should be conducted during an experiment (e.g. a specific program or particular activities provided to the experimental group). A pre-testing of the materials and any training required to administer the materials as instructed should also be discussed, so that the invariability of the administration of materials to the experimental group can be ensured (Creswell 2014). Furthermore, the particular experimental design procedures should be identified, including the identification of the experiment type, reasons for the design and development of a visual figure (Creswell 2014). Internal validity threats and external validity threats can jeopardise an experiment's validity. Internal validity threats include experimental treatments, procedures or experiences of the participants that

hinder the researcher from drawing correct conclusions about the population in the experiment. External validity threats result from incorrect conclusions drawn from the sample data to other people, other contexts and past or future circumstances (Creswell 2014).

The experiment is powerful in determining causal relationships and testing cause-and-effect hypotheses. However, it was deemed inappropriate for this research. The reasons were as follows:

- Experimental research design involves separating out and focusing on one or several causal variables (Neuman 2013), whereas this research attempts to investigate the correlations among variables in a large number of multicultural construction workers.
- Experimental research design is suited to problems that are narrow in scope (Neuman 2013). In this study, the unit of analysis and scope of research was the multicultural construction workforce, which encompasses participants from various cultural backgrounds and construction worksites (see Section 1.5).
- This research aimed to obtain data on construction workers' perceptions of stressors, personal characteristics, coping behaviours and mental health conditions during a past period of time. It is impractical to conduct such data collection in laboratory; instead, it should be conducted in a real life setting.

In contrast to the experiment, the survey intends to present a quantitative or numeric description of the trends, beliefs or opinions of a population through examining a sample of that population. Inferences regarding that population can be drawn or generalised from the sample results (Creswell 2014). In a survey, data are mainly gathered through questionnaires, structured observations, structured interviews or data acquisition tool in the form of the internet, telephone,

mail, personal interviews or group administration so as to establish the patterns of relationships (Fowler 2009; Zou, Sunindijo & Dainty 2014). This study considered a survey research design to be an appropriate method of data collection for the reasons listed below:

- The research objectives intended to explore the relationships among constructs (i.e. between determinants of mental health and mental health outcomes; dimensions of intercultural coping and mental health outcomes; and among environmental stressors, intercultural coping strategies and mental health outcomes) in view of the implications of theories and models. Therefore, quantitative data pertaining to the variables were to be collected during a single period.

- Survey research aims to generalise from a sample to a population, whereby inferences about the attitudes, characteristics or behaviours of the population can be made (Creswell 2014). Additionally, the advantage of this method is that it can identify attributes of a large population from a small group of people (Fowler 2009). The present study is consistent with this, intending to generalise inferences about the attributes of mental health issue from a specific type of construction worker to a broader range of construction workforces.

4.3 Data collection

4.3.1 Development of data collection instrument

Four major groupings of variables were identified in this research as presented in the conceptual model in Section 3.5. They were environmental stressors (i.e. work stressors and cultural stressors), personal characteristics (i.e. TABP and LOC), intercultural coping (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping), and mental health outcomes. Since these variables are unobservable variables (latent variables),

they must be inferred from measurable indicators (manifest variables). The research variables need to be operationalised to yield empirical observations. In addition, the interpretation of the concept and measurable scale items should also be presented for each research variable. The constructs and their measurement items are presented in Table 4.1.

Table 4.1: Measurement items for constructs

Constructs	Dimensions	Measurement items
Work stressors (Cooper, Sloan and Williams 1988; Leung et al. 2005; Leung, Liang and Chan 2017)	Career development	CD1: Lack of promotion
		CD2: Impending redundancy
		CD3: Absence of potential career advancement
	Factors intrinsic to a job	FIJ1: Constant pressure to work every minute
		FIJ2: Multiple tasks at the same time
		FIJ3: Urgent tasks and have tight deadlines
	Organisational structure and climate	OSC1: Small matters have to be referred to the superior
		OSC2: Subordinates need permission from the superiors
		OSC3: Any decision has to be approved by the superior
	Relationships at work	RAW1: No respect between colleagues
		RAW2: No trust between colleagues
		RAW3: Dislike of colleagues
	Role in organisation	RIO1: Conflict between high productivity and high quality
		RIO2: Lack of certainty regarding my performance at work
		RIO3: Contradictory demands from my supervisor and staff
Cultural stressors (Gil, Vega and Dimas 1994; Wong and Lin 2014; Leung, Liang and Chan 2017)	Racial discrimination	RD1: Experiencing racist jokes or name-calling
		RD2: Feeling ignored and isolate
		RD3: Encountered repeated rude, offensive gestures
	Language barriers	LB1: Unconfident in communicating in a common language
		LB2: Uncertain in reading and understanding the common language

Constructs	Dimensions	Measurement items
	Cultural value conflicts	LB3: Nervous in getting information in a common language
		CVC1: Problems with colleagues due to different cultural customs
		CVC2: Upset feelings at colleagues due to their lack of cultural customs
		CVC3: Uncomfortable to work following other cultural customs
Type A behaviour pattern (TABP) (Haynes et al. 1978)		1. Feel stressed at the end of the working day
		2. Think about work after work
		3. Feel mentally and physically exhausted after work
		4. Feel uncertain, worried and dissatisfied with how well I've accomplished my task at work
		5. Get impatient when I have to wait
		6. Often feel stressed
		7. Eat too quickly
		8. To be best at everything
		9. Domineering
		10. Like to compete
Locus of control (LOC) (Rotter 1966)		1. People's misfortunes result from the mistakes they make
		2. No matter how hard a person tries; his worth is often not recognized
		3. Success is a matter of hard work
		4. This world is run by the few people in power
		5. When I make plans, I am almost certain that I can make them work
		6. No matter how hard you try; some people just don't like you
		7. What happens to me is my own doing
		8. Many times we might just decide what to do by flipping a coin
Affective intercultural coping	Dissimilarity openness	DO1: Be patient with team members from other cultural backgrounds
		DO2: Understand why colleagues keep their cultural traditions
		DO3: Be respectful when colleagues of different cultural backgrounds speak their language

Constructs	Dimensions	Measurement items
(McLain 1993; Wang et al. 2003)	Tolerance for ambiguity	TRA1: Enjoy ambiguous situations
		TRA2: Positively tackle ambiguous problems
		TRA3: Solve complex problems from different perspectives
	Cultural empathy	CE1: Show appreciation of cultural norms
		CE2: Express my concern about discrimination
		CE3: Tell people making racist jokes is offensive
Behavioural intercultural coping (Hammer et al. 1978; Tjosvold, Chen and Yu 2003; Jordan and Lawrence 2009)	Intercultural communication competence	ICC1: Enter into meaningful dialogue with workmates
		ICC2: Develop and maintain satisfying interpersonal relationships
		ICC3: Solve communication misunderstandings
	Emotion management skills	EMS1: Talk to other people about the emotions I experience
		EMS2: If I feel down, I will do things that can make me feel better
		EMS3: Give a fair hearing to people's ideas
	Conflict management skills	CMS1: Seek a solution good for our team
		CMS2: Treat conflict as a mutual problem
		CMS3: Combine the best of positions
Cognitive intercultural coping (Dodd 1987; Wang and Chan 1995; Hartel, Hanrahan and Cerin 2005)	Cognitive complexity	CC1: Evaluate a situation from various aspects
		CC2: Acquire detailed information about a situation
		CC3: Think deeply about related challenge
	Goal orientation	GO1: Enjoy learning something
		GO2: Learn a new skill for work
		GO3: Achieve a higher standard at work
Psychological distress (PD) (Kessler et al. 2002)		1. In the past 30 days, about how often did you feel nervous?
		2. In the past 30 days, about how often did you feel hopeless?
		3. In the past 30 days, about how often did you feel restless or fidgety?
		4. In the past 30 days, about how often did you feel so depressed that nothing could cheer you up?
		5. In the past 30 days, about how often did you feel that everything was an effort?

Constructs	Dimensions	Measurement items
		6. In the past 30 days, about how often did you feel worthless?

4.3.1.1 Environmental stressors

4.3.1.1.1 Work stressors

Work stressors were measured using the five sub-dimensions: factors intrinsic to a job, role in organisation, career development, relationships at work and organisational structure and climate. Factors intrinsic to a job refer to jobs characterised by intensive tasks, tight deadlines, overtime work, and overwhelming workload (Al-Maskari et al. 2011). Role in organisation is represented by the two most common role-related factors of role conflict and role ambiguity. Career development is involved with job insecurity, under-promotion and status incongruence. Relationships at work relate to the poor relationships among workers, supervisors and subordinates. Organisational structure and climate refers to hierarchical relations and centralised organisational systems. Each of these factors were measured with three items on a five-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree') in accordance with Cooper, Sloan and Williams (1988), Leung et al. (2005) and Leung, Liang & Chan (2017).

4.3.1.1.2 Cultural stressors

Three elements were identified as the most predominant cultural stressors in the multicultural construction workplace: racial discrimination, language barriers and cultural value conflicts. Racism refers to a series of institutional inequalities and a system of beliefs on racial dominance. The construction sector has been criticised for its racial discrimination and prejudice (Wong & Lin 2014). Language barriers are recognised as a major problem for a culturally diverse workplace. They substantially impede workers' understanding of organisational regulations and teamwork and thus lead to health and safety issues (Hallowell & Yugar-Arias 2016). Cultural

value conflicts are inevitable for workers when interacting with team members from diverse cultural backgrounds. Therefore, to help construction workers understand the cultural values of co-workers with different cultural backgrounds is of great significance to enhancing their overall performance (Al-Bayati & Abudayyeh 2016). Each factor of cultural stressors was measured with three questions on a five-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). Questions concerning racial discrimination were adapted from Wong and Lin (2014). Language barriers were measured according to Leung, Liang and Chan (2017). Items for cultural value conflicts were adapted from Gil, Vega and Dimas (1994). Cultural stressors were measured through the three factors.

4.3.1.2 Personal characteristics

As discussed in Section 3.2.2, two factors were identified as being major personal characteristics in the construction workplace, namely TABP and LOC. These are the two most broadly studied personality factors that affect psycho-behavioural health and well-being (Danna & Griffin 1999).

4.3.1.2.1 Type A behavioural pattern

People with TABP tend to be more competitive, aggressive, impulsive, hostile, ambiguous, impatient and time-driven (Friedman & Rosenman 1974). Considerable research has found that workers with type A behaviour are more vulnerable to certain types of diseases (Smith, Kaminstein & Makadok 1995). In this study, TABP was measured with ten items according to the Framingham Type A scale (Haynes et al. 1978). Each item had a format comprising five alternative responses ranging from 1 ('strongly disagree') to 5 ('strongly agree'). A type A scale was created by summing the 10 items, which thus had a total score ranging from 10 to 50, with a high score referring to TABP.

4.3.1.2.2 Locus of control

Locus of control refers to the degree where individuals perceive contingency relationships between their behaviours and their outcomes (MacDonald 1973). It is a crucial determinant of health and safety management (HSC 1993). An individual of external locus of control was associated with a higher level of mental disorders than that of a person with internal locus of control (Hendrix, Ovalle & Troxler 1985). LOC was measured using eight items on a five-point Likert scale ranging from 0 ('strongly disagree') to 4 ('strongly agree') based on Rotter's (1966) Internal-External (I–E) scale. The overall score was summed by all the item scores, which ranged from 0 to 32 with a high score indicating external LOC.

4.3.1.3 Mental health outcomes

Psychological distress is a common mental health problem (Arvidsdotter et al. 2016). A high level of psychological distress suggests severe mental ill health and reflects common mental illnesses (Cuijpers et al. 2009). In this study, mental health outcomes were evaluated using the Kessler Psychological Distress Scale (K6). This measure has been broadly adopted in community epidemiological surveys and has been translated into 14 languages included in all the national surveys in the WHO's WMH Initiative (Kessler et al. 2002). The K6 helps in identifying common mental disorders or subclinical cases in the general population. It has been validated to be excellent screening instruments with good psychometric properties. K6 is recommended for use owing to its brevity and consistency across subsamples (Furukawa et al. 2003). K6 was used to measure psychological distress drawing from stress, anxiety and depression symptoms using a five-point Likert scale scoring from 0 ('none of the time') to 4 ('all of the time'). Scores of the six questions were summed, yielding a total score for psychological distress ranging from 0 to 24. A K6 score of 13 or above is considered to indicate

severe mental illness. A K6 score greater than 5 is considered to indicate moderate psychological distress (Prochaska et al. 2012).

4.3.1.4 Intercultural coping

Intercultural coping is defined as an individual's affective, behavioural, and cognitive competences to prevent or respond to stressful events for a sustained enhancement of mental health in a multicultural workplace in this study. Djebarni (1996) suggested that different types of coping strategies are needed to tackle with specific types of stressors. Thus, it is essential to develop effective coping strategies specifically targeted at the stressors related to multicultural construction workers so as to reduce their mental ill health.

In accordance with the explanation in Section 3.3, the concept of intercultural coping features three dimensions and can be empirically examined: (1) affective intercultural coping, (2) behavioural intercultural coping and (3) cognitive intercultural coping. Each dimension of intercultural coping is also composed of several sub-dimensions. Each sub-dimension was measured with three items in accordance with previous studies.

Affective intercultural coping refers to an individual's positive attitudes to manage stressful events in a multicultural work environment. According to the review of existing research of Lloyd and Hartel (2010), affective intercultural coping features three competences, including dissimilarity openness, tolerance for ambiguity and cultural empathy. The importance of dissimilarity openness in intercultural situations has been demonstrated repeatedly (Ayoko & Härtel 2000; Härtel & Fujimoto 2000). It has been found that people with high openness to perceived dissimilarity consider difference as positive and are willing to learn from dissimilar members and respect their point of view. In contrast, people with low openness to dissimilarity

regard difference as negative and intend to repel dissimilar others (Fujimoto et al. 2000). Therefore, for individuals in a culturally diverse workplace to positively interact with others to generate efficient performance, cultivating a high degree of openness to perceived dissimilarity is of great necessity (Härtel & Fujimoto 2000). Tolerance for ambiguity is defined as 'the tendency to perceive ambiguous situations as desirable' (Budner 1962, p. 29). It plays a crucial role in culturally diverse crews because it 'implies the ability to deal successfully with situations, even when a great deal of information needed to interact effectively is unknown' (Gudykunst 1993, p. 59). Cultural empathy refers to the competence to recognise and comprehend the identities, experiences and positions of individuals from different cultural backgrounds without denying one's own cultural identity (Karim 2003). Nine items were adapted from Wang et al. (2003) and McLain (1993) to measure the three aspects of affective intercultural coping. A four-point Likert scale ranging from 1 ('not at all true') to 4 ('completely true') was applied.

Behavioural intercultural coping refers to an individual's positive skills that they can apply to stressful events to diminish the negative psychological consequences in a multicultural work environment. Behavioural intercultural coping comprises intercultural communication competence, emotion management skills and conflict management skills. The importance of competence in intercultural communication is emphasised for positive outcomes in a multicultural workplace as it is focused on 'a transactional, symbolic process involving the attribution of meaning between people from different cultures' (Gudykunst & Kim 1997, p. 19). 'Effective emotion management skills involve the ability to identify, monitor, and regulate one's own and others' emotions' (Ayoko & Härtel 2000, p. 83), which help team members to reduce social and emotional conflicts (Lloyd & Hartel 2010). Similarly, researchers have called for the development of conflict management skills to cope with anxiety linked to conflict (Tang & Kirkbride 1986). Moreover, competence in conflict management is essential to the success

of a team (Leiba-O'Sullivan 1999). A cooperative approach to conflict management helps to tackle conflict-related problems (Brew & Cairns 2004). In this study, behavioural intercultural coping was measured using its three dimensions with nine questions on a four-point Likert scale ranging from 1 ('not at all true') to 4 ('completely true') based on Hammer et al. (1978), Jordan and Lawrence (2009) and Tjosvold, Chen and Yu (2003).

Cognitive intercultural coping refers to an individual's knowledge that they use to perceive and understand information concerning stressful events in a multicultural work environment. It is characterised by two competences, namely, cognitive complexity and goal orientation. 'Cognitive complexity refers to the ability of a person to perceive a wide variety of things about another person and to make finer interpersonal discriminations than cognitively simple individuals' (Dodd 1987, p. 5). Cognitively complex people are more likely to have differentiated and detailed knowledge and information schemes and tend to think deeply and more meaningfully about related perceptions and problems (Karim 2003). Goal orientation has been discovered to have implications for an individual's standing within the team. Individuals with competence in goal orientation tend to discover, understand and tackle problems and are willing to work with other colleagues (Skaalvik 1997). Thus, team members with a learning goal orientation respond positively towards themselves as well as their group (Lloyd & Hartel 2010). In this study, cognitive intercultural coping was measured with reference to the two strategies using six items on a four-point Likert scale ranging from 1 ('not at all true') to 4 ('completely true') according to Dodd (1987), Wang and Chan (1995) and Hartel, Hanrahan and Cerin (2005). Table 4.2 shows the dimensions and strategies of intercultural coping.

Table 4.2: Intercultural coping dimensions and strategies

Dimensions	Strategies
Affective intercultural coping	Dissimilarity openness
	Tolerance for ambiguity
	Cultural empathy
Behavioural intercultural coping	Intercultural communication competence
	Emotion management skills
	Conflict management skills
Cognitive intercultural coping	Cognitive complexity
	Goal orientation

4.3.2 Data collection methods

Once a data collection instrument has been developed, an appropriate method of data collection method should be selected. There are two main sources of data: primary sources and secondary sources. Primary sources provide first-hand information and include questionnaires, interviews and observations. Secondary sources provide second-hand information and include previous research findings, journals, books, records of an agency and client information already collected (Kumar 2019).

The data collection instrument indicated that this research required primary sources of data (see Section 4.3.1 and Appendix B). Primary information included personal characteristics (i.e. TABP and LOC; see Part II Section A of Appendix B), environmental stressors (i.e. work stressors and cultural stressors; see Part II Section B of Appendix B), mental health outcomes (i.e. psychological distress; See Part III Section C of Appendix B) and intercultural coping (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping; see Part IV Section D of Appendix B).

As previously explained, a survey research design was suitable to gather primary data for the quantitative research in this study. Surveys can be divided into two types: a structured interview and a self-reported questionnaire (Bryman 2016). Interviewing is one of the commonly adopted methods of data collection in the social sciences. It involves a person-to-person interaction between two or more people in the forms of face-to-face, telephone, or other electronic media with a specific purpose (Kumar 2019). In a structured interview, a predetermined set of questions using the same wording and sequence as specified in the interview schedule are put to the respondents. The elements of the structured interview are fixed and predetermined and deviation is not allowed. The structured interview has advantages in providing uniform data; data collected are comparable (Kumar 2019).

A questionnaire contains a number of questions and the answers are provided by the respondents. Therefore, respondents read the questions, interpret the information from the questions, and then complete the response (Kumar 2019). The major difference between a structured interview and a questionnaire lies in that there are person-to-person interactions in the former, while in the latter the answers are reported by the respondents themselves (Kumar 2019). The method of questionnaire has a range of strengths compared with the structured interview (Kumar 2019). First, a questionnaire method is less costly in terms of both human and financial resources. Second, the use of a questionnaire is more convenient, particularly when a method of collective administration is utilised. Third, it provides greater anonymity and so the possibility of gathering accurate data on sensitive questions is increased. Additionally, it offers more flexibility to respondents. Respondents can decide when and where to complete the questionnaire at their own pace. However, a questionnaire also has several disadvantages compared with the structured interview, including low response rate, lack of opportunity to clarify issues and high likelihood of missing data (Bryman 2016; Kumar 2019).

As suggested by Kumar (2019), in selecting between the questionnaire and structured interview the researcher needs to consider the advantages and disadvantages of the two methods as they can influence the validity of the findings. The nature of the investigation and the socioeconomic or demographic characteristics of the study population are the most important criteria for selection between the two methods. The questionnaire was deemed suitable for gathering data in this research. The reasons were first, the nature of the investigation. This study aimed to develop a comprehensive framework for mental health management by identifying the environmental stressors, personal features and mental health conditions of the study population. Some of the questions may have been sensitive so the respondents may have been reluctant to discuss them with investigators. The questionnaire was more appropriate than interview as it ensured anonymity. Second, the questionnaire was selected in response to the geographical distribution of the study population: this study attempted to collect sufficient data from construction workers on a variety of construction worksites across Australia. The potential respondents were dispersed across a wide geographic region. It was impractical to conduct interviews in this circumstance.

There are three major approaches to administering a questionnaire: (1) the mailed questionnaire, (2) collective administration and (3) online questionnaire (Kumar 2019). The prerequisite for the mailed questionnaire is that the investigators have access to the addresses of the respondents. Collective administration is a fast and convenient way to gather information from potential respondents, as respondents congregate in one place. With the development of communication technologies, the use of online questionnaire has become one of the most common methods to collect data. Questionnaires are designed using a program, and then posted on a website or sent in an email with a link for potential respondents. A mailed questionnaire and collective

administration were considered not suitable for this study in light of a lack of addresses for potential respondents, and their scattered geographical locations. Therefore, an online questionnaire was selected as the method of administering the questionnaire (see Section 4.3.7). The questionnaire for this research is presented in full in Appendix B and included the following parts:

- Part I: Background information. The first part gathered the general demographic information of the respondents (e.g. educational attainment, work experience, type of job, trade and cultural background).

- Part II Section A: Personal characteristics. This section collected information on construction workers' personal characteristics; in particular, TABP and LOC. Drawing on their actual experiences participants were asked to rate how much they agreed with each statement on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

- Part II Section B: Environmental stressors. This section collected information on the perceived stressors for construction workers in the workplace, including work stressors and cultural stressors. Drawing on their actual experiences, respondents were required to rate the level of their agreement with each of the statements on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

- Part III Second C: Mental health outcomes. This section gathered data regarding the mental health condition of the respondents during the past 30 days. Respondents were required to select the answer that best described how often they had that feeling on a five-point Likert scale ranging from 'none of the time' to 'all of the time'.

- Part IV Second D: Intercultural coping. This section aimed to collect information on the intercultural coping strategies of construction workers. Drawing on their actual

reactions in various situations, respondents were required to indicate how true each of the statements were using a four-point Likert scale ranging from 'not at all true' to 'completely true'.

4.3.3 Pilot study

Prior to administering the research instrument for data collection, it was essential to test it. Pre-testing a questionnaire involves critically examining the respondents' understanding of the questions. It should be conducted on individuals who are similar to the study population (Kumar 2019). In this study, pre-testing of the data instrument was carried out before distributing the questionnaire survey. The purposes of the pilot study were (1) to examine whether there were difficulties in comprehending the wording of the questionnaire items, (2) to identify whether the meaning of the statements it communicated were appropriate to obtain the necessary data, (3) to identify whether the questions were ambiguous for different participants, (4) to detect whether respondents interpreted the questions differently from the researchers, (5) to calculate how long it took the respondents to complete the questionnaire and (6) for the researchers to gain experience in collecting data.

The pilot study of this research involved seven participants located in Australia, including two researchers in construction work health and safety (WHS), two construction WHS professionals, two experienced construction workers and a mental health expert. The two researchers had rich experience in teaching and studying construction WHS management in Australia. Thus, reliable feedback could be obtained from them by virtue of their professional understanding. They were requested to provide comments on the wording, context, accuracy, comprehensiveness and structure of the data collection instrument. The two WHS professionals were a safety manager and a project manager from construction companies. They have more

than 10 years of experience in the construction industry and have seasoned knowledge about health and safety issues in the construction industry. The two professionals were required to comment on the comprehensibility and readability of instructions; choice of words, descriptions and questions; as well as other comments. Two construction workers working in Australian construction companies were also involved in the pilot study to guarantee that respondents of the pre-test were consistent with the participants in the data collection stage, and that the questions were appropriate for workers in the Australian construction context. They gave feedback on the time it took to complete the questionnaire and some ambiguity in the questions, as well as technical problems regarding using the Qualtrics survey platform to complete the online questionnaire. Additionally, a mental health expert was consulted about the comprehensibility, appropriateness and readability of the instructions, and choices of words, statements and contexts in the questionnaire, particularly the selection of the mental health measurement scale. Feedback on the pilot study resulted in a few amendments to the questionnaire such as validating the use of the Kessler Psychological Distress Scale (K6), shortening the questionnaire, modifying the ambiguous statements, deleting repeated questions and making the online questionnaire more user-friendly.

4.3.4 Validity and reliability of the research instrument

The concept of validity can be applied to the entire process of a study. It generally refers to the appropriateness and accuracy of each step in the research process (Kumar 2019). In terms of a research instrument, the concept of validity is defined as 'the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration' (Babbie 1989, p. 133). Accordingly, validity is the capability of the instrument to measure what it aims to measure. There are two approaches in the social sciences to establishing the validity of a research instrument: the approach based on logic that supports the construction of the research

instrument and the approach based upon statistical evidence generated from the data gathered using the instrument (Kumar 2019). There are three types of validity in quantitative research: face and content validity, concurrent and predictive validity and construct validity (Kumar 2019). Face validity refers to the process of justifying the inclusion of a question in an instrument by linking it to the research objectives. Moreover, examination of the coverage of the questions or items of the instrument with regards to the objectives of the research is also important. Content validity refers to the examination of questions of an instrument to establish the extent to which the statements cover all areas under study. The comparisons of the assessment outcomes establish predictive and concurrent validity. Predictive validity refers to the extent to which an instrument can accurately predict an outcome. Concurrent validity is established by how well an instrument compares with another observable criterion or credible findings. Construct validity hinges on statistical procedures. It is judged by determining the contribution of each variable to the total variance of the phenomenon (Kumar 2019).

The face and content validity of the data collection instrument was established. First, each question included in the questionnaire represented an essential part of a construct and all questions involving the constructs form a comprehensive coverage of the contents under study. In addition, the design and selection of the measurable scales for the constructs in this study (i.e. work stressors, cultural stressors, TABP, LOC, mental health outcomes and intercultural coping) were derived from an extensive review of relevant literature. Second, pre-testing of the data collection instrument was conducted prior to administering it for final data collection. The appropriateness, comprehensiveness and accuracy of the data collection instrument were examined and modified to ensure the questions represented their corresponding constructs within the Australian construction context.

Reliability of an instrument refers to its accuracy, stability and predictability. Thus, 'a scale or test is reliable to the extent that repeat measurements made by it under constant conditions will give the same result' (Moser & Kalton 1989, p. 353). The concept of reliability can be derived from the capability of a research instrument to generate similar measurements, and the extent of inconsistency in the different measurements. In the social sciences, making a research instrument completely accurate is impractical because there are a variety of factors that can affect the reliability of an instrument, including (1) the wording of questions: any ambiguous wordings of the questions or statements can impact on the reliability of the instrument. Respondents might understand and interpret the questions in a different manner at different times, thus leading to inaccurate responses; (2) the respondent's mood: a change in a respondent's mood can alter and impact on the reliability of the data collection instrument; (3) the regression effect of a research instrument: when an instrument aims to measure opinions/attitudes towards an issue, some respondents may change their answers after completing the questionnaire survey (Kumar 2019). Thus, the reliability of the instrument may be affected.

The impacts of these factors on the research instrument in this study were addressed. First, the measures in this study were adopted from widely accepted and validated measurement scales. Moreover, a pilot study was conducted by experts and respondents from the study population to ensure the accuracy and comprehensiveness of the wordings in the questionnaire. Second, before starting the questionnaire survey, respondents were notified that participation was voluntary and that they could withdraw at any time. Additionally, contact information for the researchers, the Western Sydney University Human Research Ethics Committee and Australian mental health support services were provided to respondents if they had any problems about the questionnaire or became upset while completing the survey. Third, the questionnaire survey

was facilitated by the online survey platform Qualtrics. Qualtrics is convenient and user-friendly, and allows users to return to the previous pages and revise the recorded answers. Respondents were encouraged to review the questionnaire before submitting it.

The reliability of a research instrument can be determined using internal consistency procedures or external consistency procedures (Kumar 2019). Internal consistency procedures refer to the notion that questions measuring the same phenomenon should generate similar results regardless of their number. External consistency procedures compare the results from two independent processes of collecting data to verify the reliability of the instrument. According to Neuman (2013), three types of reliability are identified: representative reliability, stability reliability and equivalence reliability. Representative reliability is determined to the extent that a measure generates consistent responses when administered to dissimilar populations. Stability reliability is indicated to the extent that the measurement obtains similar answers when administered during different periods of time. When manifold indicators are used to measure a construct, equivalence reliability is determined by the extent to which a measurement scale produces consistent outcomes among various items (Neuman 2013).

In this study, the reliability of the data collection instrument was determined by clear definitions and conceptualisations of all variables so that the interpretations and implications of all variables and questions of this research instrument were reliable for different respondents, for same populations over different periods of time, and between respondents and researchers. In addition, most of the constructs in this study were measured using multiple indicators, which are more stable than a single-item measurement scale (i.e. work stressors, cultural stressors and intercultural coping dimensions). Finally, pre-testing of the research instrument was conducted before administering the questionnaire survey in the actual data collection. This pilot study

aimed to examine the understanding of the questions by the respondents, which ensured the accuracy, appropriateness, clarity and comprehensiveness of the research instrument for the study population.

4.3.5 Determination of sample size

Deciding the minimum sample size is critical to guaranteeing that the outcomes of the statistical method are statistically sufficient and potent, and that the model can be generalised (Hair, Hult et al. 2017). The SEM technique with partial least squares (PLS) was adopted to analyse data in this research. Thus, the determination of sample size was based on the application of SEM technique. It is generally accepted that SEM requires large sample sizes because they provide higher stability and better explanation for the indicators. A sample number of 200 is considered to be medium-sized and is more likely than a small sample to produce stable results (Wu 2010). Owing to a lack of a single accurate or universally-accepted method to determine sample size for SEM, researchers usually depend on 'rules of thumb'. The ratio of observations to estimated parameters (N : q) has been adopted by some researchers as a guide. Particularly, it was suggested by Schreiber et al. (2006) that the ratio (N : q) should be 10 to 1, or 10 participants (observations) for each estimated parameter. Whereas, other researchers have recommended the ratio (N : q) can be 20 to 1 (Kline 2015) or 5 to 1 (Bentler & Chou 1987). Iacobucci (2010) suggested that the sample size for SEM analysis should be at least 150. For a SEM with three or more indicators per factor, a sample size of 150 'will usually be sufficient for a convergent and proper solution' (Anderson & Gerbing 1984, pp. 170–1).

The present study adopted the PLS-SEM technique to examine the research models, which considers the characteristics of the model and data when selecting the sample size. The sample size should be determined by means of power analyses derived from the part of the model with

the largest number of predictors (Hair, Hult et al. 2017). Cohen (1992) provided a framework for determining the minimum sample size for PLS-SEM models based on four parameters: significance levels, minimum R^2, statistical power of 80% and number of independent variables. In line with Cohen's (1992) recommendation, a minimum sample of 58 was considered to reach a statistical power of 80% for detecting R^2 values of at least 0.25 (with a 1% probability of error). Accordingly, a minimum sample size of 58 was considered to suffice for this study's modelling analysis.

4.3.6 Sampling

'Sampling is the process of selecting a few (a sample) from a bigger group (the sampling population) as the basis for estimating or predicting the prevalence of an unknown piece of information, situation or outcome regarding the bigger group' (Kumar 2019, p. 292). It ensures that the selected sample is representative of the population. Sampling offers a practical approach to enabling the data collection and processing elements of research to be conducted (Fellows & Liu 2015).

In this study, the unit of analysis (see Section 1.5) implied that the target unit for sampling would be individual construction workers in a multicultural work environment. The construction industry is the third largest employing industry in Australia, with over 1.15 million workers (Australia jobs 2020). Because there are no complete official lists of construction workers in Australia, it was impractical to employ random sampling. In addition, owing to the difficulty of gathering substantial and diverse samples in the construction field, non-probability sampling has been frequently utilised in construction research (Abowitz & Toole 2010). Consequently, the purposive sampling technique was used to select samples from the population in this study. A purposive sample is selected in accordance with the characteristics

of a population and the objective of the study. Since only the respondents who are best positioned and can provide information needed for the study participate in the data collection process, the data meet the predetermined criteria and are potentially information-rich (Patton 1990).

Sampling comprises two stages. Building a sampling frame was the first stage in this study. The sampling frame is 'any material or device used to obtain observational access to the finite population of interest' (Särndal, Swensson & Wretman 2003, p. 9). This frame should be able to identify and select a sample in accordance with a given probability sampling design, and develop contact with selected elements (e.g. by phone, email or home visit). Accordingly, a sampling frame should at least meet the requirements that (1) the units in the sampling frame are identified, and (2) all units can be found (Särndal, Swensson & Wretman 2003). The research aim and objectives identified onsite construction workers in Australia as the study population. Therefore, the active working members of Incolink served as the sampling frame of this study. Incolink was established in 1988 as the industry redundancy scheme. It is a joint enterprise of employer associations and industry unions in the building and construction industry. It manages essential industry funds for construction workers and also supports the industry with a range of benefits and services, such as counselling, apprentice support, financial rights and drug and alcohol support (Incolink 2019). Incolink is Australia's oldest, largest and most comprehensive workers' entitlement scheme and has been recognised as the safety net for workers' physical and mental health in the building and construction industry. With the aid of this frame, it was possible to identify and select a sample of the population of interest and establish contact with the selected sample. Therefore, this sampling frame was justified.

The second stage of sampling was approaching the potential respondents and distributing the questionnaire to them. Incolink has 35,000 active members of construction workers. They were contacted via email with the assistance of Incolink managers. The email contained a brief introduction to the survey including its purpose, inclusion and exclusion criteria, the appropriate timeframe for completion, as well as the link for completing the online questionnaire.

4.3.7 Data collection procedure

The data collection occurred from 2 February 2021 to 29 June 2021. Two major steps were included in the data collection process. The first step was contacting the construction organisation Incolink. An invitation email was sent to the executive general manager of Incolink, which elaborated the research aim, the benefits of the study, eligibility criteria and the proposed method of distributing the online questionnaire survey. Given that the aim of this study aligned with the goal of Incolink to promote mental well-being in the construction industry, Incolink accepted the invitation and was willing to circulate the questionnaire survey to its members.

An invitation letter was subsequently sent to active working members. A participant information sheet (Appendix B) was attached, which introduced the purpose of the study, inclusion and exclusion criteria for the survey, instructions for completing the questionnaire, the appropriate timeframe for completing the survey, benefits of the study, potential risks and solutions to those risks, ethical issues, contact persons and the link to the online questionnaire survey (hosted by the Qualtrics survey platform). At the end of the participant information sheet, participants were asked to select whether they consented or not to participate. Participants who selected 'I consent' proceeded to the questionnaire. Then respondents were required to complete the questions in the questionnaire survey (see the questionnaire in Appendix B).

There are four sections in the questionnaire survey. Section A (personal characteristics) asked respondents to provide information on their perceptions of TABP and LOC. Section B (environmental stressors) required respondents to rate the levels of work stressors and cultural stressors in their workplace. Section C (mental health outcomes) asked respondents to provide information on their mental health during the previous 30 days. Section D (intercultural coping) required respondents to indicate their level of intercultural coping strategies according to their actual reactions. Only eligible respondents who were at least 18 years of age, had worked in the construction industry for at least one year, were onsite workers and had experience of working with people from different cultural backgrounds in a crew or on a project would continue with the survey. A total of 398 construction workers responded to the questionnaire survey. After excluding the invalid responses—which either had short response durations (e.g. less than 5 minutes identified by Qualtrics), were incomplete or gave the same answer for all questions—data from 252 responses were considered valid and suitable for analysis.

4.3.8 Ethical considerations

All professions are guided by a code of ethics to adapt to the dynamic needs, expectations, values, and ethos of those who hold a stake in the professions (Kumar 2019). The concept of ethics is defined as 'the moral values of professional conduct that are considered desirable for good professional practice' (Kumar 2019, p. 356). Certain ethical issues may be generated in the course of carrying out research (Bouma & Ling 2004). In this research activity, ethical issues could potentially involve three stakeholders: the participants, the researcher and the funding body. This research project was awarded ethics approval by the Western Sydney University Human Research Ethics Committee, with ethics approval number H14008 (see

Appendix A for Letter of Human Research Ethics Approval). Therefore, the ethical issues regarding the three parties were addressed as follows.

4.3.8.1 Ethical issues concerning research participants

First, the ethical consideration concerning research participants involves the collection of information. It is essential to obtain the participants' informed consent such that participants are sufficiently aware of the type of information the research requires, the importance of that information, use of the information, the nature of their participation, and the impact of the participation on them (Kumar 2019). A participant information sheet was provided to the participants before they commenced the survey. It clearly indicated the purpose of the research project, the benefit of this research to the participants and the broader community, how the data collected would be used, and how they were expected to participate in the study. Thus, the ethical issue regarding collection of information was addressed.

The second ethical issue concerns consent process. After being accurately aware of the nature of the research, voluntary consent should also be obtained from the participants. According to Schinke and Gilchrist (1993, p. 83), 'all informed-consent procedures must meet three criteria: participants must be competent to give consent; sufficient information must be provided to allow for a reasoned decision; and consent must be voluntary and uncoerced'. In this study, participants were provided with information about the study prior to giving their consent and starting the questionnaire. They were also informed that their participation was entirely voluntary and they could withdraw at any time without any consequences. Using an online survey platform ensured that participants have read the information and provided consent to access the survey.

The third ethical consideration is the possibility of causing harm to participants. Harm pertains to 'not only hazardous medical experiments but also any social research that might involve such things as discomfort, anxiety, harassment, invasions of privacy, or demeaning or dehumanising procedures' (Bailey 1978, p. 384). The inconvenience of giving up time to participate was the main risk for this project. Beyond this, risk should in most cases have been no greater than those in participants' normal day-to-day activities. However, this study had the potential to involve some minor discomfort for participants in the questionnaire process since some questions may have reminded them of stressful events (e.g. work stressors, cultural stressors). To minimise any discomfort, participants were provided with the hotlines of Australian mental health support services. The following features were built into the online survey: an introduction to the questionnaire that 'warned' potential participants that the content addressed some sensitive issues, a statement that the participant 'agreed to proceed' which was checked before the questionnaire was commenced, and prompts about seeking help at the end of the questionnaire.

Another ethical consideration is maintaining confidentiality. The anonymity and confidentiality of the participants were maintained in this study in the data collection and storage processes. The anonymity of participation in this study was stated in the participant information sheet before respondents commenced the survey. By using an online survey platform to complete the questionnaire, face-to-face interactions between participants and researchers were avoided. Thus, responses were unidentified. Moreover, members of the research team alone would be privy to the data collected and all data would be deidentified before being stored. As the data were anonymised this protected the individual identities of all participants in any publications or public presentations.

4.3.8.2 Ethical issues concerning the researchers

An ethical consideration in relation to the researchers is the handling of the data. It is unethical to expose respondents' information to others for purposes other than research (Kumar 2019). In this study, data collected were anonymous and not identifiable and used only for research purposes.

4.3.8.3 Ethical issues concerning funding bodies

The imposition and acceptance of controls and restrictions from funding organisations are considered unethical (Kumar 2019). This research project was sponsored by Western Sydney University, which had no financial interests in the research outcomes. Therefore, no restraints or conditions were imposed on the results of this study.

4.3.9 Characteristics of sample

Table 4.3 presents the respondents' demographics. Most of the respondents were males (98%), which showed consistency with the male-dominated nature of the construction industry in Australia—86.4% of construction workers are male (ABS 2022). In terms of educational attainment, 61% of the respondents received a school education (primary school and secondary school), and 39% received tertiary education (higher education or vocational education and training (VET)). This is also similar to the education level in the Australian construction industry—around 49% of workforce hold a Certificate III or higher VET qualification (Statista 2021). Almost half of the respondents (49%) had been working in the Australian construction industry for over 21 years and 34% of the respondents for over 10 years, suggesting that most respondents had rich working experience in the Australian construction industry. Moreover, 19% of respondents were non-Australians, originating from more than 20 different countries,

half of whose first languages were not English. This result reflected the multicultural status of Australian workplaces.

Table 4.3: Demographics of respondents

Profile	Category	Frequency	%
Gender	Male	246	97.6
	Female	6	2.4
Age	18–25	3	1.2
	26–35	45	17.9
	36–45	77	30.6
	46–55	67	26.6
	56–65	57	22.6
	66 or above	3	1.2
Highest education Level	School education (Primary school and Secondary school)	154	61.1
	Tertiary education (Higher education and Vocational education and training (VET))	98	38.9
Working experience in Australian construction industry	Below 5 years	16	6.3
	5–10 years	27	10.7
	11–20 years	86	34.1
	21 years or above	123	48.8
Job	Apprentice	3	1.2
	Labourer	50	19.8
	Operator	32	12.7
	Tradesperson	95	37.7
	Foreman/Supervisor	58	23.0
	Others	14	5.6
Trade	Bricklayers and stonemasons	4	1.6
	Building and construction labourers	33	13.1
	Carpenters and joiners	33	13.1
	Concrete workers	14	5.6
	Crane, hoist and lift operators	27	10.7
	Earthmoving and mobile plant operators	18	7.1
	Scaffolders	10	4.0
	Glaziers	2	0.8
	Painting trades workers	6	2.4

Profile	Category	Frequency	%
	Plasterers	8	3.2
	Plumbers	53	21.0
	Structural steel and welding trades workers	12	4.8
	Wall and floor tilers	8	3.2
	Others	24	9.5
Cultural background	Australian	204	81.0
	Non-Australian	48	19.0
First language	English	228	90.5
	Non-English	24	9.5
	Total	252	100

4.4 Methods of data analysis

The methods of data analysis in this study were introduced in this section. First, the SEM approach is reviewed (Section 4.4.1). The rationale for selecting the PLS-SEM method for this research is then elaborated (Section 4.4.2). Last, the PLS-SEM process of this study is presented (Section 4.4.3).

4.4.1 Structural equation modelling

Structural equation modelling (SEM) was selected as the method of data analysis for this study. SEM is a second-generation multivariate data analysis method that has been increasingly adopted by researchers to overcome the weaknesses of first-generation methods (e.g. multiple regression, analysis of variance, cluster analysis and exploratory factor analysis). It is one of the most prominent and advanced techniques of statistical analysis in the social sciences to have emerged in recent years (Hair, Hult et al. 2017). It is acknowledged as a general model that encompasses a diverse class of multivariate statistical methods of empirical data (e.g. multiple regression, confirmatory factor analysis, confirmatory composite analysis, path analysis, covariance analysis, PLS path modelling and latent growth modelling) (Bowen & Guo 2011).

SEM is composed of two statistical methods: confirmatory factor analysis and path analysis. Confirmatory factor analysis is applied to estimate latent variables. The parameters for each variable is specified based on theories or prior knowledge. It aims to verify the factor structure/dimension of the latent constructs. Path analysis is applied to quantify the relationships between multiple variables (Byrne 2013; Fan et al. 2016). By using SEM, researchers can simultaneously analyse relationships between latent/unobserved variables, as well as between latent/unobserved variables and measured/observed variables (Hancock 2003). This modelling technique has been widely employed in the research of construction management, as by Feng et al. (2017), Liu, Ye and Feng (2019), Sunindijo and Zou (2012) and Trinh, Feng and Mohamed (2019).

SEM was identified to take three inputs (I) and produce three outputs (O) (Pearl 2012). The inputs include (I-1) a class of qualitative causal hypotheses derived from theories or empirical findings were depicted in a structural equation model, (I-2) a set of questions regarding causal relationships among research constructs and (I-3) SEM applications are generally in non-experimental designs, whereas data from experimental design can also be analysed. The outputs include (O-1) numeric estimates of model parameters for hypothesised effects (e.g. X → Y), (O-2) logical implications of the model that indirectly relate to a particular parameter but that can still be examined in the data, and (O-3) data support the testable implications of the model. The key strengths of SEM are in estimating multiple and interdependent relationships, exhibiting latent variables among the relationships and considering measurement error during the process of estimation (DiLalla 2000). Different types of constructs are identified in SEM, namely, predictor (independent) and predicted (dependent) constructs. Predictor or independent constructs refer to the unobserved latent variables used to predict dependent variables, while predicted or dependent constructs refer to the unobserved latent variables that are predicted by

independent constructs. The two types of constructs are each measured by their corresponding observed variables (also referred to as 'measurement items' or 'indicators') (Trinh 2018). In this study, the terms 'predictor construct/latent variable' and 'independent construct/latent variable' are interchangeable; the terms 'predicted construct/latent variable' and 'dependent construct/latent variable' are interchangeable; and the terms 'indicator' and 'measurement item' are interchangeable.

An example of a structural equation model is described below. It has two main components: a structural model that imputes correlations among latent variables, and a measurement model that defines latent variables using the observed variables (Kaplan 2008; Kline 2011). The structural model depicts the relationship between independent construct (χ) and dependent construct (η). The variance of the dependent construct that is not explained by its independent construct (χ) is termed structural error (ξ_η) for its corresponding dependent construct (η). The measurement model represents the relationship between the constructs and the measurement items. Measurement model A of the construct χ and measurement model B of the construct η are also described. Particularly, in measurement model A, construct χ is a second-order independent construct, which can be defined and characterised by its three first-order dimensions (i.e. χ_1, χ_2 and χ_3). The first-order constructs (i.e. χ_1, χ_2 and χ_3) are measured by observed measurement items (i.e. χ_{ij}). There is a measurement error ε_{xij} with each observed measurement item (χ_{ij}). Similarly, in measurement model B, dependent construct η is characterised and reflectively measured by its measurement items (i.e. y_1, y_2 and y_3). There is a measurement error ε_{yi} associated with each measurement item (Trinh 2018).
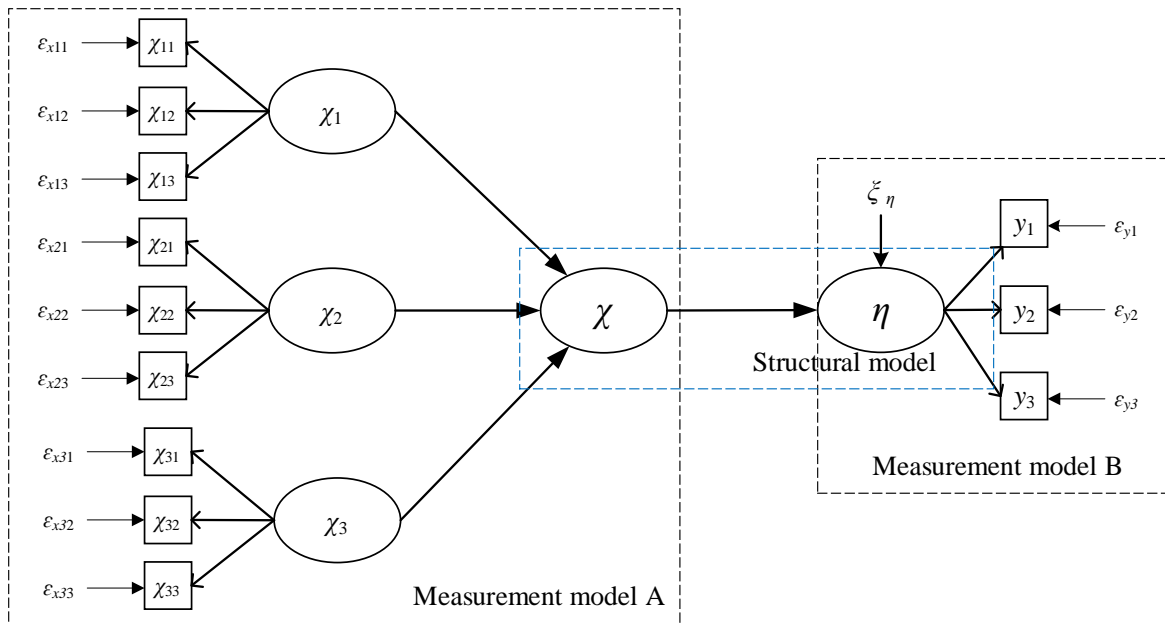
Note:

χ : second-order independent construct χ_{ij} : measurement items of independent construct

χ_i : : first-order independent constructs y_1 : measurement items of dependent construct

η : dependent construct ξ_η : structural error (or error of prediction)

ε : measurement error

$\longrightarrow$ reflective effect between observed and latent variables

$\longrightarrow$ causal effect between independent and dependent constructs

$\longrightarrow$ direct effect of error

Figure 4.2: Example of a structural equation model adapted from Trinh (2018)

In SEM, the measurement model and structural model are combined into an integrated prediction model for a set of parameter estimations, which enables the evaluation of the adequacy of the complete model in relation to the observed data (Hwang & Takane 2004). Therefore, SEM was considered appropriate for analysing and validating the hypothesised models in this study. The proposed conceptual model (see Section 3.5) indicated that this research involved multiple latent constructs (i.e. work stressors, cultural stressors, TABP, LOC, intercultural coping dimensions and mental health outcomes). These latent variables could not be directly observed, but could be measured and examined through their corresponding measurement items. Accordingly, prior to examining the hypothesised relationships, the

relationships between the latent variables and their corresponding observed variables should be examined. Moreover, some latent constructs in this study (i.e. work stressors, cultural stressors, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) are second-order constructs, which contain several sub-dimensions (first-order constructs). The second-order constructs are measured by the latent variables scores of the first-order constructs that serve as the measurement items (see Section 5.3.2 for measurement model assessment for the second-order construct). The confirmatory factor analysis and path analysis of SEM can analyse the relationships mentioned above (Bowen & Guo 2011). Additionally, the objectives and hypotheses indicate that this study attempted to examine multiple causal relationships from different models among latent constructs. SEM allows for the simultaneous analysis of the relationships among latent variables (Hancock 2003). The path analysis of SEM serves this function (Hair, Hult et al. 2017).

4.4.2 Selection of PLS-SEM approach

Two main approaches are applied to estimate the correlations in a structural equation model, including covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM, also called 'PLS path modelling') (Hair et al. 2010; Hair, Ringle & Sarstedt 2011). CB-SEM focuses on confirming theories by determining how well a proposed theoretical model can estimate the covariance matrix for a sample data, whereas, PLS-SEM is mainly used to develop theories by explaining the variance in the dependent variables when testing the model (Hair, Hult et al. 2017). An important conceptual difference between CB-SEM and PLS-SEM lies in how each approach treats the latent constructs in the model. The latent constructs are viewed as common factors in CB-SEM that define the covariation between its equivalent indicators. In contract, PLS-SEM utilises proxies to represent the latent constructs under study (Hair, Hult et al. 2017).

Three critical issues should be considered when selecting the appropriate SEM method: data characteristics, model characteristics and algorithm properties (Trinh 2018). As to data characteristics, CB-SEM calls for normally distributed data and residuals within a considerable amount of sample; in contrast, PLS-SEM have no distributional assumptions about underlying data and works efficiently with small sample sizes. With regard to model characteristics, CB-SEM cannot estimate complex models with many latent constructs and/or measurement items and generally deals with reflective measurement models, whereas PLS-SEM is flexible in modelling properties. It can handle both reflective and formative measurement models, variables measured with multiple indicators and single indicators, as well as complex models with various structural relationships. In respect of algorithm properties, CB-SEM is based on the maximum likelihood estimation and attempts to minimise the discrepancy between the predicted and sample covariance matrices, while PLS-SEM uses least square estimation and seeks to minimise the amount of unexplained variance. It has high efficiency in parameter estimation, which is demonstrated in its greater statistical power than that of CB-SEM (Cassel, Hackl & Westlund 1999; Hair, Hult et al. 2017; Hair, Ringle & Sarstedt 2011; Ringle, Sarstedt & Straub 2012).

PLS-SEM approach was selected as the data analysis method in this study for the following reasons. First, the sample size (N = 252) of this study was a medium-sized sample, which was not sizeable. Moreover, the sample data were not normally distributed. Thus, the application of PLS-SEM was more appropriate compared with CB-SEM, as PLS-SEM works efficiently with a small/medium-sized sample and has no assumptions about the data distribution.

Second, as introduced in Section 4.4.1, the measurement model of this study involved a second-order structure. Second-order constructs (e.g. work stressors) should be measured by their

corresponding formative first-order constructs (e.g. factors intrinsic to a job, role in organisation, career development, relationships at work and organisational structure and climate). The latent variable scores of formative first-order variables were used as the measurement items of the second-order variables (see Section 5.3.2 for measurement model assessment for the second-order construct). Moreover, the conceptual model of this study (Section 3.5) indicated that the SEM models were complex with many latent variables and indicators attempting to examine various structural relationships. PLS-SEM suited this study as it has the advantage over CB-SEM in handling formative measurement models and complex models.

The evaluation of the results of the second-order constructs and the examination of the moderating effects (e.g. to examine the moderating effect of intercultural coping strategies on the relationship between environmental stressors and mental health outcome) required the determining of the latent variable scores for subsequent analyses. For instance, to examine the moderating effects of affective intercultural coping strategies on the relationships between work stressors and mental health outcomes, latent variable scores of affective intercultural coping strategies and work stressors should be determined to form the interaction term and evaluate its effect on mental health outcomes (see Section 4.4.3.1.1 for two-stage approach of moderating effect). Thus, PLS-SEM was more suitable for this study as it extracts the latent variable scores whereas CB-SEM estimate models without using the latent variable scores.

Considering the above arguments (i.e. nonnormally distributed data, medium sample size, second-order structure, formative measurement models and latent variables scores), PLS-SEM is selected for data analysis as it better suits the research objective, data characteristics and model set up.

4.4.3 PLS-SEM process

The procedure for applying PLS-SEM begins with specifying the measurement and structural models, followed by examining the collected data as suggested by Hair, Hult et al. (2017). The PLS-SEM algorithm is then operated. Lastly, the results are evaluated based on the outcomes of the computation. The application of PLS-SEM process is shown in Figure 4.3. Accordingly, to address the research objectives, this study followed this PLS-SEM modelling process: (1) the structural and measurement models were specified, (2) the collected data were examined to ensure they were valid and reliable, (3) PLS-SEM algorithm was performed to examine the models and (4) the results of the structural and measurement models specified in this study were assessed.
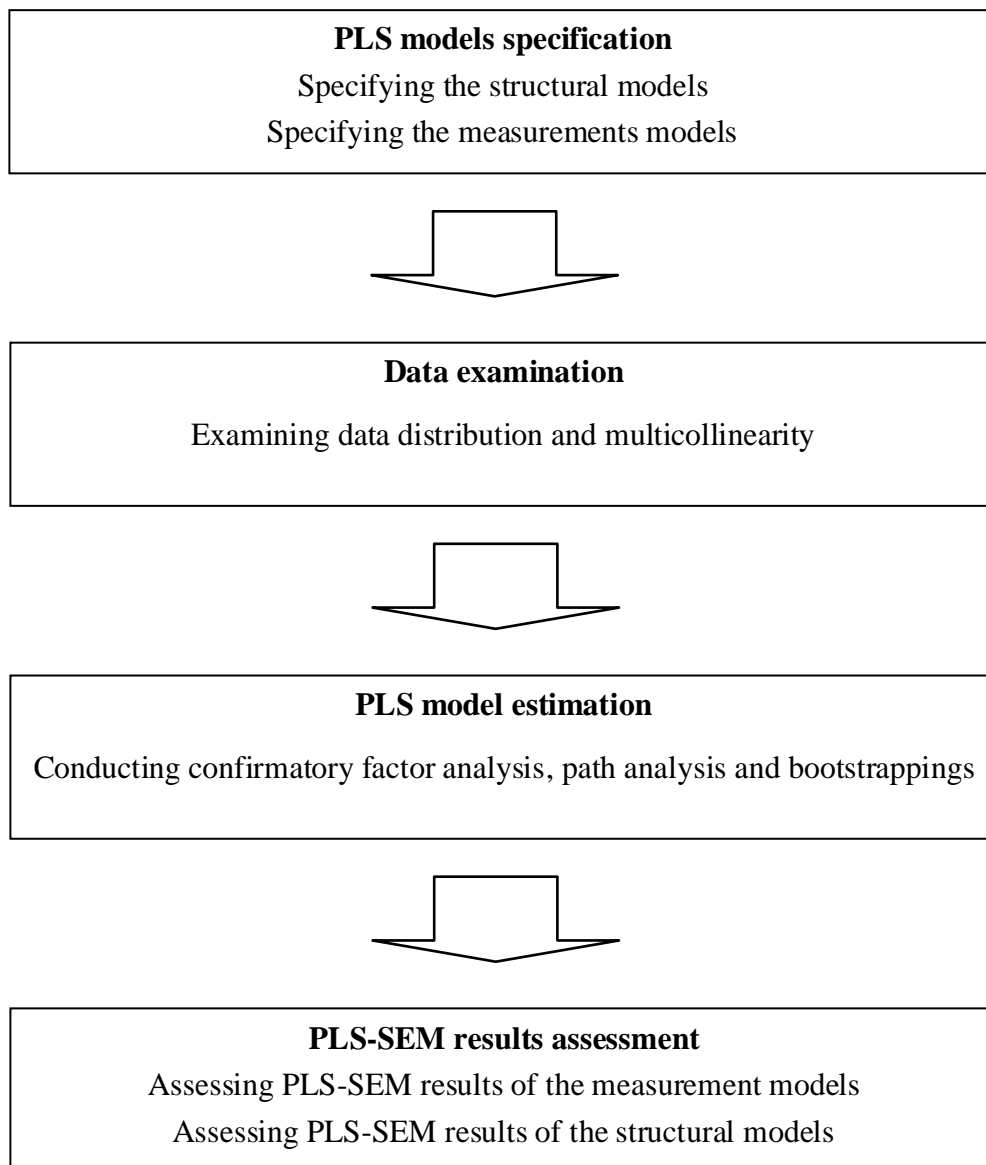
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┌─────────────────────────────────────────────────────────┐
│                  PLS models specification               │
│              Specifying the structural models           │
│            Specifying the measurements models           │
└─────────────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────────────┐
│                     Data examination                    │
│                                                         │
│         Examining data distribution and multicollinearity│
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┌─────────────────────────────────────────────────────────┐
│                   PLS model estimation                  │
│                                                         │
│  Conducting confirmatory factor analysis, path analysis and bootstrappings│
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┌─────────────────────────────────────────────────────────┐
│                 PLS-SEM results assessment              │
│         Assessing PLS-SEM results of the measurement models│
│         Assessing PLS-SEM results of the structural models│
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Figure 4.3: The procedure for applying PLS-SEM adapted from Hair, Hult et al. (2017)

The statistical software SmartPLS (version 3) was adopted to apply the PLS-SEM in this study. SmartPLS 3 is a highly user-friendly software for executing PLS-SEM analyses. It includes a number of algorithms and features which were formerly manually performed, such as advanced bootstrapping features, new consistent PLS algorithm, multigroup analysis options and the importance-performance map analysis. The latest version features improved handling of data and graphical user interface (Hair, Hult et al. 2017). Moreover, SmartPLS is the most widely applied PLS-SEM software across multiple fields (Ringle, Wende & Becker 2015). Many studies in construction management have used SmartPLS for PLS-SEM applications, and the

effectiveness of this software has been validated (Feng et al. 2017; Hong, Ramayah & Subramaniam 2018; Liu, Ye & Feng 2019). In light of the advancement of PLS-SEM applications, corresponding supports on the use of SmartPLS software for PLS analyses were developed, such as books by Hair, Joseph et al. (2017) and Hair, Hult et al. (2017) as well as online forums.

4.4.3.1 PLS-SEM specification

PLS-SEM models of this study were specified with reference to the conceptual framework and hypotheses. Each specified PLS-SEM model comprises two parts: measurement models that describe the relationship between the constructs and their corresponding indicators, and a structural model that represents the hypothesised relationships between constructs (Hair, Hult et al. 2017). Some variables in this study are second-order constructs (i.e. work stressors, cultural stressors, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) consisting of several first-order constructs (i.e. their corresponding sub-dimensions). The second-order constructs were formatively measured by their first-order constructs as they are a combination of several particular dimensions into a general concept (Edwards 2001; Wetzels, Odekerken-Schröder & Van Oppen 2009). Second-order constructs have advantages in enhancing theoretical parsimony, decreasing model complexity and matching the level of abstraction for variables (Akter, D'Ambra & Ray 2011; Chin & Gopal 1995). In this study, applying the second-order structure of SEM models helped to identify an accurate factor structure of the dimensions of constructs.

4.4.3.1.1 Modelling the relationships between determinants of mental health and mental health outcomes

To achieve Objective 1 of this study (i.e. to investigate the role of personal and environmental determinants in construction workers' mental health outcomes) and test Hypotheses 1, 2, 4 and 5 (see Section 3.2), the PLS-model 1 (work stressors and mental health outcomes), PLS-model 2 (cultural stressors and mental health outcomes), PLS-model 3 (TABP and mental health outcomes), PLS-model 4 (external LOC and mental health outcomes) were developed to describe the relationship between each determinant and psychological outcomes. The determinant variable was the independent variable and the mental health outcomes were the dependent variable. Their causal relationships are indicated by arrows as shown in Figure 4.4, which means the independent variable predicts the dependent variable. The four PLS models and their corresponding measurement items are shown in Figure 4.4 (work stressors and mental health outcomes), Figure 4.5 (cultural stressors and mental health outcomes), Figure 4.6 (TABP and mental health outcomes), and Figure 4.7 (external LOC and mental health outcomes), respectively.
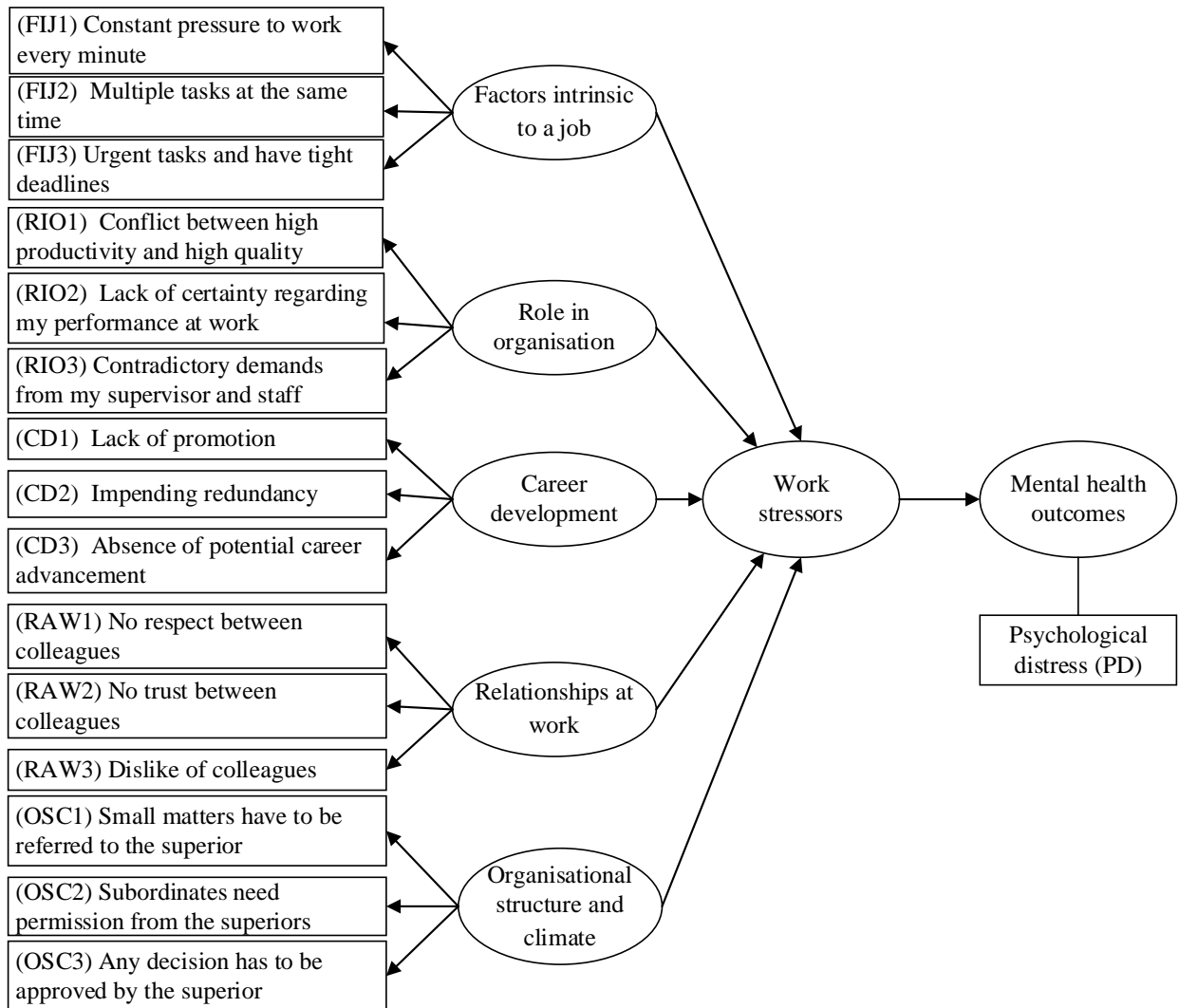
Figure 4.4: Examination of the relationship between work stressors and mental health outcomes using PLS-model 1
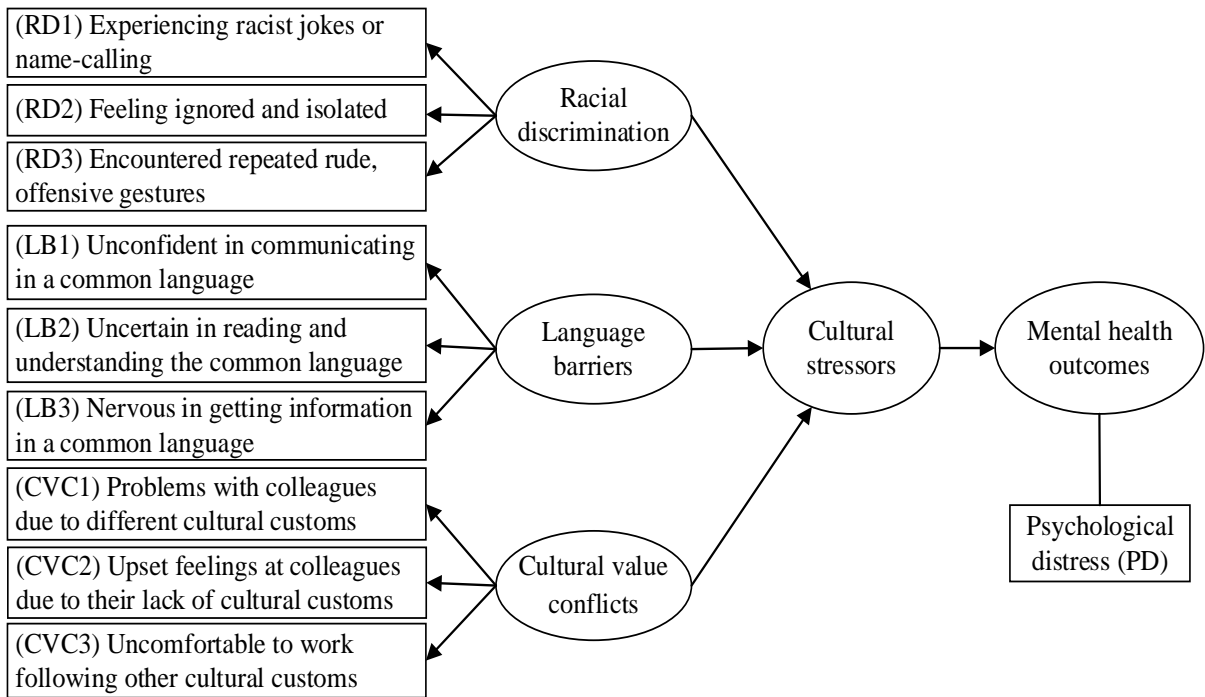
Figure 4.5: Examination of the relationship between cultural stressors and mental health outcomes using PLS-model 2
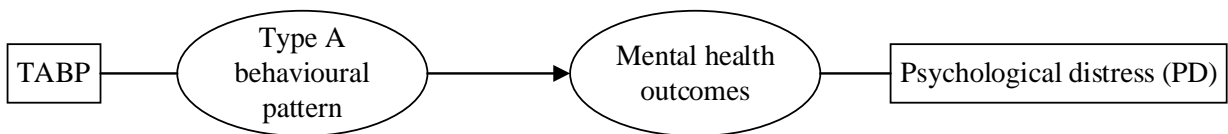
Figure 4.6: Examination of the relationship between TABP and mental health outcomes using PLS-model 3
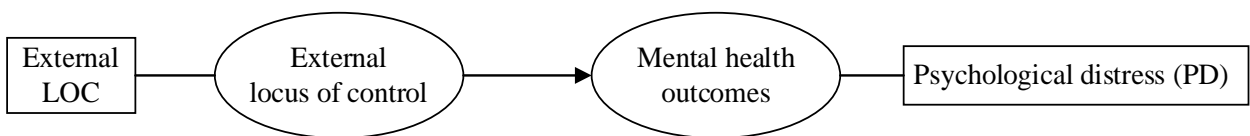
Figure 4.7: Examination of the relationship between external LOC and mental health outcomes using PLS-model 4

Moreover, in response to Objective 1 and Hypotheses 3, 6, 7, 8 and 9 (i.e. to test how personal characteristics and environmental stressors interact to influence mental health outcomes of construction workers), the PLS two-stage approach of moderating effects was applied. The two-stage approach of moderating effects was deemed appropriate for the present study for two

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reasons. First, a moderating effect is presented when a third variable (referred to as a 'moderator') changes the direction or/and the strength of a relationship between two constructs in the model (see Figure 4.8 for an example of a moderating effect). As such, the nature of the relationship differs based on the value of the moderator. In this sense, moderation can be viewed as a way to explain heterogeneity in the data (Hair, Hult et al. 2017). As shown in Figure 4.8, the moderator (M) affects the relationship between an independent variable (Y_1) and a dependent variable (Y_2). The moderating effect (p_3) is represented by an arrow pointing at the effect p_1 indicating relationship between Y_1 and Y_2. Moreover, there is also a direct impact (p_2) of moderator on the dependent variable. Consequently, the coefficient p_3 suggests how the relationship p_1 changes when the moderator M is increased or decreased by one standard deviation (Hair, Hult et al. 2017). In this study, Hypotheses 3, 6, 7, 8 and 9 attempted to determine whether the relationship between mental health outcomes and its stressors is affected by other types of determinants: (1) the relationship between work stressors and mental health outcomes is affected by cultural stressors, (2) the relationship between work stressors and mental health outcomes is affected by TABP, (3) the relationship between cultural stressors and mental health outcomes is affected by TABP, (4) the relationship between work stressors and mental health outcomes is affected by external LOC and (5) the relationship between cultural stressors and mental health outcomes is affected by external LOC.
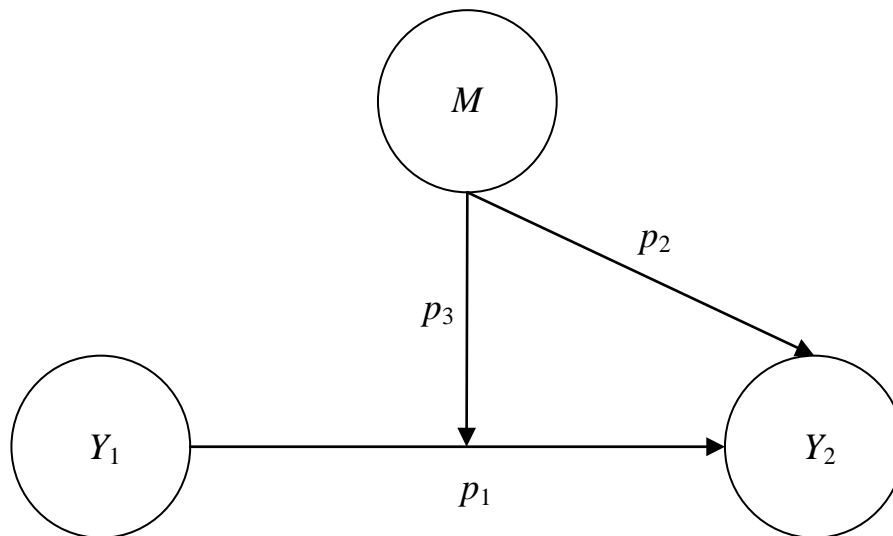
Figure 4.8: Example of a moderating effect

Three prominent approaches are used to operationalise the interaction term of the moderating effect in the PLS path model: the product indicator approach, the orthogonalising approach and the two-stage approach (Hair, Hult et al. 2017). When using the product indicator approach, each indicator of the independent variable is multiplied by each indicator of the moderator variable (Chin, Marcolin & Newsted 2003). As an extension of the product indicator approach, the orthogonalising approach seeks to address two issues resulting from the standardisation of constructs as implemented in the product indicator approach (Little, Bovaird & Widaman 2006). The two-stage approach should be used when the independent variable and/or the moderator are measured formatively (Chin 2003). This approach is generally applicable because it utilises PLS-SEM's advantage in estimating latent variable scores (Henseler & Chin 2010; Rigdon, Ringle & Sarstedt 2010). When selecting the appropriate approach for generating the integration term of the moderating effect, the applicability of each approach should be considered. The product indicator approach is not applicable when the independent construct and/or the moderator are measured formatively, and the procedure of the product indicator approach tends to introduce collinearity in the path model (Hair, Hult et al. 2017). Thus, the product indicator approach is not universally applied in PLS-SEM. Similarly, depending on

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product indicators, the orthogonalising approach is only applicable when the independent variable and moderator construct are reflectively measured. As a result, the two-stage approach, which is applicable for constructs measured formatively, must be used in this study given that the independent and moderator constructs have formative measurement models (Hair, Hult et al. 2017). Furthermore, the two-stage approach aims to determine whether the moderator exerts a significant impact on the relationship, which also suited the objectives of this moderating effect of this study (i.e. Objective 1 and Hypotheses 3, 6, 7, 8 and 9 attempted to determine whether the relationship between mental health outcomes and its stressors is significantly affected by other types of determinants).

As shown in Figure 4.9, the two-stage approach involves estimating the main effects model (i.e. without the interaction term) to obtain the latent variables scores (LVS), and multiplying the latent variables scores of the independent variable and moderator variable from the first stage to form a single-item measure used to measure the interaction term. For other latent variables, single items of their latent variable scores from Stage 1 are generated (Hair, Hult et al. 2017).
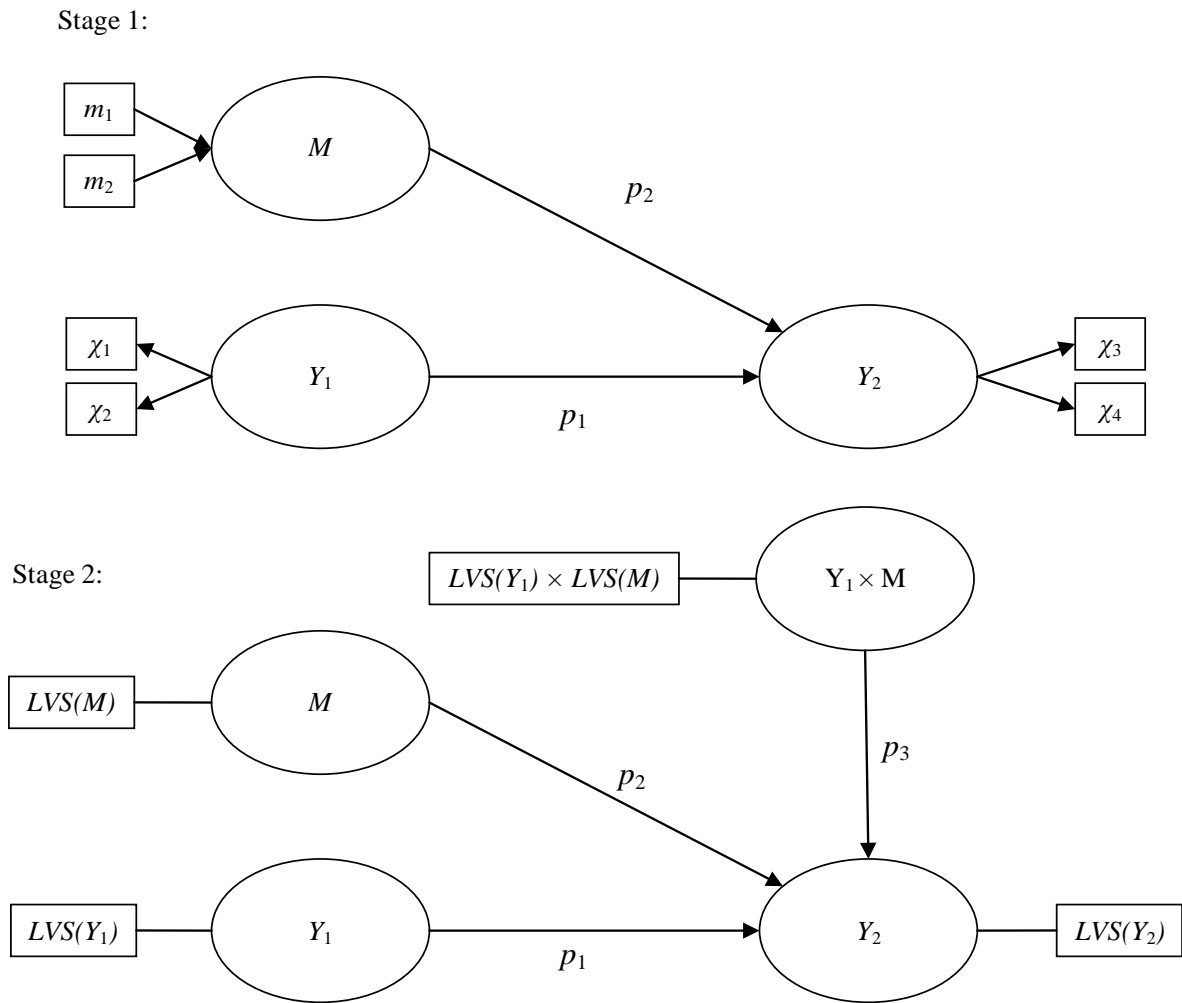
Stage 1:

Stage 2:

Figure 4.9: Two-stage approach of moderating effect (Hair, Hult et al. 2017)

Accordingly, to investigate the interaction between environmental stressors (work stressors and cultural stressors) and the interactive effects of personal characteristics (TABP and external LOC) and environmental stressors (work stressors and cultural stressors) on mental health outcomes, PLS-model 5 was developed as shown in Figure 4.10. The two-stage approach of moderating effect was applied to execute the interactions between the determinants of mental health outcomes. In this model, personal characteristics (TABP and external LOC) served as the moderators that can alter the direction and/or strength of the relationship between environmental stressors (independent variables) and mental health outcomes (dependent variable). Further, regarding interaction between environmental stressors, cultural stressors

were hypothesised to moderate the relationship between work stressors and mental health outcomes.
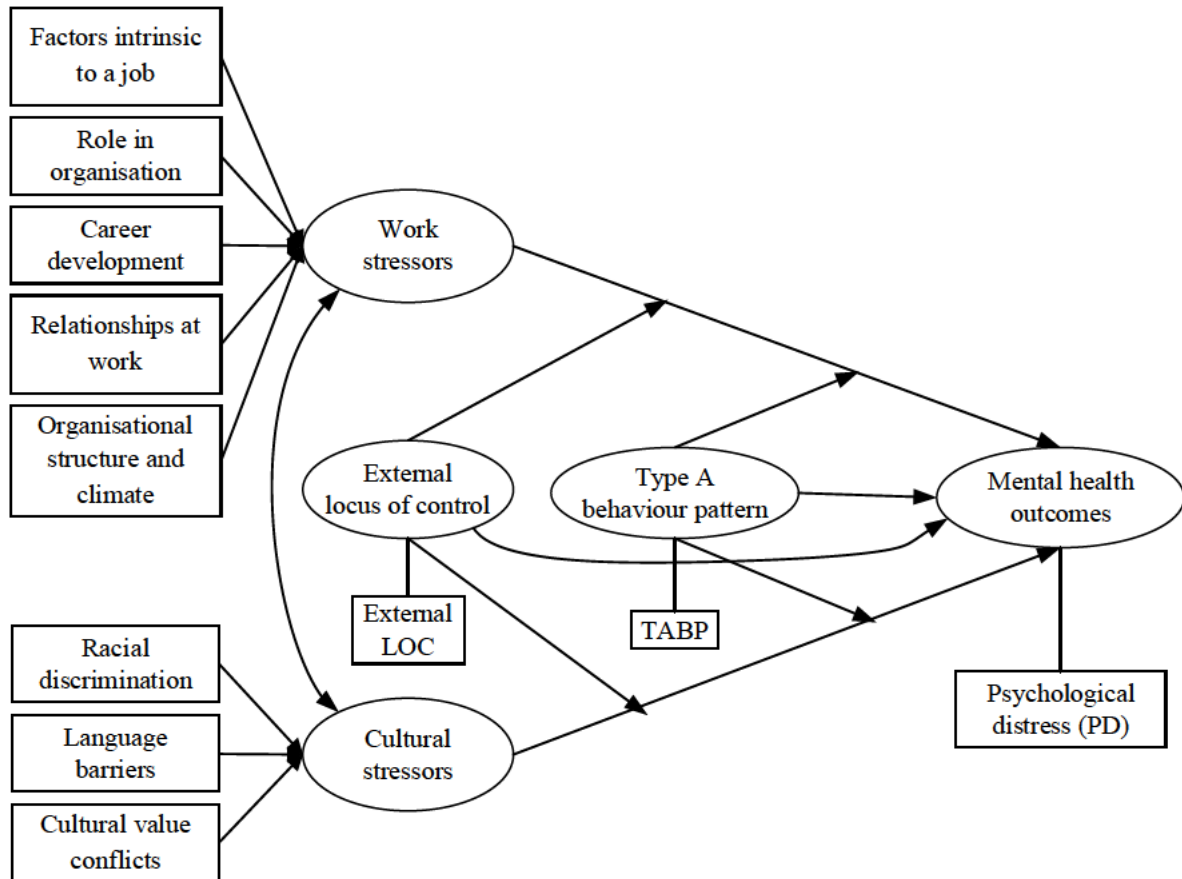
Figure 4.10: Examination of the interactive effects of personal characteristics (TABP and external LOC) and environmental stressors (work stressors and cultural stressors) on mental health outcomes using PLS-model 5

4.4.3.1.2 Modelling the relationships between intercultural coping and mental health outcomes

To achieve Objective 2 in this research (i.e. to develop a positive coping approach in multicultural construction workplaces) and to test Hypotheses 10, 11, 12 and 13 (i.e. to investigate the effects of intercultural coping and its dimensions on psychological outcomes; see Section 3.3.3), PLS-model 6, PLS-model 7, PLS-model 8, PLS-model 9 were established and are displayed in Figure 4.11 (intercultural coping and mental health outcomes), Figure 4.12 (affective intercultural coping and mental health outcomes), Figure 4.13 (behavioural

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intercultural coping and mental health outcomes) and Figure 4.14 (cognitive intercultural coping and mental health outcomes), respectively.

Figure 4.11: Examination of the impact of intercultural coping on mental health outcomes using PLS-Model 6

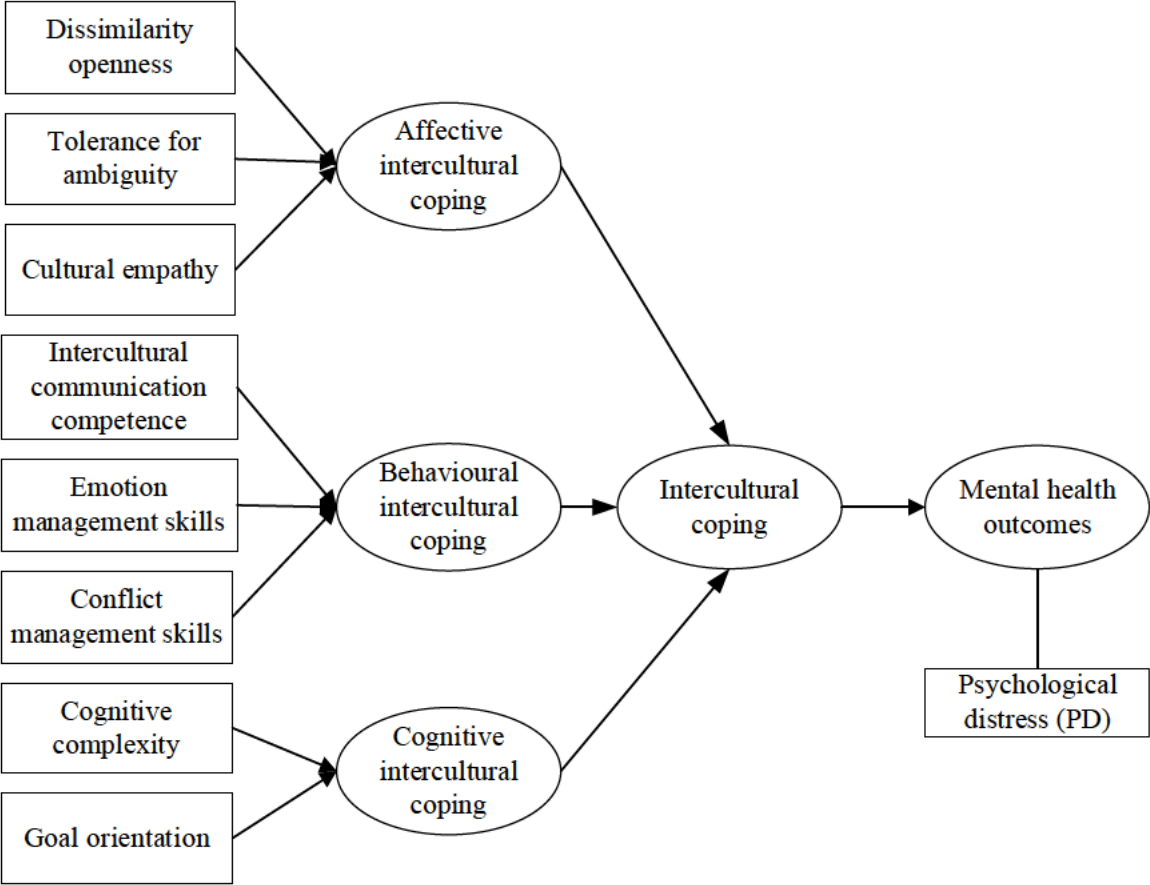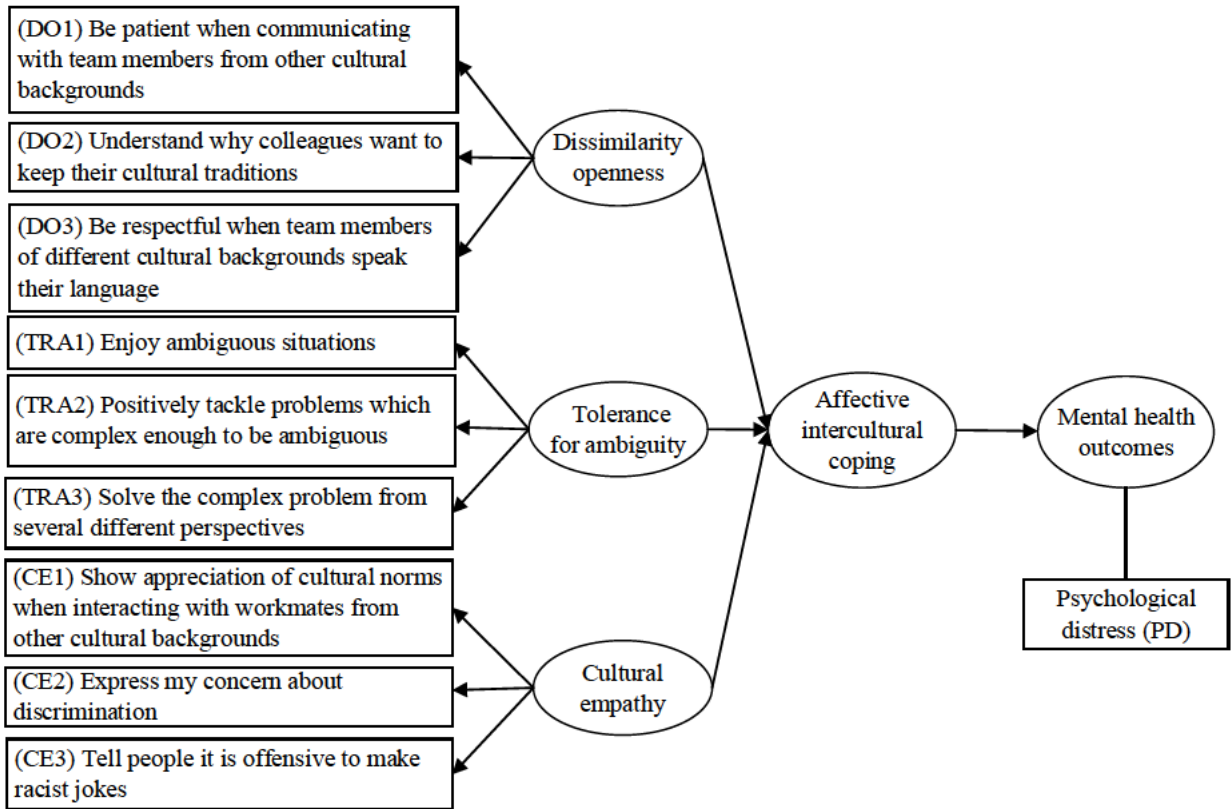**Figure 4.12: Examination of the relationship between affective intercultural coping and mental health outcomes using PLS-model 7**
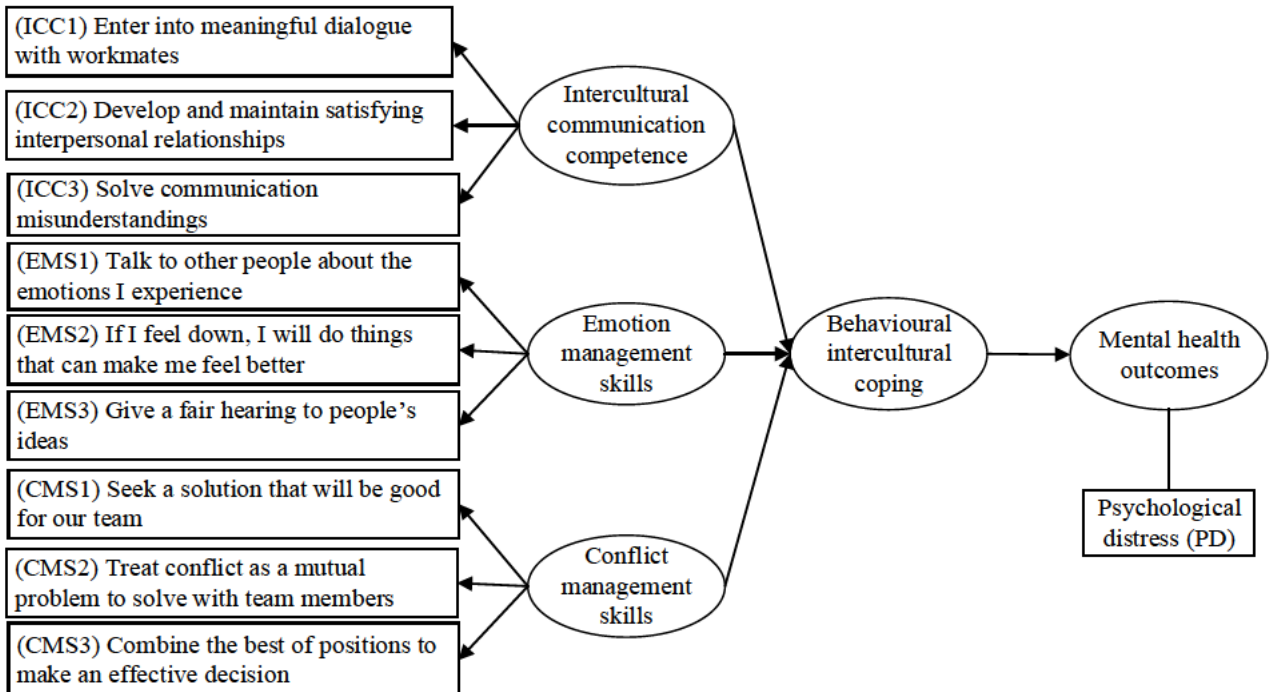

Figure 4.13: Examination of the relationship between behavioural intercultural coping and mental health outcomes using PLS-model 8
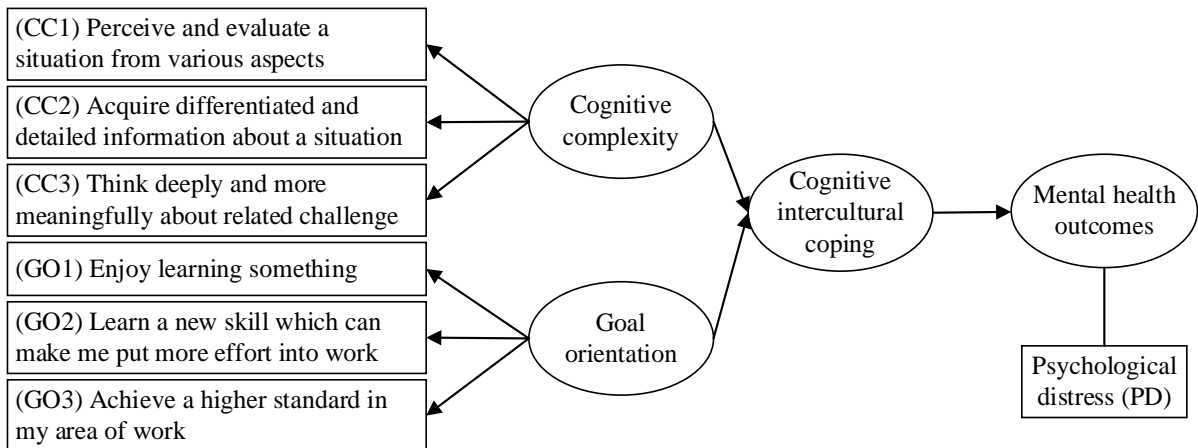
Figure 4.14: Examination of the relationship between cognitive intercultural coping and mental health outcomes using PLS-model 9

4.4.3.1.3 Modelling the moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes

Objective 3 (i.e. to investigate the effects of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces) and Hypotheses 14, 15, 16, 17, 18 and 19 indicate that this research attempted to investigate whether (1) the relationship between work stressors and mental health outcomes varies with different levels of affective intercultural coping strategies (dissimilarity openness, tolerance for ambiguity and cultural empathy), behavioural intercultural coping strategies (intercultural communication competence, emotion management skills and conflict management skills) and cognitive intercultural coping strategies (cognitive complexity and goal orientation), and (2) the relationship between cultural stressors and mental health outcomes varies with different levels of affective intercultural coping strategies (dissimilarity openness, tolerance for ambiguity and cultural empathy), behavioural intercultural coping strategies (intercultural communication competence, emotion management skills and conflict management skills) and cognitive intercultural coping strategies (cognitive complexity and goal

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orientation). The PLS two-stage approach of moderating effects was used to test the hypotheses (see two-stage approach in Section 4.4.3.1.1). Thus, PLS-model 10, PLS-model 11 and PLS-model 12 were developed to describe the moderating effect of affective/behavioural/cognitive intercultural coping strategies on the relationship between work stressors and mental health outcomes, as displayed in Table 4.4. PLS-model 13, PLS-model 14 and PLS-model 15 were developed to describe the moderating effect of affective/behavioural/cognitive intercultural coping strategies on the relationship between cultural stressors and mental health outcomes, as displayed in Table 4.5. In the models, intercultural coping strategies (moderators) were assumed to alter the strength and/or direction of the relationship between work stressors/cultural stressors (independent variables) and mental health outcomes (dependent variables).

Table 4.4: Examination of the moderating effects of intercultural coping strategies on the relationship between work stressors and mental health outcomes using PLS-models 10–12
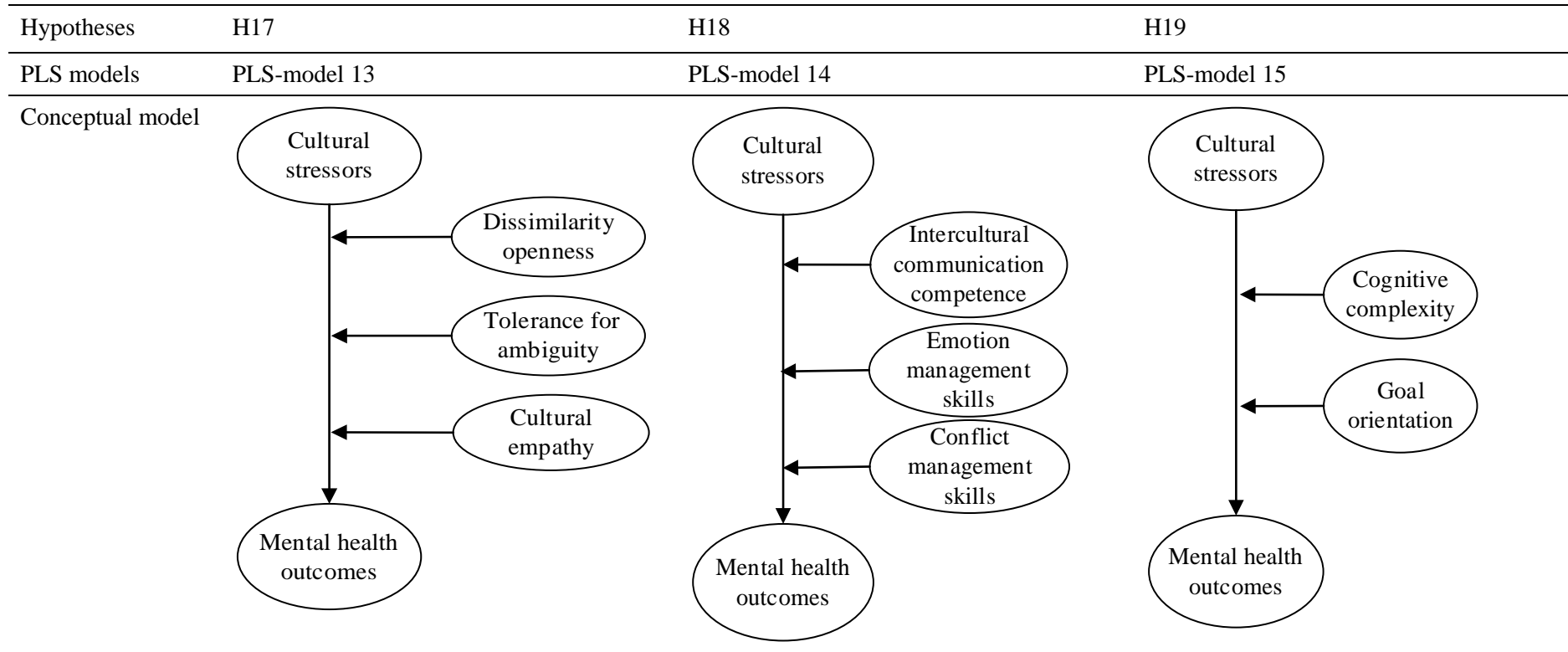
Hypotheses	H14	H15	H16
PLS models	PLS-model 10	PLS-model 11	PLS-model 12
Conceptual model			

Table 4.5: Examination of the moderating effects of intercultural coping strategies on the relationship between cultural stressors and mental health outcomes using PLS-models 13–15

Hypotheses	H17	H18	H19
PLS models	PLS-model 13	PLS-model 14	PLS-model 15
Conceptual model			

4.4.3.2 Data examination

Data examination is a very important step in the application of PLS-SEM. During the evaluation of measurement model, the error component of the data is identified and removed from the study (Hair, Hult et al. 2017). Therefore, the collected data under investigation must be carefully examined. In this study, two prospective fundamental data issues, namely data distribution and collinearity, were identified and resolved.

4.4.3.2.1 Data distribution

PLS-SEM is a nonparametric statistical technique, thereby having no requirements for the normal data distribution (Hair, Hult et al. 2017). However, to ensure that the data are not extremely non-normal is essential, as those data cause problems in the evaluation of the parameters' significance (e.g. reducing the possibility of significance for some relationships) (Hair, Ringle & Sarstedt 2011; Henseler, Ringle & Sinkovics 2009). Two common criteria are used to examine data distribution: skewness and kurtosis. Skewness is a measure of the degree to which a variable's distribution is symmetrical. Kurtosis is used to assess the extent to which a distribution is too peaked. It is recognised that when both skewness and kurtosis are close to zero, the pattern of data is a normal distribution (Hair, Hult et al. 2017). As suggested by Bowen and Guo (2011), if the number of skewness is greater than +3 or less than −3, it is indicated as 'extreme' skewness; if the number of kurtosis is greater than +10 or lower than −10, it is considered to be 'problematic' kurtosis. The examination of the skewness and kurtosis of data were generated by SmartPLS 3 before conducting data analyses. Section 5.2 presents the data distribution of this study.

4.4.3.2.2 Collinearity issues

Collinearity issue occurs when there are high correlations between two indicators, which can produce problems for parameter estimation and interpretation (Hair, Hult et al. 2017). When more than two indicators are associated, this is referred to as 'multicollinearity'. There are two conditions where collinearity problems can occur: between indicators in the formative measurement model, or in the structural model. As several PLS models in this study contained second-order constructs, the second-order constructs were formatively measured by the first-order constructs (i.e. work stressors, cultural stressors, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping). Therefore, the collinearity issues in the formative indicators must be addressed. Similarly, the collinearity problems between the predictor variables in the structural models should also be resolved. In the context of PLS-SEM, the presence of collinearity issues between the formative indicators and the predictor variables was assessed based upon the variance inflation factors (VIF) values. A VIF value of more than 5 is indicative of a potential collinearity issue (Hair, Ringle & Sarstedt 2011). The results of the examination of the formative indicators (first-order constructs) show that all VIF values are lower than 5, suggesting no collinearity issues among the indicators (see Section 5.3.2 measurement model assessment for the second-order constructs). The test results of the independent variables (second-order constructs) in the structural model also show that all VIF values are lower than 5. Accordingly, there were no critical levels of collinearity issues.

4.4.3.3 Model estimation

4.4.3.3.1 Confirmatory factor analysis

Confirmatory factor analysis (CFA) is the foundation of SEM as an accurate measurement model is the basis for latent variable analyses. It should be used as a precursor to structural

models, which specify causal relationships between the latent constructs. CFA is defined as 'a type of SEM that deals specifically with measurement models; that is, the relationships between observed measures or indicators and latent variables or factors' (Brown & Moore 2012, p. 361). CFA can be utilised for various purposes, including (1) examining the factor structure of a scale instrument, (2) verifying the number of underlying dimensions of the factors, (3) determining the adequacy of a revised scale, (4) determining the adequacy of a scale for different populations, (5) certifying the pattern of indicator-latent variable relationship, (6) determining how a test should be scored, (7) validating constructs by providing proof of convergent and discriminant validity and (8) assessing the equivalence of measurement models between different groups (Bowen & Guo 2011; Brown & Moore 2012).

This study used CFA to verify the factor structure of the latent constructs (i.e. dimensions of work stressors, dimensions of cultural stressors and intercultural coping dimensions) prior to executing path analyses. Assessment of the convergent and discriminant validity of the latent constructs in the measurement model is introduced in Section 4.4.3.4.

4.4.3.3.2 Path analysis

Path analysis is 'a statistical technique used primarily to examine hypothesised (causal) relationships between two or more variables' (Lleras 2005, p. 25). Path analysis helps researchers in separating the causal processes that lead to a certain outcome using quantitative data. The development of each path between variables in the model should have a theoretical basis (Streiner 2005). In PLS-SEM, path models are diagrams showing the hypotheses and construct relationships to be examined (Hair et al. 2016). Path coefficients are estimated in a way that minimises the amount of unexplained variance of the dependent variables in PLS-SEM algorithm (Bentler & Huang 2014; Hair, Hult et al. 2017). Since PLS-SEM involves more

flexible assumptions such as interactions, data level, nonlinearities and explicitly modelling correlated error term, it considered a powerful approach to conducting path analysis (Lleras 2005).

In this study, path analysis was used to test the relationships between (1) environmental stressors (work stressors and cultural stressors) and mental health outcomes, (2) personal characteristics (TABP and external LOC) and mental health outcomes, (3) interaction terms of personal characteristics, environmental stressors, and mental health outcomes, (4) intercultural coping dimensions and mental health outcomes, and (5) interaction terms of intercultural coping strategies, environmental stressors and mental health outcomes (see Section 4.4.3.1). Based on a thorough review of relevant literature, the path models between underlying constructs were developed. In particular, the proposed models in this study were underpinned by stress and coping theories (e.g. the transactional theory of stress and coping, person–environment fit theory), occupational stress model, acculturative stress theory, type A personality theory, attribution theory, positive psychology and intercultural competence model (see Chapter 3). Assessment of the relationships between variables in the structural model is introduced in Section 4.4.3.4.

4.4.3.3.3 Bootstrapping technique

PLS-SEM has no requirements for the data under investigation to be normally distributed. Owing to the lack of data normality, parametric significance examinations cannot be adopted to test whether coefficients (e.g. path coefficients, outer loadings and outer weights) are significant. As a result, a nonparametric bootstrap technique is used to test the significance of coefficients in PLS-SEM (Davison & Hinkley 1997).

The bootstrapping procedure is described as 'a large number of samples (i.e. bootstrap samples) are drawn from the original sample with replacement' (Hair, Hult et al. 2017, p. 164). The replacement involves drawing an observation randomly each time from the original set of data and returning it to the data set prior to drawing the next observation (i.e. observations are always drawn from the population that includes all the same data). Therefore, the bootstrap distribution formed by the estimated coefficients can be considered a reasonable approximation of the sampling distribution. The standard error and the standard deviation of the estimated coefficients can then be determined according to this distribution (Hair, Hult et al. 2017). In addition to testing the significance of parameters, the bootstrapping procedure can generate the confidence interval that offers further information on the stability of the estimated coefficient (Henseler, Ringle & Sinkovics 2009).

The bootstrapping procedure was applied to test coefficients for their significance (i.e. path coefficients and outer loadings) in the PLS models in this study. Generally, the bootstrap samples should be greater than the number of valid observations in the original data set. As recommended by Hair, Hult et al. (2017), 5000 bootstrap samples were adopted in the bootstrapping procedure.

4.4.3.4 Model results assessment

The assessment of PLS-SEM results begins with evaluating the quality of the measurement models, follows by the assessment of the structural model results on the condition that the constructs identified in the measurement models are reliable and valid.

4.4.3.4.1 Assessing PLS-SEM results of the measurement models

Measurement model assessment mainly involves internal consistency reliability (i.e. Cronbach's alpha and composite reliability), convergent validity (i.e. average variance extracted (AVE) and factor loadings) and discriminant validity (i.e. Fornell-Larcker criterion, cross-loadings and heterotrait-monotrait ratio (HTMT)). Internal consistency reliability is generally the first criterion to assess the measurement model. It is defined as 'a form of reliability used to judge the consistency of results across items on the same test. It determines whether the items measuring a construct are similar in their scores' (Hair, Hult et al. 2017, p. 235). The conservative measure for internal consistency is Cronbach's alpha, which offers a reliability estimate dependent on the intercorrelations of the observed variables. Its statistic is depicted below:

$$\text{Cronbach's } \alpha = \left(\frac{M}{M-1}\right) \times \left(1 - \frac{\sum_{i=1}^{M} s_i^2}{s_t^2}\right) \text{(Hair, Hult et al. 2017)}$$

In this formula,

M is the number of indicators of the construct

s_i^2 is the variance of the indicator i, and

s_t^2 is the variance of the sum of all M indicators.

Nevertheless, Cronbach's alpha is likely to underestimate internal consistency reliability. Thus, in applying PLS-SEM, a different measure, composite reliability, is viewed as a more suitable criterion of reliability (Hair, Hult et al. 2017). Composite reliability allows for different factor loadings of the indicators. Its formula is shown as

$$\rho_c = \frac{\left(\sum_{i=1}^{M} l_i\right)^2}{\left(\sum_{i=1}^{M} l_i\right)^2 + \sum_{i=1}^{M} var(e_i)} \text{(Hair, Hult et al. 2017)}$$

where l_i represents the standardised factor loading of the indicator i of a construct measured with M indicators e_i

e_i is the measurement error of indicator i, and

var (e_i) is the variance of the measurement error

In the PLS-SEM application, both criteria should be considered and reported. Cronbach's alpha is a conservative measure of reliability (representing the lower bound) and composite reliability represents the upper bound. The true internal consistency reliability is generally between these two values. The values of Cronbach's alpha and composite reliability range between 0 and 1, with higher values signifying higher reliability. Values above 0.6 were considered acceptable for both Cronbach's alpha and composite reliability in this study (Hair, Hult et al. 2017; Nunnally & Bernstein 1994).

Convergent validity is the degree to which a measure item correlates positively with alternative measure items of the same variable. The assessment of convergent validity is based on the factor loadings of the indicators and the AVE (Hair, Hult et al. 2017).

The size of the factor loading is referred to as 'indicator reliability'. The factor loadings of all measure items should at least be statistically significant. Apart from that, higher levels of loadings indicate higher convergent validity (Hair, Hult et al. 2017). In social science studies, the rules for applying factor loadings to evaluate convergent validity of the construct should consider removing the indicators with very low loadings (less than 0.4), retaining the indicators with loadings between 0.4 and 0.7 unless removing the indicators would result in an increase in the composite reliability or AVE, and retaining the indicators with loadings above 0.7 (Bagozzi et al. 1991; Hair, Ringle & Sarstedt 2011; Hulland 1999).

The AVE is a common measure to assess convergent validity of the construct. It refers to 'the grand mean value of the squared loadings of the indicators associated with the construct (i.e. the sum of the squared loadings divided by the number of indicators)' (Hair, Hult et al. 2017, p. 129). Thus, the AVE corresponds to the communality of the construct. The formula of the AVE is:

$$AVE = \left(\frac{\sum_{i=1}^{M} l_i^2}{M}\right) \text{ (Hair, Hult et al. 2017)}$$

Analogous to the rule of factor loadings, the higher levels of AVE values indicate the higher convergent validity of the construct. AVE values of 0.5 or higher are considered acceptable according to Hair, Hult et al. (2017).

Discriminant validity is the degree to which a construct is significantly distinct from other constructs as judged by empirical criteria (Hulland 1999). Discriminant validity is established when a construct is unique and possesses phenomena not captured by other constructs in the model. Three approaches were adopted to evaluate discriminant validity (Hair, Hult et al. 2017), namely cross-loading, Fornell-Larcker criterion and HTMT. The analysis of cross-loading specifies that an indicator's loading on the associated construct should be greater than any of its cross-loadings (i.e. correlations) on other constructs. The Fornell-Larcker criterion compares the square root of the AVE values with the latent variable correlations. The square root of the AVE of each construct should be higher than its highest correlation with any other construct. A new approach, HTMT was proposed by Henseler, Ringle and Sarstedt (2015) as a remedy for the former approaches. HTMT is the between-trait correlations to the within-trait correlations. It is an estimate of the true correlation between two constructs and can be used as the basis of the assessment of discriminant validity. An HTMT value more than 0.9 indicates an insufficient discriminant validity (Henseler, Ringle & Sarstedt 2015).

In this study, SmartPLS 3 software was utilised to assess the Cronbach's alpha, composite reliability, factor loadings, AVE, cross-loadings, square root of AVE and HTMT. Any indicators that did not meet the following criteria were removed in the models.

- The values of Cronbach's alpha and composite reliability of the constructs above 0.6 are considered acceptable in internal consistency (Hair, Hult et al. 2017; Nunnally & Bernstein 1994).

- Indicators with very low factor loadings (i.e. below 0.4) are considered to show a lack of convergent validity and should be removed from the model (Hair, Ringle & Sarstedt 2011).

- Constructs with AVE values of less than 0.5 are considered unsatisfactory, suggest a lack of convergent validity and should be deleted (Hair, Hult et al. 2017).

- An indicator's factor loading on the associated construct should be greater than any of its cross-loadings on other constructs, the square root of the AVE of each construct should be higher than its highest correlation with any other construct, and an HTMT value for all combinations of constructs should be lower than the threshold value of 0.9 to establish acceptable discriminant validity (Hair, Hult et al. 2017).

4.4.3.4.2 Assessing PLS-SEM results of the structural models

After validating the measurement models, the structural model results were evaluated to examine the relationships between constructs (e.g. path coefficients) and models' explanatory capabilities (e.g. R^2 value) (Hair, Hult et al. 2017). The structural model path coefficients were obtained after operating the PLS-SEM algorithm. They refer to the hypothesised relationships among the constructs. The standardised values of the path coefficients are between -1 and $+1$

with estimated path coefficients approaching +1 indicating strong positive relationship (and vice versa for negative relationships) (Hair, Hult et al. 2017). Moreover, bootstrapping procedure was applied to determine the standard error indicating whether or not a path coefficient was significant. The bootstrapping technique enables calculation of the empirical t values and p values for all structural path coefficients. Consequently, the coefficient is statistically significant at a certain error probability when an empirical t value is greater than the critical value. To examine the significance of path coefficients, the critical values for two-tailed tests adopted in this study were 1.96 (significance level = 5%) and 2.57 (significance level = 1%) (Hair, Hult et al. 2017).

The coefficient of determination (R^2 value) is a common measure used to assess the structural model. It refers to a measure of the predictive power of a model and is estimated as the squared correlation between a particular dependent variable's actual and predicted values. It is a representation of the combined effects of the independent variables on the dependent variables (Hair, Hult et al. 2017). The range of the R^2 value is between 0 and 1, and higher values imply higher degrees of predictive accuracy. This coefficient was adopted in this study to assess the amount of variance in the mental health outcomes explained by work stressors, cultural stressors, TABP, external LOC and dimensions of intercultural coping.

Apart from the assessment of R^2 values, the application of effect size f^2 in structural models is increasing. The effect size f^2 refers to the change in R^2 values and is used to assess whether an omitted independent construct has a substantive effect on the dependent constructs (Hair, Hult et al. 2017). According to Cohen (1988), the values of effect size f^2 below 0.02 signify no effect of the independent latent variables.

4.5 Summary

This chapter has introduced the selected research design, data collection procedures and methods of data analysis used in this research. The rationale for selecting a quantitative research approach and a survey research design were elaborated. The data collection instrument and data collection process were also provided, and relevant issues discussed. Additionally, the justification for selecting the PLS-SEM technique was clarified, followed by the PLS-SEM modelling process for data analysis. Research methods to achieve the research objectives are summarized in Table 4.6.

Table 4.6: Research methods to achieve the research objectives

Research objectives	Research methods
1. To examine the effects of personal and environmental determinants on construction workers' mental health outcomes	Literature review Questionnaire survey PLS-SEM model estimations (i.e. conducting confirmatory factor analysis and path analysis)
2. To develop a positive coping approach in multicultural construction workplaces	
3. To investigate the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces	
4. To develop a model for managing mental health of workers in multicultural construction workplaces	Integration of empirical results (i.e. integrating the statistically significant paths among constructs)

Chapter 5: Results

5.1 Introduction

This chapter presents the results of this study. The characteristics of the data are presented in

Section 5.2. The evaluation results of measurement models are described in Section 5.3. Section

5.4 demonstrates the assessment results of structural models that address Objective 1 (to

investigate the effects of personal and environmental determinants on construction workers'

mental health outcomes), Objective 2 (to develop a positive coping approach in multicultural

construction workplaces) and Objective 3 (to investigate the effect of positive coping strategies

on the relationships between environmental stressors and mental health outcomes).

5.2 Characteristics of data

The descriptive statistics of the measurement items related to the research variables of this study

are presented in Table 5.1. The skewness and kurtosis indices of all indicators reached the

critical values for data distribution (see Section 4.4.3.2 for the criteria of skewness and kurtosis).

Therefore, the measurement items of the constructs in this study were reliable for the procedure

of SEM modelling.

Table 5.1: Descriptive statistics of indicators

Items	Mean	Median	Standard Deviation	Excess Kurtosis	Skewness
FIJ1	3.349	4	1.041	−0.821	−0.251
FIJ2	3.738	4	0.906	0.024	−0.683

Items	Mean	Median	Standard Deviation	Excess Kurtosis	Skewness
FIJ3	3.865	4	0.946	−0.012	−0.661
RIO1	2.944	3	1.056	−0.682	0.051
RIO2	3.091	3	1.006	−0.837	0.004
RIO3	3.139	3	1.106	−0.942	0.041
CD1	3.091	3	1.104	−0.858	−0.004
CD2	3.167	3	1.223	−1.004	−0.113
CD3	3.401	3	1.092	−1.02	−0.075
RAW1	2.742	3	1.047	−0.562	0.407
RAW2	3.048	3	1.143	−0.989	0.018
RAW3	2.353	2	0.959	−0.139	0.492
OSC1	2.893	3	1.062	−0.846	0.095
OSC2	2.817	3	0.983	−0.453	0.399
OSC3	2.635	2	1.032	−0.571	0.408
RD1	3.306	4	1.246	−0.996	−0.349
RD2	2.417	2	0.962	−0.108	0.534
RD3	2.968	3	1.211	−1.042	0.155
LB1	1.647	1	0.912	2.804	1.675
LB2	1.512	1	0.814	5.575	2.138
LB3	1.496	1	0.779	5.449	2.064
CVC1	1.948	2	0.972	0.751	1.041
CVC2	1.75	2	0.848	0.915	1.053
CVC3	1.885	2	0.959	0.952	1.102
DO1	3.234	4	0.986	−0.002	−1.083
DO2	3.044	3	1.001	−0.434	−0.804
DO3	3.103	3	0.954	−0.255	−0.843
TRA1	2.708	3	0.971	−0.761	−0.43
TRA2	2.964	3	0.818	0.404	−0.765
TRA3	3.198	3	0.74	0.462	−0.75
CE1	3.262	3	0.763	0.389	−0.861
CE2	3.032	3	0.917	−0.283	−0.716
CE3	2.446	2	1.045	−1.19	0.02
ICC1	3.155	3	0.819	0.243	−0.817
ICC2	3.218	3	0.743	0.262	−0.727
ICC3	3.226	3	0.787	0.567	−0.916
EMS1	2.389	2	1.016	−1.123	0.053
EMS2	2.913	3	0.836	−0.161	−0.531

Items	Mean	Median	Standard Deviation	Excess Kurtosis	Skewness
EMS3	3.456	4	0.656	1.576	−1.152
CMS1	3.54	4	0.656	2.785	−1.544
CMS2	3.214	3	0.813	1.013	−1.082
CMS3	3.357	3	0.718	1.371	−1.107
CC1	3.222	3	0.695	0.897	−0.76
CC2	3.25	3	0.711	0.181	−0.672
CC3	2.873	3	0.873	−0.402	−0.471
GO1	3.583	4	0.588	2.829	−1.444
GO2	3.476	4	0.687	2.215	−1.393
GO3	3.313	3	0.73	1.002	−0.996
LOC	15.536	15	3.42	−0.058	0.087
TABP	32.29	33	5.824	0.254	−0.408
PD	7.889	6	5.924	−0.287	0.732

Notes: see Table 4.1 for the legends of the items.

5.3 Measurement model assessment

The SmartPLS 3 software was used to evaluate the parameters in the measurement and structural models. Multidimensional constructs refer to the constructs with more than one dimensions, each of which represents an aspect of the variable (Wetzels, Odekerken-Schröder & Van Oppen 2009). Given that the measurement models in this study contained second-order constructs (i.e. work stressors, cultural stressors, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping), the two-stage approach was adopted to estimate the measurement model. The two-stage approach was selected for this study according to the research objectives and characteristics of PLS-SEM modelling (Becker, Klein & Wetzels 2012). This research mainly aimed to explore the relationships between second-order constructs. The two-stage approach displays better parameter recovery of path from independent variables to second-order constructs, and from the second-order constructs to a dependent construct in the path model (Sarstedt et al. 2019); it also has the advantage in

obtaining the LVS for the first-order constructs as the latent variable scores are determined in PLS-SEM (Chin 1998; Tenenhaus et al. 2005). The assessment of the PLS-SEM results of the two-stage approach also applied the standard evaluation criteria and procedures for the measurement and structural models (Chin 2010; Ramayah et al. 2018). Nevertheless, the second-order constructs involve additional assessment for measurement models: (1) evaluate the measurement models of the first-order constructs; and (2) evaluate the measurement model of the second-order construct, which is represented by the relationship between the second-order construct and its first-order components (Sarstedt et al. 2019).

5.3.1 Measurement model assessment for the first-order constructs

In stage one, the assessment of the measurement model for the first-order constructs was based on the standard measurement model evaluation of PLS-SEM. The second-order constructs were not included, and will be assessed in the next section (5.3.2). As introduced in Section 4.4.3.3, CFA was utilized to verify the factor structures of the first-order constructs and quality of measures by assessing the internal consistency reliability, convergent validity and discriminant validity of the measurement models. Moreover, any indicators of the constructs that did not meet the criteria specified in Section 4.4.3.4 were removed in the models. The results and descriptions of the measurement models assessed by CFA are presented in this section.

Table 5.2 shows the results of measurement model evaluation, including convergent validity (i.e. factor loadings and AVE values) and internal consistency reliability (i.e. composite reliability and Cronbach's alpha). The coding and depiction of each indicator was provided in Table 4.1.

Table 5.2: Measurement model evaluation of first-order constructs

Constructs	Dimensions	Indicators	Convergent Validity		Internal Consistency Reliability	
			Loadings	AVE	Composite Reliability	Cronbach's Alpha
			> 0.40	> 0.50	> 0.60	> 0.60
Work stressors (5 dimensions, 15 measurement items)	Career development	CD1	0.691	0.591	0.812	0.655
		CD2	0.792			
		CD3	0.817			
	Factors intrinsic to a job	FIJ1	0.877	0.606	0.820	0.694
		FIJ2	0.658			
		FIJ3	0.785			
	Organisational structure and climate	OSC1	0.851	0.737	0.893	0.822
		OSC2	0.863			
		OSC3	0.861			
	Relationships at work	RAW1	0.827	0.704	0.877	0.791
		RAW2	0.878			
		RAW3	0.811			
	Role in organisation	RIO1	0.729	0.588	0.810	0.649
		RIO2	0.780			
		RIO3	0.790			
Cultural stressors (3 dimensions, 9 measurement items)	Racial discrimination	RD1	0.679	0.630	0.834	0.766
		RD2	0.916			
		RD3	0.769			
	Language barriers	LB1	0.758	0.734	0.892	0.832
		LB2	0.938			
		LB3	0.865			
	Cultural value conflicts	CVC1	0.877	0.771	0.910	0.855
		CVC2	0.854			
		CVC3	0.903			
Affective intercultural coping (3 dimensions, 9 measurement items)	Dissimilarity openness	DO1	0.935	0.632	0.833	0.735
		DO2	0.819			
		DO3	0.592			
	Tolerance for ambiguity	TRA1	0.687	0.626	0.830	0.737
		TRA2	0.953			
		TRA3	0.705			
		CE1	0.751	0.661	0.853	0.752

Constructs	Dimensions	Indicators	Convergent Validity		Internal Consistency Reliability	
			Loadings	AVE	Composite Reliability	Cronbach's Alpha
			> 0.40	> 0.50	> 0.60	> 0.60
	Cultural empathy	CE2	0.918			
		CE3	0.759			
Behavioural intercultural coping (2 dimensions, 6 measurement items)	Intercultural communication competence	ICC1	0.841	0.760	0.905	0.842
		ICC2	0.903			
		ICC3	0.870			
	Conflict management skills	CMS1	0.883	0.728	0.889	0.826
		CMS2	0.782			
		CMS3	0.890			
Cognitive intercultural coping (2 dimensions, 6 measurement items)	Cognitive complexity	CC1	0.879	0.662	0.851	0.762
		CC2	0.916			
		CC3	0.613			
	Goal orientation	GO1	0.965	0.669	0.853	0.831
		GO2	0.879			
		GO3	0.553			

Convergent validity is the extent to which a measure correlates positively with alternative measures of the same construct. It was evaluated by the factor loadings and AVE (Hair, Hult et al. 2017). Table 5.2 shows that the factor loadings of all indicators (> 0.4) and AVE values (>0.5) were above the threshold values (see Section 4.4.3.4 for the inclusion criteria), suggesting that the convergent validity of the indicator was acceptable.

The internal consistency reliability of constructs was evaluated using Cronbach's alpha (representing the lower bound) and composite reliability (representing the upper bound). The true internal consistency reliability is generally between these two values. Table 5.2 shows that the Cronbach's alpha and composite reliability of all constructs exceed the cut-off values of 0.6 (Hair, Hult et al. 2017; Nunnally & Bernstein 1994). Therefore, the internal consistency reliability of constructs was determined.

Discriminant validity is the extent to which a factor is accurately distinct from other factors by empirical criteria. Three approaches were adopted to evaluate discriminant validity as suggested by Hair, Hult et al. (2017). The first approach was the analysis of cross-loading. Table 5.3 shows that all indicators' loadings on the associated construct are greater than any of their cross-loadings (i.e. correlations) on other constructs, demonstrating that discriminant validity has been established. The Fornell-Larcker criterion compares the square root of the AVE values with the latent variable correlations. Table 5.4 shows that the square root of the AVE of each construct is higher than its highest correlation with any other construct. Additionally, the HTMT is the between-trait correlations to the within trait correlations. The construct 'emotion management skills' was removed due to its lack of discriminant validity. The HTMTs of emotion management skills with intercultural communication competence and conflict management skills are above 0.9, indicating this construct is not conceptually distinct from other constructs. Therefore, it should be deleted from the model (Hair, Hult et al. 2017). Table 5.5 demonstrates that the HTMT values for all combinations of the retained constructs are lower than 0.9. Therefore, the evaluation demonstrates that the discriminant validity is acceptable and the constructs under study are distinct.

Table 5.3: Analysis of cross-loadings of first-order constructs

Items	CC	CD	CE	CMS	CVC	DO	FIJ	GO	ICC	LB	OSC	RAW	RD	RIO	TRA
CC1	0.879	−0.026	0.358	0.597	−0.133	0.329	−0.067	0.427	0.605	−0.101	0.019	−0.212	−0.159	−0.044	0.354
CC2	0.916	−0.031	0.336	0.596	−0.119	0.276	−0.096	0.415	0.547	−0.181	−0.099	−0.194	−0.141	−0.061	0.366
CC3	0.613	−0.011	0.582	0.526	−0.064	0.355	−0.066	0.357	0.495	−0.065	0.009	−0.116	0.052	−0.070	0.341
CD1	−0.029	0.691	0.012	−0.069	0.165	0.100	0.219	0.012	−0.034	0.042	0.348	0.354	0.381	0.261	0.002
CD2	−0.024	0.792	0.038	−0.090	0.258	−0.028	0.269	−0.023	−0.030	0.010	0.389	0.345	0.397	0.281	−0.128
CD3	−0.018	0.817	0.005	−0.091	0.189	−0.039	0.243	0.057	−0.051	0.038	0.288	0.356	0.340	0.271	−0.103
CE1	0.515	0.000	0.751	0.500	−0.100	0.475	−0.003	0.336	0.536	−0.063	−0.014	−0.139	0.026	−0.076	0.477
CE2	0.325	−0.004	0.918	0.337	−0.033	0.338	−0.039	0.233	0.306	−0.062	0.004	−0.125	0.060	−0.115	0.277
CE3	0.280	0.095	0.759	0.210	0.090	0.288	0.019	0.171	0.258	0.037	0.147	−0.066	0.067	0.009	0.328
CMS1	0.588	−0.107	0.325	0.883	−0.172	0.342	−0.101	0.461	0.574	−0.256	−0.105	−0.272	−0.133	−0.063	0.335
CMS2	0.595	−0.078	0.382	0.782	−0.206	0.336	−0.059	0.420	0.619	−0.141	−0.026	−0.268	−0.186	−0.023	0.336
CMS3	0.596	−0.089	0.403	0.890	−0.198	0.269	−0.116	0.488	0.586	−0.255	−0.106	−0.364	−0.225	−0.126	0.299
CVC1	−0.115	0.248	−0.033	−0.196	0.877	−0.033	0.184	−0.074	−0.156	0.387	0.266	0.307	0.269	0.216	−0.033
CVC2	−0.146	0.184	−0.039	−0.264	0.854	−0.036	0.070	−0.193	−0.209	0.498	0.204	0.288	0.288	0.198	0.009
CVC3	−0.110	0.261	−0.004	−0.142	0.903	−0.042	0.123	−0.098	−0.114	0.387	0.296	0.307	0.255	0.241	0.057
DO1	0.313	−0.026	0.319	0.309	−0.043	0.935	−0.020	0.236	0.329	−0.147	−0.051	−0.160	0.006	−0.030	0.437
DO2	0.271	0.070	0.346	0.304	−0.006	0.819	0.002	0.220	0.302	−0.144	0.004	−0.110	0.050	−0.004	0.475
DO3	0.297	0.019	0.526	0.278	−0.048	0.592	−0.086	0.155	0.305	0.036	0.084	−0.125	0.023	−0.091	0.521
FIJ1	−0.141	0.337	−0.010	−0.182	0.170	−0.037	0.877	−0.013	−0.181	0.030	0.260	0.315	0.374	0.428	−0.141
FIJ2	0.003	0.174	−0.023	−0.008	0.071	−0.077	0.658	−0.034	0.002	−0.036	0.104	0.151	0.213	0.309	−0.095
FIJ3	−0.026	0.182	−0.015	−0.008	0.078	0.026	0.785	0.020	0.058	0.005	0.105	0.154	0.205	0.409	0.004
GO1	0.470	0.040	0.257	0.508	−0.108	0.259	−0.003	0.965	0.389	−0.246	0.008	−0.118	−0.065	−0.003	0.255

Items	CC	CD	CE	CMS	CVC	DO	FIJ	GO	ICC	LB	OSC	RAW	RD	RIO	TRA
GO2	0.437	−0.010	0.324	0.513	−0.136	0.226	−0.001	0.879	0.387	−0.235	0.001	−0.136	−0.119	0.020	0.231
GO3	0.457	0.094	0.260	0.463	−0.074	0.247	0.103	0.553	0.345	−0.133	0.022	−0.019	0.040	0.061	0.231
ICC1	0.531	−0.014	0.310	0.538	−0.136	0.329	−0.060	0.331	0.841	−0.106	0.002	−0.258	−0.135	0.059	0.364
ICC2	0.556	−0.005	0.361	0.550	−0.154	0.305	−0.012	0.331	0.903	−0.081	−0.036	−0.235	−0.113	−0.001	0.339
ICC3	0.620	−0.107	0.442	0.673	−0.161	0.355	−0.153	0.405	0.870	−0.091	−0.062	−0.330	−0.154	−0.065	0.408
LB1	−0.143	−0.025	−0.101	−0.238	0.382	−0.071	0.029	−0.259	−0.105	0.758	0.139	0.137	0.048	0.188	−0.054
LB2	−0.134	0.063	−0.022	−0.235	0.388	−0.150	0.017	−0.243	−0.072	0.938	0.144	0.238	0.194	0.179	−0.002
LB3	−0.137	0.021	−0.021	−0.249	0.495	−0.082	−0.029	−0.163	−0.126	0.865	0.154	0.195	0.083	0.191	0.027
OSC1	−0.054	0.416	0.056	−0.114	0.292	−0.026	0.154	−0.061	−0.029	0.178	0.851	0.345	0.247	0.256	-0.036
OSC2	0.011	0.387	0.065	−0.058	0.249	0.008	0.257	0.053	−0.070	0.094	0.863	0.277	0.299	0.251	-0.013
OSC3	−0.069	0.348	−0.012	−0.102	0.233	−0.018	0.163	0.013	−0.001	0.156	0.861	0.244	0.256	0.297	-0.001
RAW1	−0.141	0.396	−0.024	−0.257	0.244	−0.050	0.273	−0.122	−0.171	0.208	0.337	0.827	0.560	0.365	−0.085
RAW2	−0.206	0.425	−0.142	−0.288	0.335	−0.175	0.264	−0.085	−0.289	0.180	0.307	0.878	0.483	0.351	−0.115
RAW3	−0.213	0.312	−0.184	−0.361	0.279	−0.201	0.180	−0.149	−0.343	0.202	0.179	0.811	0.459	0.256	−0.161
RD1	−0.084	0.338	0.023	−0.048	0.192	0.074	0.255	−0.031	−0.046	−0.025	0.124	0.317	0.679	0.200	−0.053
RD2	−0.136	0.428	0.059	−0.245	0.305	−0.036	0.328	−0.129	−0.195	0.221	0.352	0.597	0.916	0.376	−0.137
RD3	−0.106	0.402	0.059	−0.086	0.182	0.114	0.271	−0.004	−0.029	0.012	0.142	0.396	0.769	0.237	−0.026
RIO1	−0.100	0.249	−0.170	−0.112	0.195	−0.006	0.314	−0.028	−0.040	0.122	0.231	0.268	0.205	0.729	−0.012
RIO2	−0.015	0.297	0.023	−0.060	0.204	−0.088	0.358	0.002	0.011	0.210	0.264	0.381	0.346	0.780	−0.109
RIO3	−0.029	0.263	−0.052	−0.037	0.176	−0.003	0.474	0.036	0.020	0.148	0.223	0.242	0.306	0.790	−0.069
TRA1	0.243	−0.040	0.222	0.127	0.007	0.447	0.032	0.122	0.192	−0.004	0.019	0.018	0.047	−0.013	0.687
TRA2	0.302	−0.111	0.347	0.285	0.035	0.544	−0.116	0.202	0.334	−0.002	−0.027	−0.141	−0.124	−0.091	0.953
TRA3	0.531	−0.070	0.425	0.470	−0.040	0.310	−0.096	0.306	0.506	−0.020	−0.004	−0.132	-0.097	-0.046	0.705

Table 5.4: Comparison of square-rooted AVEs and correlation coefficients between first-order constructs

Constructs	CC	CD	CE	CMS	CVC	DO	FIJ	GO	ICC	LB	OSC	RAW	RD	RIO	TRA
CC	0.814														
CD	−0.031	0.769													
CE	0.439	0.025	0.813												
CMS	0.682	−0.109	0.421	0.853											
CVC	−0.137	0.270	−0.026	−0.216	0.878										
DO	0.357	0.006	0.436	0.359	−0.042	0.795									
FIJ	−0.093	0.318	−0.018	−0.115	0.151	−0.033	0.778								
GO	0.479	0.018	0.295	0.535	−0.127	0.257	−0.010	0.818							
ICC	0.654	−0.049	0.428	0.675	−0.173	0.378	−0.087	0.409	0.872						
LB	−0.156	0.037	−0.046	−0.272	0.469	−0.131	0.010	−0.260	−0.106	0.857					
OSC	−0.044	0.445	0.040	−0.106	0.298	−0.014	0.224	0.005	−0.038	0.165	0.858				
RAW	−0.221	0.455	−0.137	−0.355	0.343	−0.168	0.288	−0.137	−0.316	0.232	0.333	0.839			
RD	−0.143	0.484	0.063	−0.205	0.304	0.023	0.359	−0.097	−0.153	0.152	0.312	0.595	0.794		
RIO	−0.064	0.352	−0.089	−0.094	0.252	−0.043	0.495	0.002	−0.006	0.209	0.314	0.390	0.371	0.767	
TRA	0.416	−0.107	0.412	0.369	0.014	0.550	−0.109	0.258	0.424	−0.008	−0.018	−0.140	−0.113	−0.082	0.791

Table 5.5: Heterotrait-monotrait ratio (HTMT)

Constructs	CC	CD	CE	CMS	CVC	DO	FIJ	GO	ICC	LB	OSC	RAW	RD	RIO
CC														
CD	0.063													
CE	0.706	0.073												
CMS	0.883	0.142	0.554											
CVC	0.164	0.344	0.113	0.278										
DO	0.540	0.119	0.684	0.488	0.061									
FIJ	0.141	0.434	0.063	0.137	0.171	0.118								
GO	0.673	0.106	0.425	0.687	0.158	0.363	0.085							
ICC	0.830	0.084	0.561	0.824	0.213	0.489	0.167	0.516						
LB	0.188	0.074	0.098	0.314	0.594	0.164	0.057	0.288	0.140					
OSC	0.091	0.608	0.108	0.121	0.348	0.088	0.262	0.067	0.060	0.205				
RAW	0.274	0.628	0.178	0.439	0.413	0.219	0.348	0.134	0.390	0.273	0.409			
RD	0.183	0.663	0.086	0.210	0.344	0.136	0.449	0.099	0.146	0.167	0.315	0.676		
RIO	0.126	0.539	0.155	0.115	0.332	0.116	0.729	0.088	0.088	0.291	0.426	0.535	0.470	
TRA	0.614	0.149	0.590	0.474	0.055	0.788	0.127	0.366	0.539	0.063	0.033	0.167	0.128	0.096

The results of CFA show that the sub-dimensions of the second-order constructs (i.e. work stressors, cultural stressors, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) satisfied all the criteria for establishing the validity and reliability of measurement models for the first-order constructs.

5.3.2 Measurement model assessment for the second-order constructs

In the first stage, the LVS of the first-order constructs were obtained from the measurement model assessment in PLS-SEM. In stage two, the LVS of the first-order constructs were used as the measurement items for the second-order constructs and subsequent estimations of the path models (Becker, Klein & Wetzels 2012; Lohmöller 1989; Tenenhaus et al. 2005). Thus, the relationships between the second-order constructs and first-order constructs are expressed as the measurement models of the second-order constructs. The assessments for the formative measurement models include evaluating the collinearity issues and the significance and relevance of the indicators (Hair, Hult et al. 2017; Sarstedt et al. 2019). As discussed in Section 4.4.3.2, the presence of the collinearity issues between the formative indicators and the predictor variables were assessed based upon the VIF values. As shown in Table 5.6, all indicators' (first-order components) VIF values are below the threshold of 5 (Hair, Hult et al. 2017). Therefore, collinearity does not reach critical levels between the constructs and is not an issue for the assessment of the structural model. Further, all the path coefficients between the second-order constructs and the corresponding first-order dimensions are significant ($p < 0.05$). The results confirmed the validity and reliability of the second-order constructs in this study.

Table 5.6: Second-order constructs and their associations with first-order components

Second-order constructs	First-order constructs	Loadings	T Statistics	*P* values	VIF
Work stressors	Career development	0.645	6.138	0.000	1.497
	Factors intrinsic to a job	0.728	8.981	0.000	1.372
	Organisational structure and climate	0.524	4.239	0.000	1.311
	Relationships at work	0.792	9.676	0.000	1.389
	Role in organisation	0.709	8.926	0.000	1.505
Cultural stressors	Racial discrimination	0.980	24.623	0.000	1.102
	Language barriers	0.347	2.150	0.032	1.282
	Cultural value conflicts	0.386	2.449	0.014	1.380
Affective intercultural coping	Dissimilarity openness	0.776	5.788	0.000	1.550
	Tolerance for ambiguity	0.813	6.317	0.000	1.513
	Cultural empathy	0.810	4.901	0.000	1.303
Behavioural intercultural coping	Intercultural communication competence	0.947	11.824	0.000	1.836
	Conflict management skills	0.876	4.568	0.000	1.836
Cognitive intercultural coping	Cognitive complexity	0.977	12.958	0.000	1.297
	Goal orientation	0.655	4.656	0.000	1.297

According to the assessment results of the measurement model, the constructs and their sub-dimensions as well as the corresponding indicators are thus confirmed as shown in Table 5.7. The results of the measurement models confirmed the dimensions of each construct. Specifically, sub-dimensions of intercultural coping were identified: (1) affective intercultural coping has three dimensions (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy) with nine indicators; (2) behavioural intercultural coping has two dimensions (i.e. intercultural communication competence and conflict management skills) with six measurement items; and (3) cognitive intercultural coping has two dimensions (i.e. cognitive complexity and goal orientation) with six measurement items. The dimensions of intercultural coping will be discussed in-depth in Section 6.3.1.

Constructs	Dimensions	Indicators	Interpretation
Work stressors	Career development	CD1	Lack of promotion
		CD2	Impending redundancy
		CD3	Absence of potential career advancement
	Factors intrinsic to a job	FIJ1	Constant pressure to work every minute
		FIJ2	Multiple tasks at the same time
		FIJ3	Urgent tasks and have tight deadlines
	Organisational structure and climate	OSC1	Small matters have to be referred to the superior
		OSC2	Subordinates need permission from the superiors
		OSC3	Any decision has to be approved by the superior
	Relationships at work	RAW1	No respect between colleagues
		RAW2	No trust between colleagues
		RAW3	Dislike of colleagues
	Role in organisation	RIO1	Conflict between high productivity and high quality
		RIO2	Lack of certainty regarding my performance at work
		RIO3	Contradictory demands from my supervisor and staff
Cultural stressors	Racial discrimination	RD1	Experiencing racist jokes or name-calling
		RD2	Feeling ignored and isolated
		RD3	Encountered repeated rude, offensive gestures
	Language barriers	LB1	Unconfident in communicating in a common language
		LB2	Uncertain in reading and understanding the common language
		LB3	Nervous in getting information in a common language
	Cultural value conflicts	CVC1	Problems with colleagues due to different cultural customs
		CVC2	Upset feelings at colleagues due to their lack of cultural customs
		CVC3	Uncomfortable to work following other cultural customs
	Dissimilarity openness	DO1	Be patient with team members from other cultural backgrounds

Constructs	Dimensions	Indicators	Interpretation
Affective intercultural coping	Tolerance for ambiguity	DO2	Understand why colleagues keep their cultural traditions
		DO3	Be respectful when colleagues of different cultural backgrounds speak their language
		TRA1	Enjoy ambiguous situations
		TRA2	Positively tackle ambiguous problems
		TRA3	Solve complex problems from different perspectives
	Cultural empathy	CE1	Show appreciation of cultural norms
		CE2	Express my concern about discrimination
		CE3	Tell people making racist jokes is offensive
Behavioural intercultural coping	Intercultural communication competence	ICC1	Enter into meaningful dialogue with workmates
		ICC2	Develop and maintain satisfying interpersonal relationships
		ICC3	Solve communication misunderstandings
	Conflict management skills	CMS1	Seek a solution good for our team
		CMS2	Treat conflict as a mutual problem
		CMS3	Combine the best of positions
Cognitive intercultural coping	Cognitive complexity	CC1	Evaluate a situation from various aspects
		CC2	Acquire detailed information about a situation
		CC3	Think deeply about related challenge
	Goal orientation	GO1	Enjoy learning something
		GO2	Learn a new skill for work
		GO3	Achieve a higher standard at work

In addition, as presented in Section 4.3.1 on the development of data collection instrument, the values of TABP, LOC and psychological distress were calculated by summing all the items. Thus, these three constructs were measured by their total scores of the indicators. A t-test conducted by Statistical Package for Social Sciences software was used to examine the overall values as suggested by Feng et al. (2017). The score of TABP was calculated by summing its 10 indicators. The t-test reveals that participants displayed a high level of type A behaviour in general (mean = 32.29 within the range of 10 to 50; $p < 0.01$). The score of LOC was computed

by summing eight items scores. The overall score for LOC showed a relatively internal locus of control for the workers (mean = 15.53 within the range of 0 to 32; $p < 0.01$). Moreover, for psychological distress, scores from six items were summed. The overall score for psychological distress of each participant ranges from 0 to 24 with a mean of 7.89 ($p < 0.01$), suggesting that the respondents have moderate mental distress on average. Overall, the analysis above showed a satisfactory level of reliability and validity of the measurement model.

5.4 Structural model assessment

After validating the measurement models, the structural model results were evaluated to examine the relationships between constructs and models' explanatory power in the second stage. The results of the PLS models aim to achieve the research objectives of exploring the effects of personal characteristics and environmental stressors on mental health outcomes of construction workers, examining the effects of intercultural coping dimensions on mental health outcomes of construction workers, and investigating the moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes. The following sections present the results of path analysis.

5.4.1 Impacts of personal and environmental determinants on mental health outcomes[5]

The impacts of personal characteristics and environmental stressors on psychological distress were examined using PLS-model 1, PLS-model 2, PLS-model 3 and PLS-model 4. Table 5.8 shows the results of the structural models: there are significant and positive correlations between (1) work stressors and psychological distress ($\beta = 0.494$, $p < 0.01$) (Hypothesis 1), (2)

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[5] The content of this section is extracted from the publication: Liu, Q, Feng, Y, London, K & Zhang, P 2022, 'Influence of personal characteristics and environmental stressors on mental health for multicultural construction workplaces in Australia', *Construction Management and Economics*, DOI: 10.1080/01446193.2022.2127154.

cultural stressors and psychological distress ($\beta = 0.388$, $p < 0.01$) (Hypothesis 2), (3) TABP and psychological distress ($\beta = 0.517$, $p < 0.01$) (Hypothesis 4) and (4) external LOC and psychological distress ($\beta = 0.375$, $p < 0.01$) (Hypothesis 5). Therefore, the results indicate that Hypotheses 1, 2, 4 and 5 are supported. Psychological distress influenced by work stressors, cultural stressors, TABP and external LOC has R^2 values of 0.244, 0.151, 0.267 and 0.140, respectively. This means that 24.4% change in psychological distress can be explained by work stressors, 15.1% can be explained by cultural stressors, 26.7% can be explained by TABP and 14% can be explained by external LOC. The range of the R^2 value is between 0 and 1. As suggested by Cohen (1988), R^2 values of 0.26, 0.13 or 0.02 for endogenous latent variable are respectively considered as substantial, moderate, or weak. Accordingly, the determinants identified in this study have a moderate to substantial explanatory power for psychological distress. Further discussion of the results of the relationships are presented in Section 6.2.

Table 5.8: Results of relationships between determinants and mental health outcomes

Results	Hypotheses			
	H1	H2	H4	H5
	Work stressors→ psychological distress	Cultural stressors → psychological distress	TABP → psychological distress	External LOC → psychological distress
	PLS-model 1	PLS-model 2	PLS-model 3	PLS-model 4
Dependent variable	Psychological distress	Psychological distress	Psychological distress	Psychological distress
Independent variable	Work stressors	Cultural stressors	Type A behavioural pattern	External locus of control
Coefficient	0.494**	0.388**	0.517**	0.375**
T Statistics	10.254	6.475	11.834	6.719
R^2	0.244	0.151	0.267	0.140
R^2 adjusted	0.241	0.147	0.264	0.137
f^2	0.323	0.177	0.365	0.163
Interpretation	Supported	Supported	Supported	Supported

Notes: ** $p < 0.01$ (2 –tailed)

The interactive effects of the personal and environmental determinants on mental health outcomes (shown in Table 5.9) were tested using PLS-model 5. The results show that (1) cultural stressors interact with work stressors to influence psychological distress ($\beta = 0.146$, $p < 0.05$) (Hypothesis 3), (2) TABP moderates the relationship between work stressors and psychological distress ($\beta = 0.133$, $p < 0.05$) (Hypothesis 6) and (3) TABP moderates the relationship between cultural stressors and psychological distress ($\beta = -0.181$, $p < 0.05$) (Hypothesis 7). However, the moderating effects of LOC on the relationships between work stressors and psychological distress ($\beta = -0.143$, $p > 0.05$) (Hypothesis 8) and cultural stressors and psychological distress ($\beta = 0.120$, $p > 0.05$) (Hypothesis 9) were discovered to be not significant. The reason might be that the overall score for LOC of workers showed a relatively internal locus of control that tends to be independent of environment (Newton & Keenan 1990)

(see Section 5.3.2 for the overall score of LOC). Thus, the interactions between LOC and environmental stressors were not significant in this study.

Table 5.9: Results of the interactive effects of personal and environmental determinants on mental health outcomes

Moderating effect	Coefficient	Standard Deviation	T Statistics	P Values	Interpretation
Cultural stressors*Work stressors –> Psychological distress	0.146	0.066	2.227	0.026	Supported
TABP*Work stressors –> Psychological distress	0.133	0.066	2.022	0.043	Supported
TABP*Cultural stressors –> Psychological distress	−0.181	0.074	2.438	0.015	Supported
LOC*Work stressors –> Psychological distress	−0.143	0.082	1.740	0.082	Not supported
LOC*Cultural stressors –> Psychological distress	0.120	0.084	1.425	0.154	Not supported

The result of the moderating effect indicated that the relationship between work stressors and psychological distress does not remain constant at different levels of cultural stressors. Figure 5.1 demonstrates the variance of the simple slope for psychological distress on work stressors at different levels of cultural stressors. The three lines show the associations between work stressors (x-axis) and psychological distress (y-axis) under different levels of cultural stressors. The second line indicates the relationship between work stressors and psychological distress when there is a mean level of cultural stressors. The other two lines indicate the relationships for lower (i.e. mean value of cultural stressors minus one standard deviation unit) and higher (i.e. mean value of cultural stressors plus one standard deviation unit) levels of cultural stressors. The relationship between work stressors and psychological distress is positive under three levels of cultural stressors as indicated by their positive slope. Additionally, a higher level of cultural stressors entails a stronger correlation between work stressors and psychological

distress, whereas a weaker relationship between work stressors and psychological distress is involved with a lower level of cultural stressors. This result presents empirical evidence to support Hypothesis 3. The interactive effects between cultural stressors and work stressors on mental health outcomes will be discussed in Section 6.2.1.
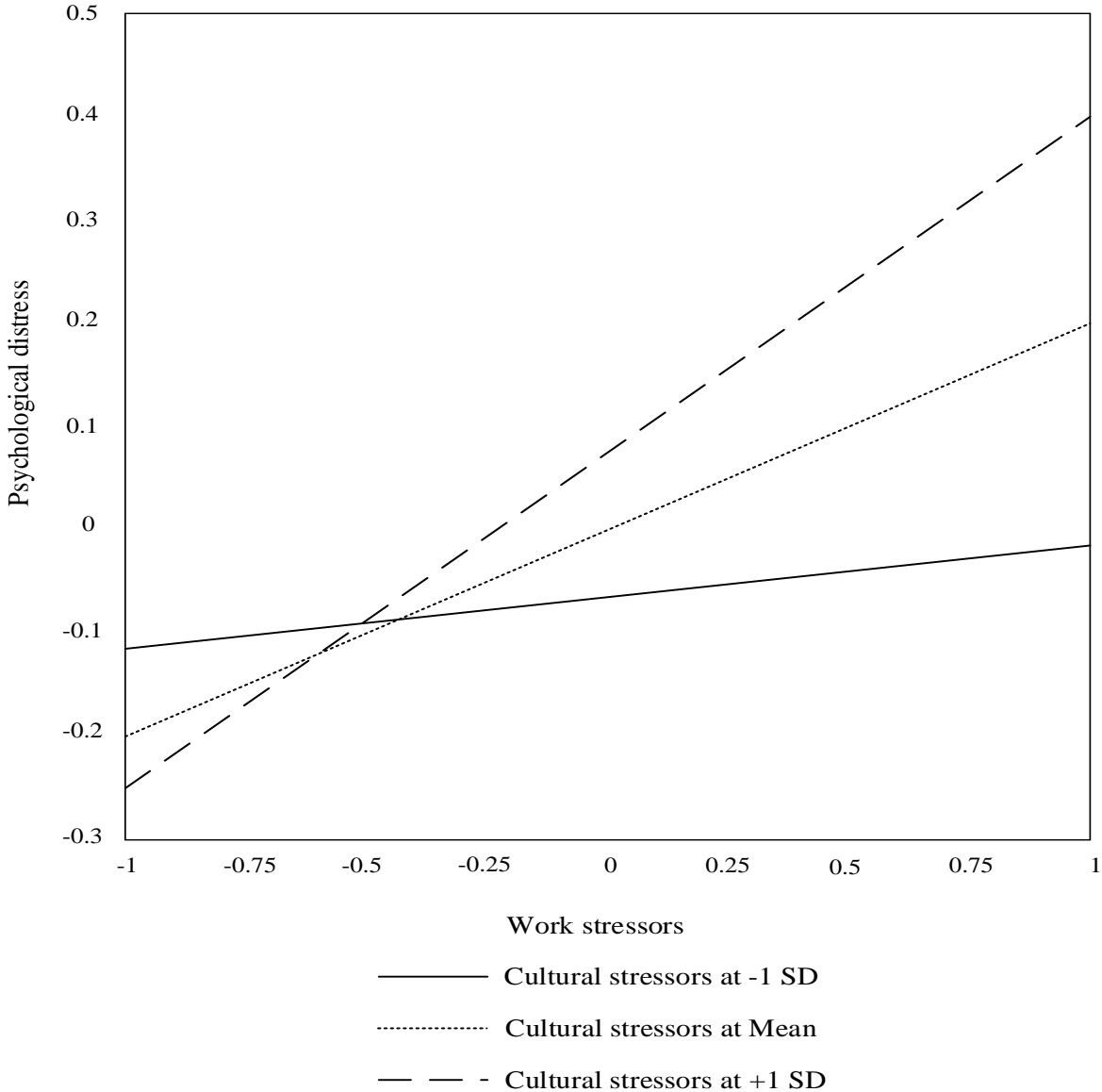
Figure 5.1: Simple slope for psychological distress on centred work stressors at three typical values of cultural stressors

The three lines in Figure 5.2 represent the relationships between work stressors and psychological distress at different levels of TABP. The relationship between work stressors and psychological distress is positive under three levels of TABP. However, the variance of the

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simple slope indicates that there is a stronger relationship between work stressors and psychological distress under higher levels of TABP (mean value of TABP plus one standard deviation unit). Nevertheless, the lower level of TABP (mean value of TABP minus one standard deviation unit) entails a weaker relationship between work stressors and psychological distress. This offers empirical findings to support Hypothesis 6. Further discussion on how TABP affects the relationship between work stressors and psychological distress is presented in Section 6.2.3.
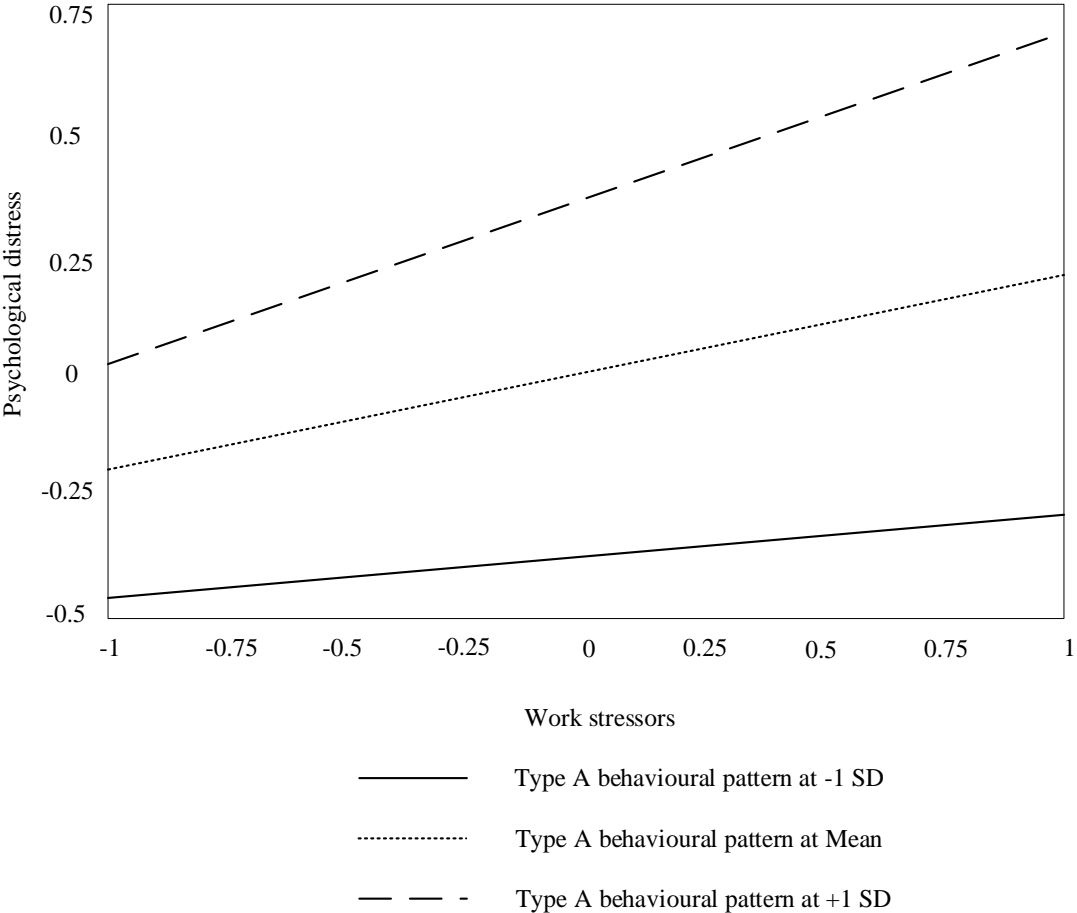
Figure 5.2: Simple slope for psychological distress on centred work stressors at three typical values of TABP

The variance of the simple slope for psychological distress on cultural stressors at different levels of TABP is shown in Figure 5.3. The relationship between cultural stressors and psychological distress is positive under lower levels and average levels of TABP. The variance

of the simple slope indicates that there is a stronger relationship between cultural stressors and psychological distress under lower levels of TABP (mean value of TABP minus one standard deviation unit). However, the relationship between cultural stressors and psychological distress is negative when there is a higher level of TABP (mean value of TABP plus one standard deviation unit). Hypothesis 7 was supported with this empirical finding. The moderating effect of TABP on the relationship between cultural stressors and psychological distress is further discussed in Section 6.2.3.
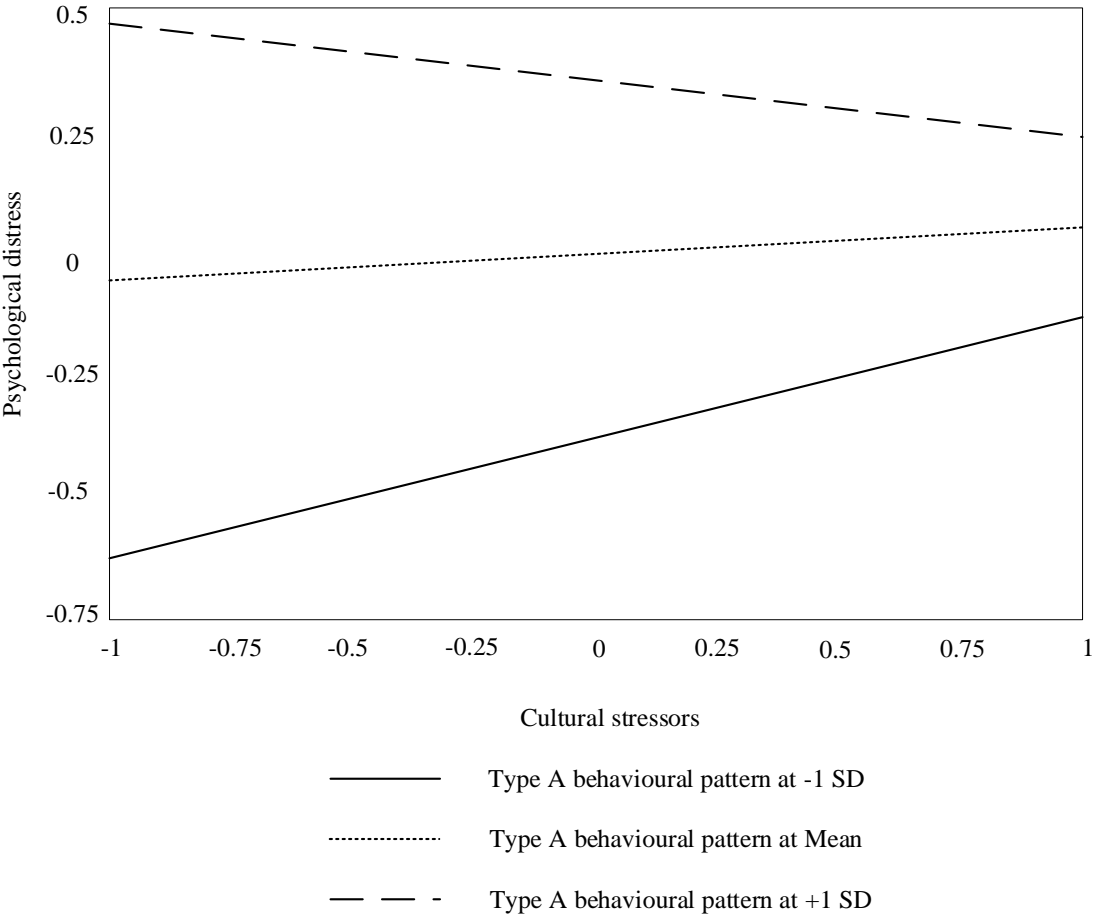
Figure 5.3: Simple slope for psychological distress on centred cultural stressors at three typical values of TABP

5.4.2 Impacts of intercultural coping on mental health outcomes

The relationship between intercultural coping (IC) and mental health outcomes was examined using PLS-model 6. The results (Table 5.10) show that intercultural coping has a significant negative correlation with psychological distress ($\beta = -0.255$, $p < 0.01$). Moreover, the path coefficients between intercultural coping and its three dimensions are positively significant: (1) affective intercultural coping ($\beta = 0.473$, $p < 0.01$), (2) behavioural intercultural coping ($\beta = 0.356$, $p < 0.01$) and (3) cognitive intercultural coping ($\beta = 0.339$, $p < 0.01$). Therefore, the results indicate that intercultural coping has a positive impact on the mental health of construction workers. An increase in intercultural coping leads to a decrease in psychological distress. Thus, Hypothesis 10 is supported with this empirical evidence.

The relationships between three dimensions of intercultural coping and mental health outcomes were investigated using PLS-model 7, PLS-model 8 and PLS-model 9. The results of the relationships between dimensions of intercultural coping (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) and mental health outcomes are shown in Table 5.10. The results display that there are significant and negative relationships between (1) affective intercultural coping and psychological distress ($\beta = -0.223$, $p < 0.01$) (Hypothesis 11), (2) behavioural intercultural coping and psychological distress ($\beta = -0.259$, $p < 0.01$) (Hypothesis 12) and cognitive intercultural coping and psychological distress ($\beta = -0.208$, $p < 0.01$) (Hypothesis 13). Therefore, the results indicate that Hypotheses 11, 12 and 13 are confirmed. Psychological distress influenced by intercultural coping, affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping has R^2 values of 0.065, 0.050, 0.067 and 0.043, respectively, which indicates that intercultural coping and its three dimensions have weak explanatory powers for psychological distress. The low R^2 values are attribute to only considering the influences of coping. Coping is used for reducing

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the effects of stressors on psychological distress and it would have greater impacts on mental health outcomes under stressful circumstances. Discussion on the results of the relationships are presented in the next section.

Table 5.10: Results of relationships between intercultural coping and mental health outcomes

Results	Hypotheses			
	H10	H11	H12	H13
	IC→ Psychological distress	AIC→ Psychological distress	BIC → Psychological distress	CIC → Psychological distress
	PLS-model 6	PLS-model 7	PLS-model 8	PLS-model 9
Dependent variable	Psychological distress	Psychological distress	Psychological distress	Psychological distress
Independent variable	IC	AIC	BIC	CIC
Coefficient	−0.255**	−0.223**	−0.259**	−0.208**
T Statistics	3.780	3.474	4.116	3.111
R^2	0.065	0.050	0.067	0.043
R^2 adjusted	0.061	0.046	0.064	0.039
f^2	0.070	0.052	0.072	0.045
Interpretation	Supported	Supported	Supported	Supported

** $p < 0.01$ (2 –tailed).

5.4.3 Moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes[6]

The moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes were tested using PLS-models 10–15. Environmental stressors (i.e. work stressors and cultural stressors) served as independent

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[6] The content of this section is extracted from the publication: 'Environmental stressors and coping strategies in multicultural construction workplaces', *Construction Management and Economics*, (under review).

variables in PLS-SEM models of moderating effect. Affective intercultural coping strategies (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy), behavioural intercultural coping strategies (i.e. intercultural communication competence and conflict management skills) and cognitive intercultural coping strategies (i.e. cognitive complexity and goal orientation) served as moderator variables that exerted influence on the relationships between environmental stressors and psychological distress. The results of the moderating effects are shown in Table 5.11. In a multicultural construction workplace, (1) dissimilarity openness significantly moderated the relationship between cultural stressors and psychological distress ($\beta = -0.133$, $p < 0.05$), (2) cognitive complexity significantly moderated the relationship between work stressors and psychological distress ($\beta = -0.119$, $p < 0.05$) and (3) goal orientation significantly moderated the relationship between work stressors and psychological distress ($\beta = 0.156$, $p < 0.05$). However, moderating effects of other intercultural coping strategies were not significant.

Table 5.11: Results of the moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes

Moderating effect	Coefficient	Standard Deviation	T Statistics	P Values	Interpretation
Cultural empathy*Cultural stressors –> Psychological distress	−0.021	0.069	0.305	0.761	Not supported
Dissimilarity openness*Cultural stressors –> Psychological distress	−0.133	0.066	1.996	0.046*	Supported
Tolerance for ambiguity*Cultural stressors –> Psychological distress	0.123	0.080	1.545	0.122	Not supported
Conflict management skills*Cultural stressors –> Psychological distress	0.005	0.084	0.058	0.954	Not supported
Intercultural communication competence*Cultural	0.038	0.087	0.436	0.663	Not supported

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Moderating effect	Coefficient	Standard Deviation	T Statistics	P Values	Interpretation
stressors –> Psychological distress					
Cognitive complexity*Cultural stressors –> Psychological distress	−0.075	0.074	1.010	0.312	Not supported
Goal orientation*Cultural stressors –> Psychological distress	0.112	0.076	1.471	0.141	Not supported
Cultural empathy*Work stressors –> Psychological distress	0.064	0.060	1.061	0.289	Not supported
Dissimilarity openness*Work stressors –> Psychological distress	−0.057	0.070	0.814	0.416	Not supported
Tolerance for ambiguity*Work stressors –> Psychological distress	0.015	0.074	0.197	0.844	Not supported
Conflict management skills*Work stressors –> Psychological distress	−0.030	0.084	0.356	0.722	Not supported
Intercultural communication competence*Work stressors –> Psychological distress	0.066	0.085	0.770	0.441	Not supported
Cognitive complexity*Work stressors –> Psychological distress	−0.119	0.060	1.978	0.048*	Supported
Goal orientation*Work stressors –> Psychological distress	0.156	0.073	2.141	0.032*	Supported

* $p < 0.05$ (2 –tailed).

The results of the moderating effect indicated that the relationship between cultural stressors and psychological distress varies with different levels of dissimilarity openness. Figure 5.4 demonstrates the variance of the simple slope for psychological distress on cultural stressors at different levels of dissimilarity openness. The three lines show the associations between cultural stressors (x-axis) and psychological distress (y-axis) under different levels of dissimilarity openness. The second line indicates the relationship between cultural stressors and

psychological distress when there is a mean level of dissimilarity openness. The other two lines indicate the relationships for lower (i.e. mean value of dissimilarity openness minus one standard deviation unit) and higher (i.e. mean value of dissimilarity openness plus one standard deviation unit) levels of dissimilarity openness. The relationship between cultural stressors and psychological distress is positive under three levels of dissimilarity openness as indicated by their positive slope. Moreover, a higher level of dissimilarity openness entails a weaker correlation between cultural stressors and psychological distress (+1 standard deviation), whereas a stronger relationship between cultural stressors and psychological distress involves a lower level of dissimilarity openness (−1 standard deviation). This result presents empirical evidence to support Hypothesis 17. The moderating role of dissimilarity openness in the relationship between cultural stressors and mental health outcomes is further discussed in Section 6.4.1.
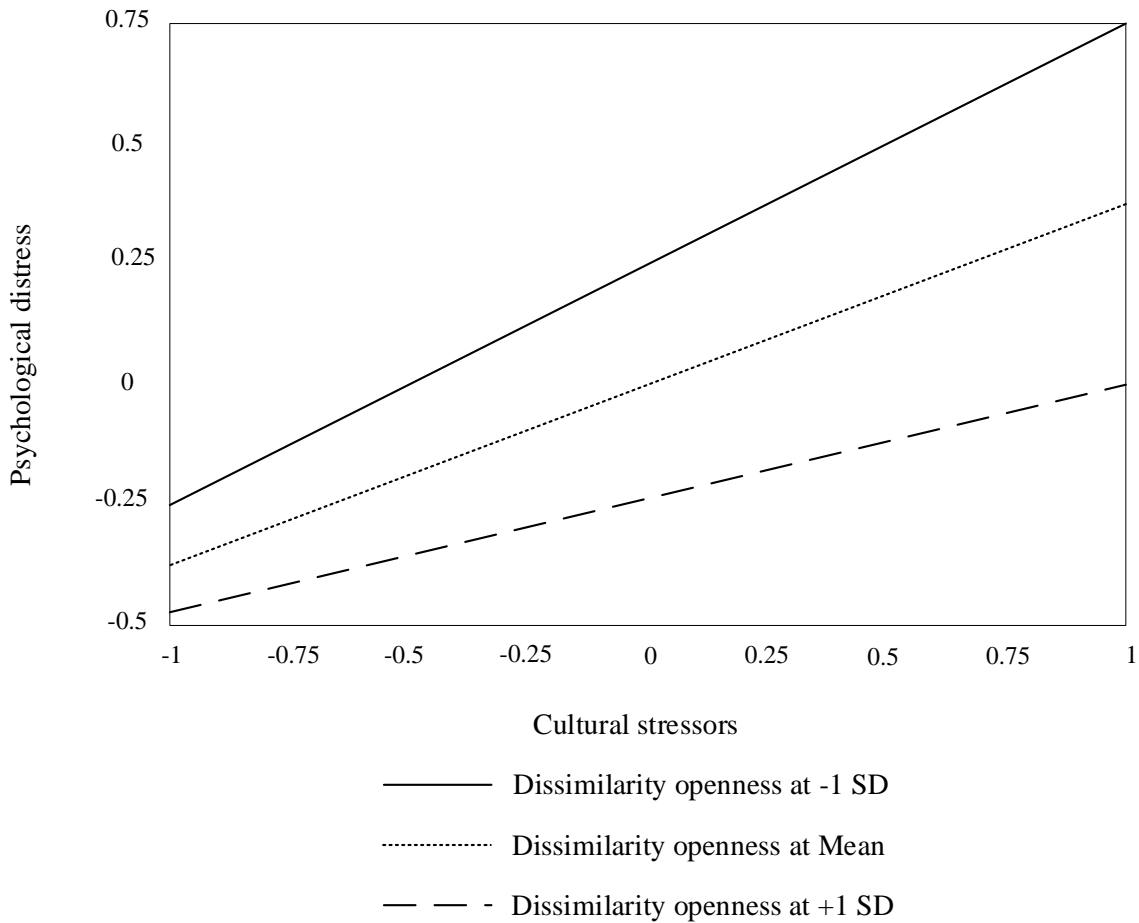
Figure 5.4: Simple slope for psychological distress on centred cultural stressors at three typical values of dissimilarity openness

The relationship between work stressors and psychological distress at different levels of cognitive complexity is shown in Figure 5.5. The relationship between work stressors and psychological distress is positive under three levels of cognitive complexity as suggested by the positive slope. The variance of the simple slope indicates that there is a weaker relationship between work stressors and psychological distress under higher levels of cognitive complexity (+1 standard deviation), whereas there is a stronger relationship between work stressors and psychological distress under lower levels of cognitive complexity (−1 standard deviation). This result presents empirical support for Hypothesis 16. The moderating effects of cognitive complexity on the relationship between work stressors and mental health outcomes will be discussed in Section 6.4.2.
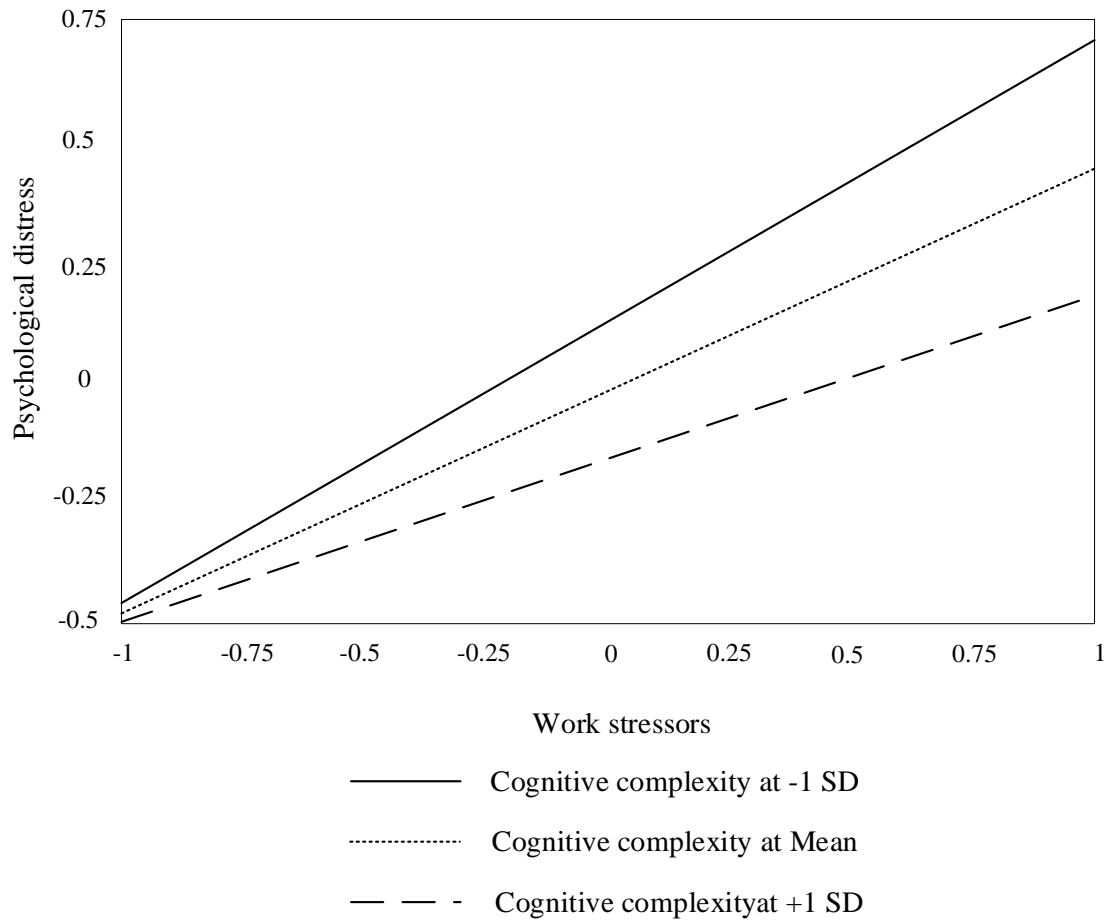
Figure 5.5: Simple slope for psychological distress on centred work stressors at three typical values of cognitive complexity

The relationship between work stressors and psychological distress under different levels of goal orientation is reflected by the three lines in Figure 5.6. Goal orientation moderated the relationship between work stressors and psychological distress. The relationship between work stressors and psychological distress is positive under three levels of goal orientation as shown with a positive slope. However, the variance of the simple slope indicates that higher levels of goal orientation entail a stronger relationship between work stressors and psychological distress (+1 standard deviation). This statistical result and its implications are discussed in Section 6.4.2.
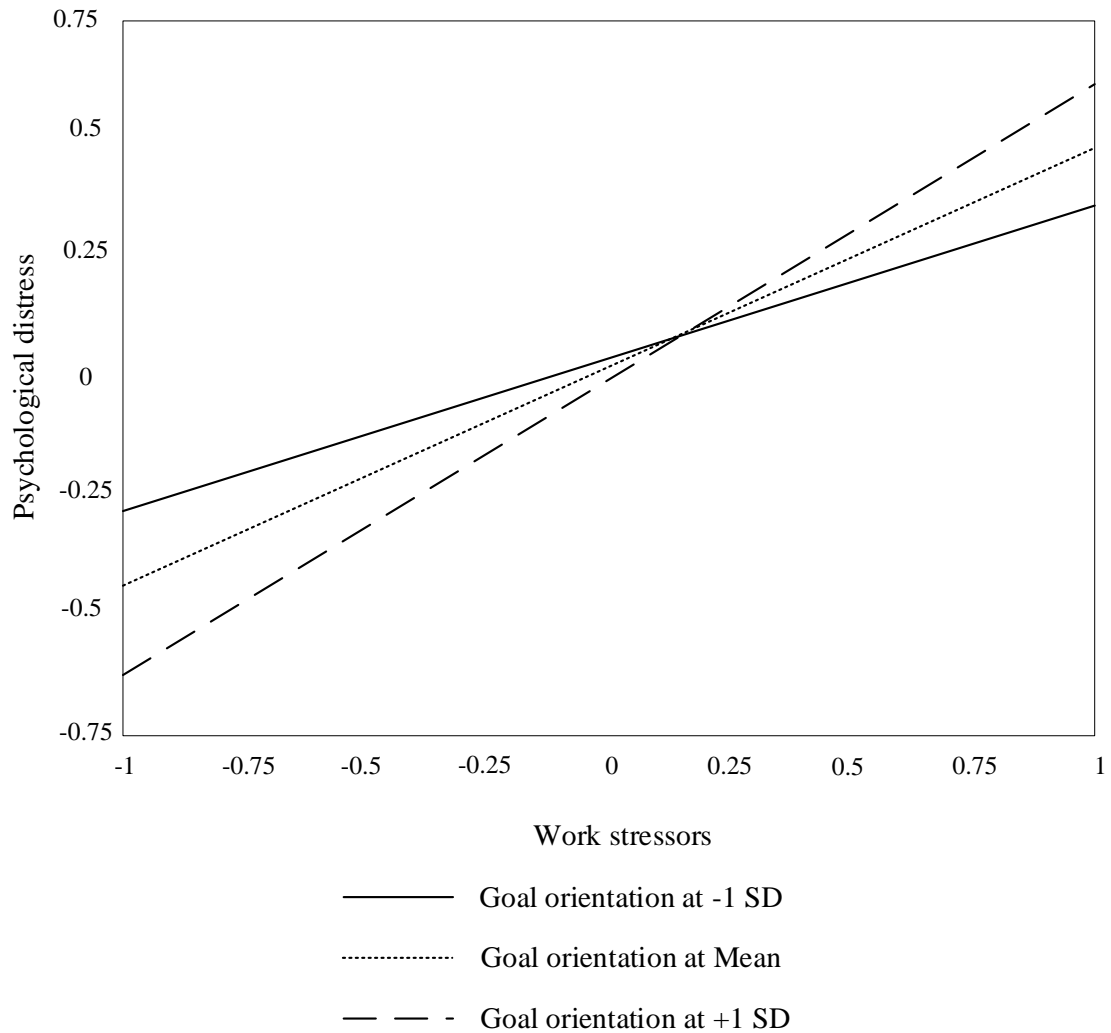
Figure 5.6: Simple slope for psychological distress on centred work stressors at three typical values of goal orientation

5.5 Summary

This chapter has presented the results of PLS-SEM models in this study. The assessment of measurement models was executed through examining the convergent validity, internal consistency reliability and discriminant validity of the first-order constructs, and the validity and reliability of the second-order constructs. The results of the measurement model assessment confirmed the dimensions of intercultural coping and its measurement items (see Section 5.3). The results of structural model assessment examined how personal characteristics (i.e. TABP and external LOC) and environmental stressors (i.e. work stressors and cultural stressors)

directly and jointly impact on mental health outcomes (see Section 5.4.1). The results demonstrated that both personal characteristics (i.e. TABP and external LOC) and environmental stressors (i.e. work stressors and cultural stressors) have direct and significant impacts on mental health outcomes, and their interactions also have significant impacts on mental health outcomes. Therefore, Objective 1 (i.e. to examine the impacts of personal and environmental determinants on construction workers' mental health outcomes) was achieved. The structural model results also examined the impacts of intercultural coping and its three dimensions on mental health outcomes (Section 5.4.2). It was revealed that there exist significant negative relationships between intercultural coping and its three dimensions (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) and psychological distress. Therefore, Objective 2 (i.e. to develop a positive coping approach in multicultural construction workplaces) was achieved.

In addition, the moderating effects of intercultural coping strategies on the relationships between environmental stressors and psychological distress were investigated (Section 5.4.3). The results demonstrated that the negative impact of cultural stressors on mental health outcomes becomes weaker under higher levels of dissimilarity openness. The adverse impact of work stressors on mental health outcomes becomes less significant under higher levels of cognitive complexity. Moreover, a high level of goal orientation exacerbates the negative effect of work stressors on mental health outcomes. Hence, Objective 3 (i.e. to investigate the moderating effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes) was addressed.

Chapter 6: Discussion

6.1 Introduction

This chapter provides the discussion and implications of the empirical results of the PLS-SEM analyses given in Chapter 5. Section 6.2 discusses the impacts of environmental stressors and personal characteristics on the mental health outcomes of construction workers in a multicultural workplace. Section 6.3 elaborates the dimensions of intercultural coping and their effects on mental health outcomes. Section 6.4 explains the moderating effects of specific intercultural coping strategies on relationships between environmental stressors (i.e. work stressors and cultural stressors) and mental health outcomes. Section 6.5 describes the model developed in this study.

6.2 Impacts of environmental and personal determinants on mental health outcomes[7]

The results of the structural model assessments confirmed the hypothesised relationships between environmental stressors (i.e. work stressors and cultural stressors) and mental health outcomes, personal characteristics (i.e. TABP and external LOC) and mental health outcomes,

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[7] The content of this section is extracted from the publication: Liu, Q, Feng, Y, London, K & Zhang, P 2022, 'Influence of personal characteristics and environmental stressors on mental health for multicultural construction workplaces in Australia', *Construction Management and Economics*, DOI: 10.1080/01446193.2022.2127154.

and the interactive effects of environmental and personal determinants on mental health outcomes. The subsequent sections discuss the interpretations of these empirical results.

6.2.1 Environmental stressors in multicultural construction workplaces

The results confirmed the significant positive correlations between work stressors and psychological distress as well as cultural stressors and psychological distress (Section 5.4.1). This finding suggests that workers' mental health is not only affected by factors related to their jobs, but also the cultural environment of the workplace. Cultural stressors, which have received little attention in previous studies, play a critical role in mental health in a multicultural construction workplace. The results also showed that cultural stressors moderated the relationship between work stressors and psychological distress. This finding confirmed that the impact of work stressors on mental health outcomes varies at different levels of cultural stressors in a multicultural construction workplace.

The findings of this study confirmed that work stressors can contribute to the mental ill health of construction workers ($\beta = 0.494$, $p < 0.01$), Specifically, the PLS-SEM modelling analysis (see Table 5.6) revealed that work stressors stem from poor working relationships, the intrinsic nature of the job, role conflict/ambiguity, unsatisfying career development and hierarchical organisational structure. Of these, relationships at work ($\beta = 0.792$, $p < 0.01$) were ranked as the most prevalent source of work stressors, followed by factors intrinsic to the job ($\beta = 0.728$, $p < 0.01$) and role in organisation ($\beta = 0.709$, $p < 0.01$). This result differs from those of previous studies on work stressors in the construction sector. Sun et al. (2022) found that role conflict was the most significant work-related factor associated with mental health problems in the construction workforce. Cattell, Bowen and Edwards (2016) found that critical time constraints were the most important job stressors in the construction project environment.

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The inconsistency in findings may be attributed to the different work environment. This study focused on multicultural worksites, where workers frequently interact with workmates from different cultures. Issues in the relationships between workers from diverse cultures can be aggravated by communication barriers or racial harassment (Wong & Lin 2014). Thus, greater efforts are advised to focus on workplace relationships to substantially reduce potential work hazards and create a mentally healthy working environment. Interventions should be developed to maintain quality relationships among construction workers, reform the ingrained conditions of construction work and demarcate the roles and responsibilities of different trades within the construction workforce.

The results of this study also revealed the significant positive impact of cultural stressors on mental health in the construction sector ($\beta = 0.388$, $p < 0.01$). In a multicultural workplace, cultural stressors may originate from difficulties and conflicts associated with intercultural contact (Joiner, Thomas & Walker 2002). They are generally accompanied by a series of negative phenomena, such as feelings of marginality and isolation, confusion of self-identity, as well as anxiety, depression and stress (Berry et al. 1987). Thus, more attention should be paid to diminish the cultural stressors and address the issues arising from a multicultural workplace. This study has demonstrated that racial discrimination, language barriers and cultural value conflicts are the major cultural stressors producing mental ill health on the construction worksite (Table 5.6). Racial discrimination was found to be the most significant contributing factor ($\beta = 0.980$, $p < 0.01$). This finding confirms those of Wong and Lin (2014), who discovered that there are various explicit and subtle forms of racial discrimination on construction sites. Similarly, Brown et al. (2011) revealed that exposure to discrimination involving aggressive acts brought about high levels of mental distress. Therefore, programs and

policies against racial discrimination and for the equal rights of construction personnel should be implemented.

The results further show that cultural stressors interact with work stressors to influence mental health outcomes (Figure 5.1). This result suggests that high levels of cultural stressors could exacerbate the adverse impact of work stressors on mental health, while low levels of cultural stressors could reduce the adverse effect. The construction industry has been criticised for cultural intolerance and racism (Wong & Lin 2014). This condition hinders communication within groups and eventually creates a socially fragmented workplace where employees feel more stressed (Loosemore & Chau 2002). Moreover, an individual is more likely to experience mental ill health as cultural stressors (e.g. racial discrimination) impede an individual's career goals, produce greater workloads despite limited rewards or undermine the person's sense of control at work (Bhui et al. 2005). In contrast, the moderating effect of cultural factors uncovered in this study emphasises the importance of an inclusive and tolerant culture in the multicultural workplace. This is supported by the acculturation strategy framework developed by Sam and Berry (2010), which shows that individuals who integrate (maintain their original culture while actively interacting with other cultures) are associated with better psychological and sociocultural adaptations than those who choose to assimilate, separate or marginalise in terms of intercultural relations. Social identity theory (Tajfel & Turner 1986) also argues that a sense of belonging to a group gives a person a strong sense of well-being. Furthermore, the moderating effect of cultural stressors was reinforced by Singh, Winkel and Selvarajan (2013), who revealed that a positive organisational context (e.g. diverse culture) significantly contributed to employees' work and mental health performance.

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In light of these findings, in a multicultural construction workplace with lower levels of cultural stressors, the negative impact of work stressors on mental health outcomes can be diminished or eliminated. Accordingly, higher levels of work stressors may not necessarily lead to severe mental health problems. The extent to which mental health outcomes in the study were influenced by work stressors was directly associated with the multicultural context of the workplace. Thus, it is argued that a positive cultural context holds great significance for the multicultural workforce in promoting good mental health, and so strategies and policies that may help to create a positive, culturally diverse workplace should be developed. Construction organisations are advised to improve their cultural environment by eliminating racial discrimination, addressing language barriers and promoting understanding of different cultural values. Policies emphasising the respect and appreciation of diverse cultural values and equal treatment of colleagues from different cultural backgrounds should be established and implemented. Targeted programs such as language support for workers from different cultures, training focused on promoting multicultural awareness and intercultural communication as well as programs concerned with managing intercultural conflicts can be developed to create a culturally tolerant construction worksite.

6.2.2 Personal determinants of mental health outcomes

Significant positive correlations between TABP and psychological distress as well as between external LOC and psychological distress were discovered in this study (Section 5.4.1). This finding implies that personal characteristics are significantly associated with workers' mental ill health. Construction workers characterised by TABP and external LOC are more likely to suffer from psychological distress. This finding is in line with arguments from the field of psychology, which state that personal characteristics (i.e. TABP, LOC) play a primary role in one's psychological outcomes (Hendrix, Ovalle & Troxler 1985).

The findings of this study differ from those of Leung, Liang and Chan (2017), who found that type A behaviour did not significantly affect the stress levels of expatriate construction professionals. The difference may have come about because front-line workers tend to have more stress-prone personalities than construction professionals. More attention should thus be given to workers with type A personality. Training programs designed to modify this behavioural pattern should be provided to these workers. In terms of LOC, the finding is consistent with Shin and Lee (2021), who found significant relationships between LOC and mental health problems. The finding also corresponds with Schäfer et al. (2020) showing that external LOC was positively associated with mental ill health at work. Employees featuring an external LOC tend to find the workplace more stressful and menacing (Roberts, Lapidus & Chonko 1997). Therefore, targeted coping strategies should be tailored for workers with external LOC.

6.2.3 Moderating effect of type A behaviour pattern

This study found that TABP moderated the relationship between work stressors and psychological distress (Figure 5.2). This finding implies that high levels of TABP exacerbate the adverse impact of work stressors on mental health outcomes. This study also discovered that TABP moderated the relationship between cultural stressors and psychological distress (Figure 5.3). However, it was found that higher levels of TABP entail a weaker and negative relationship between cultural stressors and psychological distress.

The result of the moderating effects of TABP confirmed that personal characteristics interact with environmental stressors to determine mental health outcomes as is suggested by the transactional theory of stress and coping and person–environment fit theory. This finding is also

consistent with previous studies in the field of psychology that have found that TABP moderated the relationship between stressors and psychological outcomes (e.g. Day & Jreige 2002; Jamal 1990). TABP individuals are characterised by aggression, competitiveness and a sense of urgency. They are more likely to feel stressed or anxious when encountering work-related stressors than their counterparts (Ivancevich, Matteson & Preston 1982). In contrast, high TABP workers presented less significant mental ill health when confronted by culturally stressful events. One plausible explanation might be that high TABP individuals are more ambitious and achievement-oriented. A stressful cultural environment may stimulate their competitive spirit and inspire them to concentrate on work, thereby achieving a sense of accomplishment resulting in less psychological distress (Newton & Keenan 1990). Given that TABP changes the effects of environmental stressors on mental health outcomes, the assignment of personnel on construction projects should match personal traits with tasks to minimise the adverse effects of potential stressors.

6.3 Dimensions of intercultural coping and their impacts on mental health outcomes

6.3.1 Dimensions of intercultural coping

The results of the measurement model assessment provide empirical evidence to support the proposed factor structure of dimensions of intercultural coping (see Table 5.7). The statistical analysis confirmed that the reliability and validity of the factors were satisfactory. Additionally, the structural model assessment revealed that positive relationships between intercultural coping and its three dimensions. Therefore, intercultural coping is regarded as a latent variable consisting of three dimensions (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) that are also latent variables and evaluated with measurable scales.

6.3.1.1 Affective intercultural coping

The results (Table 5.7) show that affective intercultural coping was characterised by three sub-dimensions underlying nine measurable scales: dissimilarity openness (DO1, DO2, DO3), tolerance for ambiguity (TRA1, TRA2, TRA3) and cultural empathy (CE1, CE2, CE3). This result revealed the crucial nature of workers' positive attitudes for effective coping with stressful intercultural situations. This finding is supported by previous studies on the importance of these positive attitudes (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy) in coping in a multicultural work environment (Gudykunst 1993; Härtel & Fujimoto 2000; Karim 2003). Individuals with a high level of dissimilarity openness tend to deal with differences positively and be willing to interact with dissimilar members. In contrast, people with low dissimilarity openness regard differences as negative and tend to repel dissimilar others (Fujimoto et al. 2000). Dissimilarity openness can promote positive interactions in a diverse workforce, which help to develop a healthy organisational climate and diminish destructive conflicts. Furthermore, dissimilarity openness is found to be a crucial factor in determining the effectiveness of interactions between diverse individuals in the workplace (Härtel & Fujimoto 2000). Individuals with tolerance for ambiguity tend to perceive ambiguous situations as desirable (Budner 1962). Tolerance for ambiguity plays crucial role in culturally diverse crews because it enable the individual to successfully respond to situations although most of the information is unknown (Gudykunst 1993). Individuals capable of cultural empathy can recognise and comprehend the identity, experience and position of a person from a different cultural background without the denial of one's own cultural identity (Karim 2003). Cultural empathy helps team members to establish an understanding of team members' cultural backgrounds (Lloyd & Hartel 2010) and lays a solid foundation for trust between colleagues by

enhancing communication (Johnson et al. 1996). Thus, cultural empathy has been recognised as playing a key role in the success of intercultural interactions (Lloyd & Hartel 2010).

The features of the three dimensions of affective intercultural coping demonstrate their essential roles in a multicultural construction workplace. The construction industry is infamous for its prevalence of bullying and racial discrimination, which are significant determinants of poor mental health (Wong & Lin 2014). Coping competences such as dissimilarity openness and cultural empathy help promote understanding between workers with different backgrounds and create a more friendly environment, thereby reducing inappropriate banter at work and alleviating bullying and racial discrimination. The construction industry's business model tends to cause uncertainly over future workloads (Rees-Evans 2020), resulting in job insecurity for construction workers. Additionally, owing to the complexity of construction projects, high mobility of onsite labourers and various role requirements, role ambiguity can be easily created for construction workers (Sun et al. 2022). Tolerance for ambiguity may help strengthen workers' ability to cope with uncertainty and tackle ambiguous situations in a positive manner so as to reduce mental health problems. Construction workers with these essential competences (i.e. dissimilarity openness, tolerance for ambiguity and cultural empathy) can better promote good mental health in the multicultural workplace.

6.3.1.2 Behavioural intercultural coping

The results (Table 5.7) show that behavioural intercultural coping was characterised by two sub-dimensions underlying six measurable scales: intercultural communication competence (ICC1, ICC2, ICC3) and conflict management skills (CMS1, CMS2, CMS3). This result indicated the essential skills for managing stressful situations in the multicultural work environment. This finding is corroborated by previous studies (e.g. Ayoko & Härtel 2000;

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Logan, Steel & Hunt 2014). Workers can encounter a variety of culture-related issues such as language barriers and conflicts around cultural norms when interacting with culturally distinct members, thus resulting in misunderstandings and confusion (Härtel & Ma 2006), and further causing mental ill health (such as anxiety, stress, depression) (McCord, Draucker & Bigatti 2019). Therefore, intercultural communication competence is a critical coping strategy for effective communication in an intercultural context (Logan, Steel & Hunt 2014).

Findings by Rees-Evans (2020) revealed that 90% of workers engaged in manual labour experienced mental health problems because of poor communication during a project's lifecycle. Therefore, to improve psychological welling for construction workers, communication competence needs to be encouraged to establish quality interpersonal relationships, eliminate barriers to information and create a healthy organisational culture (Migowski et al. 2018; Nwaogu, Chan & Naslund 2022). Conflicts, if not managed appropriately, can lead to undesirable and destructive behaviours (Robbins 1983). Therefore, many practitioners have attempted to develop conflict management skills to cope with the anxiety related to conflict (Tang & Kirkbride 1986). Specifically, previous research has indicated that how team members manage conflicts can largely determine the success of a multicultural organisation (Jehn, Northcraft & Neale 1999). Findings of Sun et al. (2022) revealed that role conflict was the most significant source of mental health problems among the construction workforce. Construction workers may experience role conflict when they are designated multiple contradictory tasks, or tasks they are not willing to do (Leung, Chan & Yu 2009). Moreover, interpersonal conflict was also found to be a key determinant of poor mental health in the construction sector, and could derive from construction scheduling, construction errors and different modes of working (Sun et al. 2022). Thus, conflict management skills are essential for construction workers to manage conflicting situations and alleviate mental health

problems. Construction workers with the critical competences of intercultural communication and conflict management skills can better cope with stressors in the multicultural workplace.

6.3.1.3 Cognitive intercultural coping

The results (Table 5.7) show that cognitive intercultural coping comprised two sub-dimensions underlying six measurable scales: cognitive complexity (CC1, CC2, CC3) and goal orientation (GO1, GO2, GO3). This result indicated the essential cognitive knowledge for employees to cope with stressors in a multicultural work environment. This finding is supported by previous studies (e.g. Pancer et al. 2000; Skaalvik 1997). Individuals with cognitive complexity are more likely to have elaborated and differentiated knowledge systems and can think more thoroughly and sufficiently about relevant concepts (Karim 2003). Thus, they are more inclined to develop effective strategies for coping with difficulties and challenges (Pancer et al. 2000). The construction industry is a demanding and stressful working environment, characterised by various potential hazards (e.g. heavy workload, long working hours, job insecurity, poor organisational climate and racial discrimination) (Al-Maskari et al. 2011; Chan, Nwaogu & Naslund 2020). These ingrained workplace stressors are difficult to eliminate. However, cognitive complexity can help workers perceive and evaluate stressful situations from different perspectives and consider difficulties as positive challenges, thus mitigating the adverse impacts of stressors on mental health conditions.

Individuals with a goal orientation attempt to improve their skills and acquire new tasks. They are also able to discern their own competencies and avoid negative assessments (Vrugt, Oort & Zeeberg 2002). Furthermore, they focus more on discovering, comprehending and resolving problems, and are more likely to collaborate with others (Skaalvik 1997). Consequently, coping by using goal orientation would be apt to result in positive outcomes for not only employees

themselves but also the organisation. A construction project is complicated and fragmented, requiring close teamwork between workers. Goal oriented workers can enhance teamwork, and thus benefit their mental health performance as well as project performance. Thus, construction workers with these crucial competences (i.e. cognitive complexity and goal orientation) can better manage mental health issues in the multicultural workplace.

6.3.2 Impacts of intercultural coping on mental health outcomes

The results (Section 5.4.2) demonstrated that intercultural coping has a negative correlation with the psychological distress of construction workers ($\beta = -0.255$, $p < 0.01$). Moreover, investigation of the associations between the dimensions of intercultural coping and psychological distress showed that there are significant negative relationships between affective intercultural coping and psychological distress ($\beta = -0.223$, $p < 0.01$), behavioural intercultural coping and psychological distress ($\beta = -0.259$, $p < 0.01$) and cognitive intercultural coping and psychological distress ($\beta = -0.208$, $p < 0.01$). Behavioural intercultural coping was found to have the strongest negative association with psychological distress. The result suggests that effective coping with mental health problems for a multicultural construction workforce can be achieved through employing positive personal competences from the affective, behavioural and cognitive domains as measured via a decreased value of psychological distress (i.e. the negative relationships between three dimensions of intercultural coping and psychological distress). Positive skills for stressful situations play a greater role in reducing mental ill health. The finding of the positive impact of intercultural coping on mental health is consistent with the implications of positive psychology, which suggest that intervention programs developing positive personal competences and resources reduce psychological problems and promote good mental health (Di Fabio 2017; Seligman 2008). Havermans et al. (2018) also discovered that competence training can help workers cope with stress and manage adjustments. Therefore,

intercultural coping, as a positive coping approach, can help workers build essential coping skills to deal with stressors in the multicultural work environment.

Existing studies on mental health interventions in the construction industry have typically focused on a reactive approach to coping with stressors and psychological symptoms. Helplines and professional help-seeking have been among the most popular mental health supports offered by construction organisations (Rees-Evans 2020). The construction industry is a male-dominated industry. Construction workers are less likely to talk about mental health problems and seek help from others under the 'macho' culture of the industry, which may make mental health issues worse (Rees-Evans 2020). This can partially explain why existing help-seeking interventions are ineffective and mental health issues remains prevalent in the construction domain. Construction workers tend to deal with the issue themselves. However, they frequently used maladaptive coping strategies (e.g. alcohol consumption, smoking and narcotics), which lead to higher levels of mental illness (Langdon & Sawang 2018). Therefore, the implementation of an intercultural coping approach is needed for construction workers to positively manage their mental health and achieve sustained psychological well-being. Accordingly, interventions oriented to cultivate essential intercultural competences for construction workers should be developed. Systematic education and training aimed at appropriate use of intercultural coping should also be established for a sustained improvement to psychological well-being. Additionally, policies prescribing intercultural coping strategies can be formulated to create a psychologically healthy workplace.

6.4 Moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes[8]

The results of this study have demonstrated that affective intercultural coping strategy (i.e. dissimilarity openness) and cognitive intercultural coping strategies (i.e. cognitive complexity and goal orientation) significantly moderated the relationships between specific types of environmental stressors and psychological distress (Figure 5.7). The impacts of environmental stressors (i.e. work stressors and cultural stressors) on psychological distress vary at different levels of intercultural coping strategies. The finding corroborates the transactional theory of stress and coping, suggesting that the effectiveness of a specific type of coping strategy in alleviating the impacts of stressors on psychological outcomes is dependent on the types of stressors (Folkman & Lazarus 1980). In particular, dissimilarity openness significantly buffered the effects of cultural stressors on psychological distress (Figure 5.4). This result suggests that when construction workers employ more strategies of dissimilarity openness to cope with cultural stressors, the relationship between cultural stressors and psychological distress is significantly weaker than when they use less dissimilarity openness. Cognitive complexity alleviated the effects of work stressors on psychological distress (Figure 5.5). This suggests that workers using more cognitively complex strategies have lower levels of psychological distress resulting from work stressors. However, although goal orientation was found to be a significant moderator between work stressors and psychological distress, higher levels of goal orientation exacerbated the effects of work stressors on psychological distress (Figure 5.6).

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[8] The content of this section is extracted from the publication: 'Environmental stressors and coping strategies in multicultural construction workplaces', *Construction Management and Economics*, (under review).

6.4.1 Moderating effects of intercultural coping strategies on the relationship between cultural stressors and psychological distress

The results of this study showed that dissimilarity openness significantly buffered the effects of cultural stressors on psychological distress (Figure 5.4). This finding suggests that dissimilarity openness is an effective coping strategy targeted at cultural stressors in a multicultural construction workforce. When construction workers employ more strategies for dissimilarity openness to cope with cultural stressors, the adverse impacts of cultural stressors on psychological outcomes are significantly reduced. This is more so than when other types of coping strategies are used. This finding is supported by previous studies that have emphasised the vital moderator role of dissimilarity openness in intercultural interactions and positive outcomes (Ayoko & Härtel 2000; Härtel & Fujimoto 2000). In a multicultural workplace, dissimilarity is prevalent among workers. Failure to manage dissimilarity can lead to cultural stressors such as racial discrimination, language barriers and conflicts in cultural value (Foster, Marshall & Williams 1991). Dissimilarity openness centres on the understanding, acknowledgement, and appreciation of different cultures (Wang et al. 2003). Individuals with a high level of dissimilarity openness tend to deal with cultural differences positively and be willing to interact with dissimilar members, which helps to develop a healthy organisational climate and diminish destructive conflicts (Fujimoto et al. 2000). Moreover, the process model of intercultural competence suggests that positive attitudes (e.g. respect, openness) serve as the foundation of the model and affect all other aspects of intercultural competence (Deardorff 2011). Thus, positive attitudes are the basis for the positive knowledge and skills to deal with stressful events. Therefore, dissimilarity openness, a positive affective coping approach, should be incorporated into interventions designed to buffer the individual from psychological distress arising from cultural stressors.

6.4.2 Moderating effects of intercultural coping strategies on the relationship between work stressors and psychological distress

The results showed that cognitive complexity interacted with work stressors and exerted a significant moderating effect on psychological distress (Figure 5.5). When construction workers employ more strategies related to cognitive complexity to cope with work stressors, the adverse impacts of work stressors on psychological distress are significantly mitigated. They are also mitigated more than when other types of coping strategies are employed. These results confirm the effectiveness of cognitive complexity in managing work stressors. Indeed, individuals with cognitive complexity are more likely to have comprehensive and differentiated understandings of relevant situations, and develop effective strategies to deal with difficulties and challenges (Karim 2003; Pancer et al. 2000). Cognitive complexity is the dimension of cognitive coping that aims to alter the cause of stress and effect the cognitive reappraisal of the stressor. Because stress is dependent on the cognitive appraisal of the stressor and potential resources, the appraisal of the stressor tends to be more important than practical actions to alter the stressor (Lazarus & Folkman 1984; Song 2009). The construction workplace is marked by a variety of ingrained work stressors (e.g. overwhelming workload, role conflicts and poor relationships). Workers employing cognitively complex strategies can help themselves to perceive and appraise those complex, stressful situations from various angles, and to think of the stressful situations as opportunities instead of difficulties, thereby preventing or minimising negative psychological consequences. Therefore, cognitive complexity, a positive cognitive coping approach, should be incorporated into intervention strategies designed to buffer workers from psychological distress resulting from work stressors.

The results showed that goal orientation significantly moderated the relationship between work stressors and psychological distress (Figure 5.6). However, the adverse effect of work stressors

on psychological outcomes became more significant when more goal orientation strategies were employed. The reason might be that goal orientation can be manifest as learning-orientation or performance-orientation. Individuals who are performance-oriented attempt to maintain positive judgements of their skills, make good impressions and outperform colleagues, which can result in a competitive work environment (Vrugt, Oort & Zeeberg 2002). Under these circumstances, work stressors might be exacerbated, leading to higher levels of psychological distress. Although adaptive coping strategies are generally related to improved psychological well-being, they may fail to reduce psychological distress generated from specific stressors. Findings of Langdon and Sawang (2018) also demonstrated that adaptive coping strategies (e.g. acceptance, humour) were related to increased psychological distress in the construction workforce. Consequently, the employment of adaptive coping strategies should be adjusted when facing different stressors. In a stressful working environment, construction companies should change the organisational culture from a performance-oriented culture to a people-oriented culture to develop a supportive work environment instead of a competitive work environment. Recreational activities designed to promote good relationships between workers and release work pressure may assist in this.

6.5 Model for managing mental health of workers in multicultural construction workplaces

The results provided empirical support to the hypotheses in this study. A total of 13 out of 19 hypotheses were confirmed. Statistically significant relationships between constructs were also found in this study. From the empirical results, a model for managing mental health in multicultural construction workplaces was developed (Figure 5.7). Thus, Objective 4 (i.e. to develop a model for managing mental health of workers in multicultural construction workplaces) was achieved.

Figure 5.7: Model of managing mental health in multicultural workplaces, with significant standardised path coefficients

Figure 5.7 shows the significant relationships between environmental stressors (i.e. work stressors and cultural stressors), personal characteristics (i.e. TABP and external LOC), intercultural coping and the psychological distress of construction workers in multicultural workplaces. The model confirms that work stressors and cultural stressors are major sources of psychological distress in the multicultural construction workplace. Cultural stressors can also

interact with work stressors to exacerbate psychological distress. Both personal traits—TABP and external LOC—significantly contribute to psychological distress. In particular, TABP moderates the relationships between environmental stressors and psychological distress. High levels of TABP exacerbate the positive impact of work stressors on psychological distress but reduce the effect of cultural stressors on psychological distress. Moreover, the developed model confirms that intercultural coping approaches (i.e. affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping) mitigate psychological distress. In addition, intercultural coping strategies can moderate the relationships between environmental stressors and psychological distress. Specifically, dissimilarity openness alleviates the effect of cultural stressors on psychological distress. Cognitive complexity attenuates the impact of work stressors on psychological distress. Goal orientation increases the effect of work stressors on psychological distress.

The model developed in this study presents a comprehensive perspective on managing mental health in a multicultural construction context. Management of mental health can be achieved by: (1) diminishing identified work and cultural stressors in the workplace, (2) modifying vulnerable personal traits and matching personal traits with job demands, (3) enhancing intercultural coping and (4) designing effective intercultural coping strategies for specific types of stressors. Thus, this model can be used as a framework for construction organisations to develop appropriate mental health interventions for workers.

Previous models in the construction sector (e.g. Bowen, Govender & Edwards 2014; Leung, Liang & Chan 2017; Naoum et al. 2018) have focused on the direct impact of stressors on mental health outcomes or coping behaviours. The model developed in this study highlights the interaction between personal and environmental factors in influencing mental health outcomes.

In particular, this model uncovers the interaction between personal characteristics and environmental stressors in affecting psychological outcomes, and shows how positive coping behaviours moderate the relationships between environmental stressors and mental health outcomes. Therefore, this model provides new knowledge of the dynamic and interactive effects of person–environment factors on mental health in the multicultural context. Moreover, the intercultural coping provided in this model serves as an innovative approach to addressing mental ill health and promoting good mental health among a culturally diverse workforce.

6.6 Summary

This chapter has discussed and interpreted the empirical results, supported by relevant theories and previous studies. The discussion has focused on the impacts of person–environment determinants on mental health outcomes, the dimensions of intercultural coping and their impacts on mental health outcomes, the moderating effects of intercultural coping strategies on the relationships between environmental stressors and mental health outcomes, as well as the model developed from the empirical results. In the next chapter, the summary of this study will be presented, which includes key findings, contributions and limitations of the study and recommendations for future research.

Chapter 7: Conclusions

7.1 Summary

Mental health in multicultural construction workplaces has emerged as an important social issue. To reduce mental ill health and promote good mental health for construction workers, there is a need for effective management of mental health in the multicultural work environment. In this study, this need was addressed by investigating the relationships between person–environment determinants, intercultural coping and mental health outcomes in the multicultural construction workforce.

Four specific objectives were identified to achieve the research goal (see Chapter 1). To address the research objectives, a conceptual framework for the relationships between person–environment determinants, intercultural coping and mental health outcomes was developed, drawing on a literature review (see Chapter 3). A quantitative approach and a survey research design were used in accordance with the positivist paradigm. Data were collected using an online questionnaire survey of the Australian construction industry (see Chapter 4). The SEM technique with partial least squares estimation (PLS) was adopted to analyse the data (see Chapter 5). The empirical results of the PLS-SEM analyses were discussed in the context of theory and literature (see Chapter 6). The following sections summarise the key findings, highlighting the achievement of the research objectives and the implications of the findings for theory and practice.

7.2 Key findings

The purpose of this study is to improve mental health of construction workers in multicultural construction workplaces with four specific objectives (see Section 1.4). The key findings are summarised concerning the research aim and objectives (shown in Table 7.1).

7.2.1 Environmental and personal determinants of mental health outcomes

The first objective was to examine the role of environmental stressors and personal characteristics in construction workers' mental health outcomes. This objective was achieved by testing Hypotheses 1–7. The outcomes of the testing show that: (1) work stressors have a positive impact on psychological distress (Hypothesis 1), (2) cultural stressors have a positive impact on psychological distress (Hypothesis 2), (3) cultural stressors interact with work stressors to effect psychological distress (Hypothesis 3), (4) TABP has a positive impact on psychological distress (Hypothesis 4), (5) external LOC has a positive impact on psychological distress (Hypothesis 5), and (6) TABP moderates the relationship between environmental stressors (i.e. work stressors and cultural stressors) and psychological distress (Hypotheses 6 and 7) (see Section 5.4.1).

The results revealed the significant determinants of mental health outcomes, including environmental stressors (i.e. work stressors and cultural stressors) and personal characteristics (i.e. TABP and external LOC). The findings suggest that workers' mental health is not only affected by factors related to their job, but also the cultural environment of the workplace. Additionally, high levels of cultural stressors can exacerbate the adverse impact of work stressors on mental health, while low levels of cultural stressors can reduce the adverse effect. The results also reveal that TABP workers who feature aggressive, competitive, ambiguous and

impulsive personalities—as well as external LOC workers, who believe their behaviours are determined by external factors—are more vulnerable to mental ill health. Moreover, high TABP workers are more likely to feel psychological distress when encountering work stressors but less likely to experience psychological distress under cultural stressors.

7.2.2 Positive coping approach

The second objective of this study was to develop a positive coping approach in multicultural construction workplaces. This objective was achieved by testing Hypotheses 10–13. The outcomes of testing show that (1) intercultural coping has a significant negative correlation with psychological distress (Hypothesis 10), (2) affective intercultural coping is negatively related to psychological distress (Hypothesis 11), (3) behavioural intercultural coping is negatively related to psychological distress (Hypothesis 12) and (4) cognitive intercultural coping is negatively related to psychological distress (Hypothesis 13) (see Section 5.4.2). The results suggest that intercultural coping can improve the mental health of construction workers.

This study developed a positive coping approach, namely, intercultural coping, which is conceptualised by incorporating intercultural competences into a coping repertoire based on positive psychology. Intercultural coping is defined as an individual's affective, behavioural and cognitive competencies to prevent and respond to stressful events for a sustained enhancement of psychological well-being (see Section 3.3). Intercultural coping features three dimensions: affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping. Affective intercultural coping refers to an individual's positive attitudes to manage stressful events in a multicultural work environment. It is characterised by three sub-dimensions underlying nine measurable items: dissimilarity openness (DO1, DO2, DO3), tolerance for ambiguity (TRA1, TRA2, TRA3) and cultural empathy (CE1, CE2, CE3).

Behavioural intercultural coping refers to an individual's positive skills for handling stressful events so as to diminish the negative psychological consequences in a multicultural work environment. Behavioural intercultural coping features two sub-dimensions underlying six measurable scales: intercultural communication competence (ICC1, ICC2, ICC3), and conflict management skills (CMS1, CMS2, CMS3). Cognitive intercultural coping refers to an individual's capacity to perceive and understand information for stressful events in a multicultural work environment. It is characterised by two sub-dimensions underlying six measurable items: cognitive complexity (CC1, CC2, CC3) and goal orientation (GO1, GO2, GO3) (see Table 5.7).

7.2.3 Moderating effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes

The third objective was to examine the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in a multicultural construction workforce. This objective was achieved by testing Hypotheses 14–19. The outcomes of the testing show that (1) dissimilarity openness moderates the relationship between cultural stressors and psychological distress, (2) cognitive complexity moderates the relationship between work stressors and psychological distress and (3) goal orientation moderates the relationship between work stressors and psychological distress (see Section 5.4.3).

The results confirmed the effectiveness of different types of intercultural coping strategies in managing different types of stressors in multicultural construction workplaces. In particular, when construction workers adopt strategies for dissimilarity openness, which attempt to understand, acknowledge and appreciate different cultures, the adverse impacts of cultural stressors on mental health outcomes are significantly reduced. Similarly, when construction

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workers employ strategies of cognitive complexity that perceive and evaluate stressful situations with comprehensive and detailed information, the adverse impacts of work stressors on mental health outcomes are significantly mitigated. In addition, the adverse effect of work stressors on psychological outcomes becomes more significant when workers are performance-oriented.

7.2.4 The model developed for managing mental health of workers in a multicultural construction workplace

The fourth objective is to develop a model for managing mental health of workers in multicultural construction workplaces. This objective was achieved by integrating the statistically significant paths among constructs (see Section 6.5). The model shows that the mental health outcomes of construction workers are determined by the interactions between environmental stressors, personal characteristics and intercultural coping approaches. Accordingly, this model presents a detailed and comprehensive perspective on managing mental health in a multicultural construction context by (1) reducing the potential sources of psychological distress in the work environment, (2) modifying vulnerable personal traits and matching personal traits with job demands, (3) enhancing intercultural coping and (4) designing effective intercultural coping strategies for specific types of stressors. This model can be adopted as a framework for construction organisations seeking to develop effective mental health interventions for workers.

Table 7.1: Summary of the research findings and achieved objectives

Research findings	Achieved objectives
1. Work stressors and cultural stressors contribute to the mental ill health of construction workers 2. The impact of work stressors on mental health outcomes varies at different levels of cultural stressors 3. Construction workers characterised by TABP and external LOC are more likely to suffer from mental ill health 4. TABP changes the effects of environmental stressors on mental health outcomes	Examine the role of environmental stressors (i.e. work stressors and cultural stressors) and personal characteristics (i.e. TABP and external LOC) in construction workers' mental health outcomes
1. Intercultural coping features three dimensions: affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping 2. There are significant positive relationships between intercultural coping dimensions and mental health	Develop a positive coping approach in multicultural construction workplaces
1. Dissimilarity openness mitigates the effects of cultural stressors on mental ill health 2. Cognitive complexity alleviates the effects of work stressors on mental ill health 3. Goal orientation exacerbates the effects of work stressors on mental ill health	Investigate the effect of positive coping strategies on the relationships between environmental stressors and mental health outcomes in multicultural construction workforces
1. Overall management of mental health can be achieved by reducing the potential sources of mental ill health in the work environment, modifying vulnerable personal traits and matching personal traits with job demands, improving intercultural coping, and designing effective intercultural coping strategies for specific types of stressors	Develop a model for managing mental health of workers in multicultural construction workplaces

7.3 Contribution to knowledge

This research contributes to knowledge of mental health management in the multicultural construction workforce by investigating the relationships between determinants, positive coping and mental health outcomes. Specifically, it extends knowledge on the relationships between person–environment determinants and mental health outcomes, intercultural coping theory and interactions between intercultural coping strategies and stressors.

First, the findings of this study contribute to the existing body of knowledge by extending research on the conditions for mental health (see Section 6.2 for details). Compared with previous models (e.g. Leung, Liang & Chan 2017; Sun et al. 2022), which have typically focused on the direct effects of stressors on psychological outcomes, the model developed in this study recognises the interactions between personal and environmental determinants and examines their joint effects on mental health outcomes, thereby advancing the understanding of the mechanisms and pathways of how stressors may influence workers' mental health in the construction sector. This study provides a foundation for the interactions between major stressors. It is suggested that further research examines the interactive effects of different types of stressors on psychological outcomes to facilitate a deeper knowledge of mental health in the construction industry. Moreover, through focusing on a heterogeneous population in the construction industry, an important but less investigated determinant of psychological outcomes—cultural stressors—has been identified in this study.

Second, this study proposes a positive coping approach: intercultural coping based on positive psychology (see Section 3.3). The notion of intercultural coping contributes to the development of coping theories and provides a new perspective on addressing mental health issues in a multicultural environment. Unlike existing coping mechanisms in the construction industry, which have featured generic strategies and typically positioned coping as a reactive approach (Wong, Reker & Peacock 2006), this study has focused on a proactive coping approach tailored for a multicultural construction workforce. This study also confirms that intercultural coping is a multidimensional concept that is composed of three dimensions: affective intercultural coping, behavioural intercultural coping and cognitive intercultural coping. The factor structure of intercultural coping that was discovered in this study may offer a theoretical framework by

which intercultural coping can be examined and measured. This study identified the factor structure of intercultural coping by validating the measurement scale of intercultural coping dimensions. The measurable scale items of intercultural coping offer an understanding of mental health management by which intercultural coping is operationalised to address mental health issues in the multicultural construction workplace. Thus, this validated data collection instrument can be used in future research as a tool for measuring intercultural coping (see Section 5.3). The factor structure of intercultural coping also aids the understanding of this concept. The dimensions reflect the definition and features (i.e. affective, behavioural, and cognitive aspects) of intercultural coping, which can further the application of intercultural coping in managing mental health in a multicultural context.

Third, this study extends the existing body of work by uncovering the moderating effect of positive coping strategies on the relationships between stressors and psychological outcomes (see Section 6.4 for details). Previous studies (e.g. Chan, Nwaogu and Naslund 2020; Sun et al. 2022) have focused on identifying the contributing factors of mental ill health to diminish potential stressors. The moderating effect of intercultural coping strategies revealed in this study demonstrates that mental health can be improved utilising coping given constant stressor levels, thereby contributing to the understanding of the stressor–psychological outcome process from the perspective of positive psychology. This finding also advances the current body of knowledge by identifying the effective coping strategies directed at specific types of stressors in a multicultural workplace. The results identified the effective intercultural coping strategies that can be used in the face of work stressors and cultural stressors to mitigate psychological distress; this in turn can pave the way for the design of effective intervention studies.

Lastly, this study contributes to the theoretical development of mental health management by developing a model for managing mental health in a multicultural construction workplace. The innovation of this model lies in its provision of new knowledge about the dynamic and interactive effects of person–environment factors on mental health in the multicultural context.

7.4 Contribution to practice

This study identifies the sources of mental health problems in a multicultural construction environment. The crucial role of cultural stressors and how they interact with other stressors is emphasised in this study (see Section 6.2.1 for details). Therefore, it is recommended that construction organisations devise intervention programs and pertinent policies to reduce the identified stressors and create a positive, culturally diverse workplace, thereby diminishing the impacts of an adverse environment on mental health outcomes. Moreover, this study uncovered the extent of influence of personal and environmental determinants on mental health outcomes in a multicultural workplace. Knowledge as to how stressors influence mental health in a multicultural work environment will benefit the practice of occupational health and safety in the construction industry. Understanding the interactions between personal and environmental factors in influencing mental health can also help construction WHS practitioners in developing interventions that are tailored for workers who are vulnerable to mental health problems. Psychological therapies are also recommended, such as workers talking with mental health professionals to better understand their thoughts and behavioural patterns. Additionally, a good fit between personal characteristics and task demands should be ensured.

The development of intercultural coping provides a new perspective on preventing and responding to stressful situations so as to enhance mental health conditions for a multicultural construction workforce (see Section 3.3 for details). The validated measurement scales for

measuring intercultural coping can be used as an assessment tool for practitioners to evaluate the level of intercultural coping for managing stressful situations. In addition, the findings of this study recognise the essential personal competences of individuals for promoting good mental health from the three dimensions of intercultural coping (i.e. affective, behavioural and cognitive dimensions).

This outcome can assist multicultural organisations to recognise the impact of cultural diversity on employees' mental health and initiate intervention programs focusing on cultivating intercultural competences for a sustained improvement of psychological well-being. Corresponding training programs can be developed to help workers cultivate the affective, behavioural and cognitive competences tailored for workplace stressors in construction industry. For instance, affective intercultural coping training programs might focus on developing positive attitudes (e.g. being open to cultural differences, thinking of ambiguous situations positively and understanding members' cultural backgrounds) for construction workers to create a healthy and inclusive work environment. Behavioural intercultural coping training programs could centre upon establishing positive skills such as competence in intercultural communication and conflict management. Training for cognitive intercultural coping may focus on promoting essential knowledge (e.g. comprehensive and differentiated knowledge systems, learning goal orientation) for perceiving and assessing stressors in a complex construction workplace. Follow-up assessment programs can also be devised to evaluate the effectiveness of the training for reducing mental health problems. Moreover, construction organisations should formulate pertinent policies that cover the implementation of intercultural coping to create a psychologically healthy workplace for a multicultural workforce.

By uncovering the moderating effects of intercultural coping strategies, this study also contributes to the practice of construction work health and safety. The intercultural coping strategies (i.e. dissimilarity openness, cognitive complexity and goal orientation) recognised in this study can help practitioners to develop effective intervention programs targeted at specific stressors (see Section 6.4). Training in coping strategies can be developed to equip construction workers with effective coping resources. Dissimilarity openness strategies focusing on understanding, respecting, appreciating and accepting different cultures can be effective interventions to alleviate negative psychological outcomes in the presence of cultural stressors. Cognitive complexity training on the positive cognitive appraisal of work stressors can be an effective intervention strategy to improve psychological well-being. Construction companies can develop intervention programs on topics including accepting and understanding cultural differences, promoting intercultural interactions, recognising different cultural values and providing a culturally inclusive work environment. Organisations can also establish training programs on topics including the appraisal of work stressors as positive challenges, perceiving the situation from different angles and reassessing the overall impact. Shifting from a performance-oriented culture to a people-oriented culture may also reduce the negative effect of work stressors on workers' psychological well-being. Further, interventions to create a supportive working environment including highlighting team spirit, promoting team collaboration and maintaining good relationships between workers can be undertaken. These individual-oriented interventions can be applied by both the construction workers and organisations to alleviate the levels of psychological distress and its adverse ramifications.

Moreover, through focusing on a heterogeneous population in the construction industry, this study has expanded the scope of research from a monocultural workplace environment to a multicultural workplace environment. The findings of this study offer a framework and

reference for researchers and practitioners to manage mental health in other workplaces, industries and countries with a similarly multicultural context.

7.5 Limitations of the study

The limitations of this study need to be highlighted and discussed.

The first limitation is the potential response bias associated with the self-reporting survey. Response bias refers to a wide range of responses to surveys or interviews that bias the response (from the accurate or truthful response). The response bias may be ascribed to the nature of the question and the motives of the respondents (Furnham 1986). Nonetheless, this impact was minimised in the present study through a variety of approaches.

To begin with, a pilot study was conducted to verify the questionnaire. Through the pilot study, the problem of wording for understanding the questionnaire items was examined, the appropriateness of the meaning of the statements was identified, questions that were ambiguous for different populations were revised, the comprehensiveness and accuracy of the questions applied in the Australian construction context was examined and different interpretations of the questionnaire items between the researchers and respondents were avoided (see Section 4.3.3). Another factor guarding against response bias was that the sample population was selected according to the research objectives and the characteristics of the population. Only eligible respondents who met the research criteria could participate in the questionnaire survey. Moreover, participation in this research was voluntary. Before commencing the questionnaire survey, respondents were informed that their participation was entirely voluntary and they could withdraw at any time without any consequences. Respondents were also recommended to

review the questionnaire before submitting it. Finally, they were encouraged to contact the research team if they had any questions regarding the questionnaire survey (see Section 4.3.4). Further, the sample size reached adequate statistical power and effect size. This study adopted the PLS-SEM method to examine the research models, which considers the characteristics of the model and data when selecting the sample size. As recommended by Cohen (1992), four parameters (i.e. significance levels, minimum R^2, statistical power of 80% and number of independent variables) were considered to determine the minimum sample size of PLS-SEM models. The minimum sample of 58 was considered to achieve a statistical power of 80% for detecting R^2 values of at least 0.25 (with a 1% probability of error). Accordingly, the minimum sample size of 58 was adequate for the modelling purposes in this study (see Section 4.3.5). Finally, statistical analysis confirmed the validity of the research findings. The assessment of measurement models confirmed the reliability and validity of the constructs specified in the models (see Section 5.3). The findings were also interpreted and supported by theories and previous studies. Thus, the findings of this study are still valid given the limitation.

A second limitation of this study relates to the selection of research approach. This study employed a quantitative approach and data were collected using a questionnaire survey (Sections 4.2 and 4.3). Questionnaire surveys can detect the relationships between constructs but they may be insufficient to explain why the relationships exist. Therefore, for a better understanding of the relationships between constructs, qualitative research approaches can be employed. This limitation leads to the directions for future research as is discussed in the next section.

The third limitation of this study involves the generalisability of the research findings. The findings were reached on the basis of information provided by workers in Australian

construction industries and may not be generalised or applicable to other counties or industries. Some countries may not have a multicultural context or be immigrant-receiving countries. Moreover, the construction sector in Australia may also vary in several ways from those of other industries and regions. Therefore, the findings should be interpreted in terms of the Australian construction context.

This study collected data from onsite construction workers. The demographic results showed that only 2% of participants were female workers. This result is relatively consistent with the current status of the gender distribution on Australian construction worksites. In Australia, females make up only 2.5% of the tradespeople and onsite construction workers (Gerber 2022). Owing to the challenging and gendered nature of construction worksites—such as inadequate toileting facilities, overwhelming workload, unrealistic deadlines, uncertainty of working location and gender-based discrimination—few women choose to work on site in the construction sector (Rees-Evans 2020). Many of the women who do work in this sector are desk-based, working in design, administrative or management roles (BalfourBeatty 2022). The small sample of female participants made it difficult to draw valid findings for female workers and make the comparison between male and female workers in this study.

Last, the focus of this research is the multicultural workforce in the construction industry. Only workers who had experience working in a team with people from different cultural backgrounds were eligible to participate in the questionnaire survey. Information about the immigration status of respondents and the degree of cultural diversity in their workplaces was not collected; nor was the temporal effect of cultural stressors on mental health investigated in this study. The duration over which workers are exposed to a culturally diverse worksite may influence their mental health outcomes, and the impact of cultural stressors on mental health may vary for

workers with different lengths of working experience. However, most participants in this study have a rich working experience (94% of respondents have been working for over five years). Thus, the temporal effect of such experience is insignificant.

7.6 Recommendations for future research

In light of the limitations articulated in the previous section, several research directions for further studies are identified. As mentioned in the second limitation, the questionnaire survey is appropriate to test relationships between constructs but may not be sufficient to explain why the relationships exist. Therefore, future research may consider adopting a mixed methods approach to obtain in-depth understanding about the relationships among constructs. Apart from quantitative approaches, qualitative research approaches such as interviews and observations could also be adopted to collect data. For instance, unstructured interviews could be used to ascertain workers' perceptions of different stressors in the workplace and how they affect mental health conditions. Observations may be used to detect which coping measures workers take to deal with problems. Surveys can then be used to track mental health conditions over a period of time. Through combining the quantitative and qualitative research methods, a better understanding of each construct and its relationships as well as a complete perspective of the research problem can be captured. In sum, a mixed research method should be adopted in future studies to obtain a comprehensive and detailed understanding of the research problem.

As discussed in the third limitation, this study collected data solely from construction workers in Australia. Nevertheless, this study, as a first step, presented a reference for similar studies to be conducted in other counties featuring a multicultural work environment. As a result of globalisation, migrant construction workers are increasing in many countries and regions (e.g. Malaysia, the UK, the US, Singapore and Hong Kong) (Ahmed, Leung & Ojo 2022; Chan,

Javed et al. 2017). As mental health problems are also prevalent in the construction sectors in those places, the findings of this study may provide valuable insights for them to address psychological issues. Thus, in future research, comparative studies can be conducted between different counties or regions with multicultural work environments.

As mentioned in the fourth limitation, data were primarily collected from male construction workers in this study. Previous research indicated that the sources of mental ill health may be different for males and females. Female personnel is likely to experience additional stressors compared to their male counterparts, such as harassment, lack of respect or support from subordinates and lower salary (Kamardeen & Sunindijo 2017). Therefore, females tend to have a higher level of mental ill health than their male colleagues (Chan, Nwaogu & Naslund 2020). It is therefore recommended that future studies be conducted to compare the sources of mental ill health in multicultural workplaces between male and female workers.

The final limitation indicated that the focus of this research is the multicultural workforce in the construction industry. Multiculturalism is characterised by the dissimilarities in ethnicity, linguistics and worldviews (Moieni, Mousaferiadis & Sorezano 2017). Different levels of multiculturalism may have varying effects on mental health. For future research, it may be worth investigating the impact of the degree of multiculturalism on mental health and comparing the findings between migrant workers and local workers. Additionally, further studies may consider and compare the different temporal effects of working experience on mental health in a multicultural context.

Through comparing the findings with previous research of Leung, Liang and Chan (2017), this study indicated that the effects of TABP on mental health differ for different labourers (see

Section 6.2.3). Therefore, it would be advantageous for future researchers to explore the relationships between personal characteristics and mental health by different construction trades. Additionally, the relationships between specific personal traits and environmental stressors deserve further exploration in future studies. Finally, given that coping competences have positive impacts on mental health, in future research, it would be worthwhile to explore potential interactions amongst various coping competences and factors that contribute to development of these competences.

References

Abbeduto, L, Seltzer, MM, Shattuck, P, Krauss, MW, Orsmond, G & Murphy, MM 2004, 'Psychological well-being and coping in mothers of youths with autism, down syndrome, or fragile X syndrome', *American Journal on Mental Retardation*, vol. 109, no. 3, pp. 237–54.

Abowitz, DA & Toole, TM 2010, 'Mixed method research: fundamental issues of design, validity, and reliability in construction research', *Journal of Construction Engineering and Management*, vol. 136, no. 1, pp. 108–16.

ABS—*see* Australian Bureau of Statistics

Adhikary, P, Sheppard, ZA, Keen, S & Teijlingen, EV 2018, 'Health and well-being of Nepalese migrant workers abroad', *International Journal of Migration, Health and Social Care*, vol. 14, no. 1, pp. 96–105.

Ahmed, K, Leung, M-y & Ojo, LD 2022, 'An exploratory study to identify key stressors of ethnic minority workers in the construction industry', *Journal of Construction Engineering and Management*, vol. 148, no. 5, p. 04022014.

AimBig 2022, *What diversity brings to a workplace*, viewed 1 August 2022, <https://www.aimbigemployment.com.au/what-diversity-brings-to-a-workplace/#:~:text=This%20has%20flowed%20into%20the,background%20through%20their%20working%20life.>.

Ajayi, SO, Jones, W & Unuigbe, M 2019, 'Occupational stress management for UK construction professionals: understanding the causes and strategies for improvement', *Journal of Engineering, Design and Technology*, vol. 17, no. 4, pp. 819–832.

Akter, S, D'Ambra, J & Ray, P 2011, 'Trustworthiness in mHealth information services: an assessment of a hierarchical model with mediating and moderating effects using partial least squares (PLS)', *Journal of the American Society for Information Science and Technology*, vol. 62, no. 1, pp. 100–16.

Al-Bayati, AJ & Abudayyeh, O 2016, 'Safety challenges in the U.S. construction industry: the Hispanic workforce perspective', *Proceedings of the 2016 Construction Research Congress: old and new construction technologies converge in historic San Juan* American Society of Civil Engineers (ASCE), pp. 2967–71, Scopus.

Al-Maskari, F, Shah, SM, Al-Sharhan, R, Al-Haj, E, Al-Kaabi, K, Khonji, D et al. 2011, 'Prevalence of depression and suicidal behaviors among male migrant workers in United Arab Emirates', *Journal of Immigrant and Minority Health*, vol. 13, no. 6, pp. 1027–32.

Alderson, L 2017, *Uncovered: the truth behind construction's mental health*, viewed 25 July 2022, <https://www.constructionnews.co.uk/agenda/mind-matters/uncovered-the-truth-behind-constructions-mental-health-27-04-2017/>.

Aldwin, CM 2007, *Stress, coping, and development: an integrative perspective*, Guilford Press, New York.

American Heritage Dictionary 2022, *American Heritage Dictionary of the English Language*, 5th edn, HarperCollins Publishers.

Amirkhan, JH 1990, 'A factor analytically derived measure of coping: the coping strategy indicator', *Journal of Personality and Social Psychology*, vol. 59, pp. 1066–74.

Anderson, JC & Gerbing, DW 1984, 'The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis', *Psychometrika*, vol. 49, no. 2, pp. 155–73.

Arasaratnam-Smith, LA 2017, 'Intercultural competence: an overview', in DK Deardorff & LA Arasaratnam-Smith (eds.), *Intercultural competence in higher education*, Routledge, London, pp. 7–18.

Arvidsdotter, T, Marklund, B, Kylén, S, Taft, C & Ekman, I 2016, 'Understanding persons with psychological distress in primary health care', *Scandinavian Journal of Caring Sciences*, vol. 30, no. 4, pp. 687–94.

Australia jobs 2020, *Industry outlook*, viewed 23 June 2021, <https://australianjobs.employment.gov.au/jobs-future/industry-outlook>.

Australian Bureau of Statistics 2007, *National survey of mental health and wellbeing: summary of results*, Canberra, ACT Australian Bureau of Statistics.

Australian Bureau of Statistics 2017a, *National Health Survey: Users' guide, 2014–15*, cat. no. 4363.0, viewed 12 May 2022, <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4363.0~2014-15~Main%20Features~Kessler%20Psychological%20Distress%20Scale-10%20(K10)~35>.

Australian Bureau of Statistics 2017b, *Census of Population and Housing: cultural diversity data cube*, cat. 2071.0, Canberra, ACT.

Australian Bureau of Statistics 2017c, *Census reveals a fast changing, culturally diverse nation*, viewed 01 August 2022, <https://www.abs.gov.au/ausstats/abs@.nsf/lookup/media%20release3>.

Australian Bureau of Statistics 2022, *Labour Force, Australia, Detailed*, viewed 09 January 2023, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release>.Aveiga, F, Valverde, O, Jaselskis, EJ & Strong, KC 2011, 'Integration-communications training for improving productivity and conflict resolution strategies among culture and language diverse construction sites', *International Journal of Human Resources Development and Management*, vol. 11, no. 1, pp. 16–37.

Ayoko, OB & Härtel, CE 2000, 'Cultural differences at work: How managers deepen or lessen the cross-racial divide in their workgroups', *Queensland Review*, vol. 7, no. 1, pp. 77–87.

Babbie, E 1989, *Survey research methods*, 2nd edn, Wadsworth, Belmont, CA.

Bagozzi, RP, Yi, Y & Phillips, LW 1991, 'Assessing construct validity in organizational research', *Administrative science quarterly*, vol. 36, pp. 421–58.

Bailey, KD 1978, *Methods of social research*, 3rd edn, Free Press, New York.

BalfourBeatty 2022, *Inspiring Change: Attracting women into construction*, viewed 01 September 2022, <https://www.balfourbeatty.com/how-we-work/public-policy/inspiring-change-attracting-women-into-construction/>.

BCBuildingTrades 2020, *83% of construction workers have experienced a mental health issue*, viewed 28 July 2022, <https://bcbuildingtrades.org/83-of-construction-workers-have-experienced-a-mental-health-issue/>.

Becker, J-M, Klein, K & Wetzels, M 2012, 'Hierarchical latent variable models in PLS-SEM: guidelines for using reflective-formative type models', *Long Range Planning*, vol. 45, nos. 5–6, pp. 359–94.

Bentler, PM & Chou, C-P 1987, 'Practical issues in structural modeling', *Sociological Methods & Research*, vol. 16, no. 1, pp. 78–117.

Bentler, PM & Huang, W 2014, 'On components, latent variables, PLS and simple methods: reactions to Rigdon's rethinking of PLS', *Long Range Planning*, vol. 47, no. 3, pp. 138–45.

Berry, JW 1976, *Human ecology and cognitive style: comparative studies in cultural and psychological adaptation*, SAGE/Halsted, New York.

Berry, JW 1992, 'Acculturation and adaptation in a new society', *International Migration*, vol. 30, no. s1, pp. 69–85.

Berry, JW 1997, 'Immigration, acculturation, and adaptation', *Applied Psychology*, vol. 46, no. 1, pp. 5–34.

Berry, JW 2006a, 'Acculturative stress', in PTP Wong & LCJ Wong (eds.), *Handbook of multicultural perspectives on stress and coping*, Springer, New York, pp. 287–98.

Berry, JW 2006b, 'Contexts of acculturation', in DL Sam & JW Berry (eds.), *The Cambridge handbook of acculturation psychology*, Cambridge University Press, Cambridge, pp. 27–42.

Berry, JW, Kim, U, Minde, T & Mok, D 1987, 'Comparative studies of acculturative stress', *International Migration Review*, vol. 21, no. 3, pp. 491–511.

Beusenberg, M, Orley, JH & World Health Organization 1994, *A user's guide to the self reporting questionnaire (SRQ)*, World Health Organization Division of Mental Health, Geneva.

Bhagat, RS, McQuaid, SJ, Lindholm, H & Segovis, J 1985, 'Total life stress: a multimethod validation of the construct and its effects on organizationally valued outcomes and withdrawal behaviors', *Journal of Applied Psychology*, vol. 70, no. 1, pp. 202–214.

Bhui, K, Stansfeld, S, McKenzie, K, Karlsen, S, Nazroo, J & Weich, S 2005, 'Racial/ethnic discrimination and common mental disorders among workers: findings from the EMPIRIC Study of Ethnic Minority Groups in the United Kingdom', *American Journal of Public Health*, vol. 95, no. 3, pp. 496–501.

Billings, A & Moos, RH 1981, 'The role of coping responses and social resources in attenuating the stress of life events', *Journal of Behavioral Medicine*, vol. 4, no. 2, pp. 139–57.

Borghetti, C 2017, 'Is there really a need for assessing intercultural competence? Some ethical issues', *Journal of Intercultural Communication*, vol. 44, no. 1, pp. 1–18.

Boschman, JS, van der Molen, HF, Sluiter, JK & Frings-Dresen, MHW 2013, 'Psychosocial work environment and mental health among construction workers', *Applied Ergonomics*, vol. 44, no. 5, pp. 748–55.

Bouma, G & Ling, R 2004, *The research process*, 5th edn, Oxford University Press, South Melbourne.

Bowen, NK & Guo, S 2011, *Structural equation modeling*, Oxford University Press, Oxford.

Bowen, P, Edwards, P, Lingard, H & Cattell, K 2014, 'Workplace stress, stress effects, and coping mechanisms in the construction industry', *Journal of Construction Engineering and Management*, vol. 140, no. 3, pp. 04013059-01–04013059-15.

Bowen, P, Govender, R & Edwards, P 2014, 'Structural equation modeling of occupational stress in the construction industry', *Journal of Construction Engineering and Management*, vol. 140, no. 9.

Bowen, P, Zhang, RP & Edwards, P 2021, 'An investigation of work-related strain effects and coping mechanisms among South African construction professionals', *Construction Management and Economics*, vol. 39, no. 4, pp. 298–322.

Breslow, L & Buell, P 1960, 'Mortality from coronary heart disease and physical activity of work in California', *Journal of Chronic Diseases*, vol. 11, nos. 3–4, pp. 421–44.

Brew, FP & Cairns, R 2004, 'Styles of managing interpersonal workplace conflict in relation to status and face concern: a study with Anglos and Chinese', *International Journal of Conflict Management*, vol. 15, no. 1, pp. 27–56.

Brown, LP, Rospenda, KM, Sokas, RK, Conroy, L, Freels, S & Swanson, NG 2011, 'Evaluating the association of workplace psychosocial stressors with occupational injury, illness, and assault', *Journal of Occupational and Environmental Hygiene*, vol. 8, no. 1, pp. 31–7.

Brown, S 1997, 'Excess mortality of schizophrenia: a meta-analysis', *The British Journal of Psychiatry*, vol. 171, no. 6, pp. 502–8.

Brown, S, Inskip, H & Barraclough, B 2000, 'Causes of the excess mortality of schizophrenia', *The British Journal of Psychiatry*, vol. 177, no. 3, pp. 212–17.

Brown, TA & Moore, MT 2012, 'Confirmatory factor analysis', in RH Hoyle (ed.), *Handbook of structural equation modeling*, Guilford Press, New York, pp. 361–79.

Bryman, A 2016, *Social research methods*, 5th edn, Oxford University Press, Oxford.

Budner, S 1962, 'Intolerance of ambiguity as a personality variable', *Journal of Personality*, vol. 30, no. 1, pp. 29–50.

Burke, RJ & Weir, T 1980, 'The Type A experience: occupational and life demands, satisfaction and well-being', *Journal of Human Stress*, vol. 6, no. 4, pp. 28–38.

Burki, T 2018, 'Mental health in the construction industry', *The Lancet Psychiatry*, vol. 5, no. 4, p. 303.

Byrne, BM 2013, *Structural equation modeling with AMOS: basic concepts, applications, and programming*, Routledge, New York.

Cairney, J, Veldhuizen, S, Wade, TJ, Kurdyak, P & Streiner, DL 2007, 'Evaluation of 2 measures of psychological distress as screeners for depression in the general population', *The Canadian Journal of Psychiatry*, vol. 52, no. 2, pp. 111–20.

Cameron, K, Dutton, J & Quinn, R 2003, *Positive Organizational Scholarship: foundations of a new discipline*, Berrett-Koehler, San Francisco.

Campbell, F 2006, *Occupational stress in the construction industry*, Chartered Institute of Building, Berkshire, UK.

Cano, MÁ, Schwartz, SJ, Castillo, LG, Romero, AJ, Huang, S, Lorenzo-Blanco, EI et al. 2015, 'Depressive symptoms and externalizing behaviors among Hispanic immigrant adolescents: examining longitudinal effects of cultural stress', *Journal of Adolescence*, vol. 42, pp. 31–9.

Carter, L & Stanford, J 2021, *Investing in better mental health in Australian workplaces*, viewed 11 March 2021, <https://apo.org.au/sites/default/files/resource-files/2021-05/apo-nid313144.pdf>.

Carver, CS & Scheier, MF 1982, 'Control theory: A useful conceptual framework for personality-social, clinical, and health psychology', *Psychological Bulletin*, vol. 92, pp. 111–35.

Carver, CS, Scheier, MF & Weintraub, JK 1989, 'Assessing coping strategies: a theoretically based approach', *Journal of Personality and Social Psychology*, vol. 56, pp. 267–83.

Cassel, C, Hackl, P & Westlund, AH 1999, 'Robustness of partial least-squares method for estimating latent variable quality structures', *Journal of Applied Statistics*, vol. 26, no. 4, pp. 435–46.

Cattell, K, Bowen, P & Edwards, P 2016, 'Stress among South African construction professionals: a job demand-control-support survey', *Construction Management and Economics*, vol. 34, no. 10, pp. 700–23.

Cedstrand, E, Mølsted Alvesson, H, Augustsson, H, Bodin, T, Bodin, E, Nyberg, A et al. 2021, 'Co-creating an occupational health intervention within the construction industry in Sweden: stakeholder perceptions of the process and output', *International Journal of Environmental Research and Public Health*, vol. 18, no. 24, p. 12872.

Chan, AP, Javed, AA, Wong, FK, Hon, CK & Lyu, S 2017, 'Evaluating the safety climate of ethnic minority construction workers in Hong Kong', *Journal of Professional Issues in Engineering Education and Practice*, vol. 143, no. 4, p. 04017006.

Chan, AP, Nwaogu, JM & Naslund, JA 2020, 'Mental ill-health risk factors in the construction industry: systematic review', *Journal of Construction Engineering and Management*, vol. 146, no. 3, p. 04020004.

Chan, APC, Wong, FKW, Hon, CKH, Javed, AA & Lyu, S 2017, 'Construction safety and health problems of ethnic minority workers in Hong Kong', *Engineering, Construction and Architectural Management*, vol. 24, no. 6, pp. 901–19.

Chan, IYS, Leung, MY & Liang, Q 2018, 'The roles of motivation and coping behaviours in managing stress: qualitative interview study of Hong Kong expatriate construction professionals in mainland China', *International Journal of Environmental Research and Public Health*, vol. 15, no. 3, p. 561.

Cheng, Y, Chen, CW, Chen, CJ & Chiang, TL 2005, 'Job insecurity and its association with health among employees in the Taiwanese general population', *Social Science and Medicine*, vol. 61, no. 1, pp. 41–52.

Chin, WW 1998, 'The partial least squares approach to structural equation modeling', in GA Marcoulides (ed.), *Modern methods for business research*, Lawrence Erlbaum Associates, Mahwah, NJ, pp. 295–336.

Chin, WW 2003, *PLS Graph 3.0*, Soft Modeling, Inc, Houston, TX.

Chin, WW 2010, 'How to write up and report PLS analyses', in V Esposito Vinzi, WW Chin, J Henseler & H Wang (eds.), *Handbook of partial least squares: concepts, methods and applications, II*, Springer, Heidelberg, pp. 655–90.

Chin, WW & Gopal, A 1995, 'Adoption intention in GSS: Relative importance of beliefs', *ACM SIGMIS Database: the DATABASE for advances in information systems*, vol. 26, nos. 2–3, pp. 42–64.

Chin, WW, Marcolin, BL & Newsted, PR 2003, 'A partial least squares latent variable modeling approach for measuring interaction effects: results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study', *Information Systems Research*, vol. 14, no. 2, pp. 189–217.

Cohen, J 1988, *Statistical power analysis for the behavioral sciences*, Lawrence Erlbaum, Mahwah, NJ.

Cohen, J 1992, 'A power primer', *Psychological Bulletin*, vol. 112, no. 1, pp. 155–9.

Compas, BE, Connor-Smith, JK, Saltzman, H, Thomsen, AH & Wadsworth, ME 2001, 'Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research', *Psychological Bulletin*, vol. 127, no. 1, pp. 87–127.

Coombs, T 2005, *Australian mental health outcomes and classification network: Kessler -10 Training Manual*, NSW Institute of Psychiatry, Parramatta, NSW, Australia.

Cooper, CL 1972, 'Group training for individual and organizational development', *Interpersonal Development*, vol. 3, nos. 1–4, p. 174.

Cooper, CL & Baglioni Jr, AJ 1988, 'A structural model approach toward the development of a theory of the link between stress and mental health', *British Journal of Medical Psychology*, vol. 61, no. 1, pp. 87–102.

Cooper, CL & Marshall, J 1976, 'Occupational sources of stress: A review of the literature relating to coronary heart disease and mental ill health', *Journal of Occupational Psychology*, vol. 49, no. 1, pp. 11–28.

Cooper, CL, Sloan, SJ & Williams, S 1988, *Occupational Stress Indicator: management guide*, NFER-Nelson, Windsor.

Creswell, JW 2003, *Research design: qualitative, quantitative, and mixed methods approaches*, 2nd edn, SAGE Publications, Thousand Oaks, CA.

Creswell, JW 2014, *Research design: qualitative, quantitative, and mixed methods approaches*, 4th edn, SAGE Publications, Thousand Oaks, CA.

Creswell, JW & Clark, VLP 2017, *Designing and conducting mixed methods research*, 3rd edn, SAGE Publications, Thousand Oaks, CA.

Creswell, JW & Creswell, JD 2017, *Research design: qualitative, quantitative, and mixed methods approaches*, 5th edn, SAGE Publications, Thousand Oaks, CA.

Cuijpers, P, Smits, N, Donker, T, Ten Have, M & de Graaf, R 2009, 'Screening for mood and anxiety disorders with the five-item, the three-item, and the two-item Mental Health Inventory', *Psychiatry Research*, vol. 168, no. 3, pp. 250–5.

Dane, FC 1990, *Research methods*, Brooks/Cole, Pacific Grove, CA.

Danna, K & Griffin, RW 1999, 'Health and well-being in the workplace: a review and synthesis of the literature', *Journal of Management*, vol. 25, no. 3, pp. 357–84.

Davison, A & Hinkley, D 1997, *Bootstrap methods and their application*, Cambridge University Press, Cambridge.

Dawson, BA & Williams, SA 2008, 'The impact of language status as an acculturative stressor on internalizing and externalizing behaviors among Latino/a children: a longitudinal analysis from school entry through third grade', *Journal of Youth Adolescence*, vol. 37, no. 4, pp. 399–411.

Day, AL & Jreige, S 2002, 'Examining Type A behavior pattern to explain the relationship between job stressors and psychosocial outcomes', *Journal of Occupational Health Psychology*, vol. 7, no. 2, pp. 109–20.

De Jonge, J & Dormann, C 2006, 'Stressors, resources, and strain at work: a longitudinal test of the triple-match principle', *Journal of Applied Psychology*, vol. 91, no. 6, pp. 1359–74.

Deardorff, DK 2006, 'Identification and assessment of intercultural competence as a student outcome of internationalization', *Journal of Studies in International Education*, vol. 10, no. 3, pp. 241–66.

Deardorff, DK 2011, 'Assessing intercultural competence', *New Directions for Institutional Research*, vol. 2011, no. 149, pp. 65–79.

Demerouti, E, Bakker, AB, Nachreiner, F & Schaufeli, WB 2001, 'The job demands-resources model of burnout', *Journal of Applied Psychology*, vol. 86, no. 3, pp. 499–512.

Department of Home Affairs 2018, *Australia's multicultural statement – Multicultural Australia: United, Strong, Successful*, viewed 22 July 2022, <https://www.homeaffairs.gov.au/mca/Statements/english-multicultural-statement.pdf>.

DeSimone, RL & Harris, DM 1998, *Human resource development*, The Dryden Press, Orlando, FL.

Di Fabio, A 2017, 'Positive healthy organizations: promoting well-being, meaningfulness, and sustainability in organizations', *Frontiers in Psychology*, vol. 8, no. 1938, pp. 1–6.

DiLalla, LF 2000, 'Structural equation modeling: uses and issues', in HEA Tinsley & SD Brown (eds.), *Handbook of applied multivariate statistics and mathematical modeling*, Academic Press, New York, pp. 439–64.

Djebarni, R 1996, 'The impact of stress in site management effectiveness', *Construction Management & Economics*, vol. 14, no. 4, pp. 281–93.

Dodd, C 1987, 'An introduction to intercultural effectiveness skills', in CH Dodd & FF Montalvo (eds.), *Intercultural skills for multicultural societies*, SIETAR International, Washington, DC, pp. 3–12.

Edwards, JR 1992, 'A cybernetic theory of stress, coping, and well-being in organizations', *Academy of Management Review*, vol. 17, no. 2, pp. 238–74.

Edwards, JR 2001, 'Multidimensional constructs in organizational behavior research: an integrative analytical framework', *Organizational Research Methods*, vol. 4, no. 2, pp. 144–92.

Edwards, JR, Caplan, RD & Harrison, RV 1998, 'Person–environment fit theory: Conceptual foundations, empirical evidence, and directions for future research', in CL Cooper (ed.), *Theories of organizational stress*, Oxford University Press, Oxford, pp. 28–67.

Endler, NS & Parker, JD 1989, 'Coping with frustrations to self-realization: stress, anxiety, crises, and adjustment', in E Krau (ed.), *Self-realization, success, and adjustment*, Praeger Publishers, Wesport, CT, pp. 153–164.

Endler, NS & Parker, JD 1990, 'Multidimensional assessment of coping: A critical evaluation', *Journal of Personality and Social Psychology*, vol. 58, no. 5, pp. 844–54.

Enshassi, A, Al-Swaity, E, Abdul Aziz, AR & Choudhry, R 2018, 'Coping behaviors to deal with stress and stressor consequences among construction professionals: a case study at the Gaza Strip, Palestine', *Journal of Financial Management of Property and Construction*, vol. 23, no. 1, pp. 40–56.

Everymind 2022, *Understanding mental ill-health*, viewed 24 July 2022, <https://everymind.org.au/mental-health/understanding-mental-health/what-is-mental-illness>.

Fan, Y, Chen, J, Shirkey, G, John, R, Wu, SR, Park, H & Shao, C 2016, 'Applications of structural equation modeling (SEM) in ecological studies: an updated review', *Ecological Processes*, vol. 5, no. 1, pp. 1–12.

Fellows, RF & Liu, AM 2015, *Research methods for construction*, 4th edn, John Wiley & Sons, West Sussex, UK.

Feng, Y, Wu, P, Ye, G & Zhao, D 2017, 'Risk-compensation behaviors on construction sites: demographic and psychological determinants', *Journal of Management in Engineering*, vol. 33, no. 4, p. 04017008.

Findler, L, Wind, LH & Barak, MEM 2007, 'The challenge of workforce management in a global society: modeling the relationship between diversity, inclusion, organizational culture, and employee well-being, job satisfaction and organizational commitment', *Administration in Social Work*, vol. 31, no. 3, pp. 63–94.

Folkman, S 1984, 'Personal control and stress and coping processes: a theoretical analysis', *Journal of Personality and Social Psychology*, vol. 46, no. 4, pp. 839–52.

Folkman, S 1997, 'Positive psychological states and coping with severe stress', *Social Science Medicine*, vol. 45, no. 8, pp. 1207–21.

Folkman, S & Lazarus, RS 1980, 'An analysis of coping in a middle-aged community sample', *Journal of Health and Social Behavior*, vol. 21, no. 3, pp. 219–39.

Folkman, S & Lazarus, RS 1985, 'If it changes it must be a process: study of emotion and coping during three stages of a college examination', *Journal of Personality and Social Psychology*, vol. 48, no. 1, pp. 150–70.

Folkman, S & Lazarus, RS 1991, 'Coping and emotion', in A Monat & RS Lazarus (eds.), *Stress and coping: an anthology*, 3rd edn, Columbia University Press, New York, pp. 207–27.

Folkman, S, Lazarus, RS, Dunkel-Schetter, C, DeLongis, A & Gruen, RJ 1986, 'Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes', *Journal of Personality and Social Psychology*, vol. 50, no. 5, pp. 992–1003.

Folkman, S & Moskowitz, JT 2004, 'Coping: pitfalls and promise', *Annual Review of Psychology*, vol. 55, pp. 745–74.

Fordjour, GA, Chan, APC & Tuffour-Kwarteng, L 2021, 'Exploring construction employees' perspectives on the potential causes of psychological health conditions in the construction industry: a study in Ghana', *International Journal of Construction Education and Research*, vol. 17, no. 4, pp. 373–93.

Foster, L, Marshall, A & Williams, LS 1991, *Discrimination against immigrant workers in Australia*, International Labour Organization, Canberra, ACT.

Fowler, FJ 2009, *Survey research methods*, 4th edn, SAGE Publications, Thousand Oaks, CA.

French, JRP & Caplan, RD 1972, 'Organization stress and strain', in AJ Marrow (ed.), *The failure of success*, Amacom, New York, pp. 30-66.

French, JR, Rogers, W & Cobb, S 1974, 'A model of person–environment fit', in GV Coelho, DA Hamburgh & JE Adams (eds.), *Coping and adaptation*, Basic Books, New York, pp. 316–33.

Freud, A 1946, *The ego and the mechanisms of defense*, International Universities Press, New York.

Freud, S 1930, *Civilization and its discontents.* Standard Edition, vol. 21, Hogarth Press, London.

Freud, S 1989 [1940], *An outline of psycho-analysis*, WW Norton & Company, New York.

Friedman, M & Rosenman, RH 1959, 'Association of specific overt behavior pattern with blood and cardiovascular findings: blood cholesterol level, blood clotting time, incidence of arcus senilis, and clinical coronary artery disease', *Journal of the American Medical Association*, vol. 169, no. 12, pp. 1286–96.

Friedman, M & Rosenman, RH 1974, *Type A behavior and your heart*, Fawcett, Greenwich, Conn.

Fujimoto, Y, Härtel, CE, Härtel, GF & Baker, NJ 2000, 'Openness to dissimilarity moderates the consequences of diversity in well-established groups', *Asia Pacific Journal of Human Resources*, vol. 38, no. 3, pp. 46–61.

Furnham, A 1986, 'Response bias, social desirability and dissimulation', *Personality and Individual Differences*, vol. 7, no. 3, pp. 385–400.

Furnham, A 1999, *The psychology of behaviour at work*, Psychologist Press, Hive, Sussex.

Furukawa, TA, Kessler, RC, Slade, T & Andrews, G 2003, 'The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being', *Psychological Medicine*, vol. 33, no. 2, pp. 357–62.

Fusilier, MR, Ganster, DC & Mayes, BT 1987, 'Effects of social support, role stress, and locus of control on health', *Journal of Management*, vol. 13, no. 3, pp. 517–28.

Ganster, DC 1989, 'Worker control and well-being: a review of research in the workplace', *Job Control and Worker Health*, vol. 3, no. 23, pp. 213–29.

Garratt, AM, Ruta, DA, Abdalla, MI, Buckingham, JK & Russell, IT 1993, 'The SF36 health survey questionnaire: an outcome measure suitable for routine use within the NHS?', *British Medical Journal*, vol. 306, no. 6890, pp. 1440–4.

Gerber, P 2022, *Women in construction: Smashing down the concrete walls that keep them out*, Monash University, viewed 01 September 2022, <https://lens.monash.edu/@politics-society/2022/03/07/1384504/women-in-construction-smashing-down-the-concrete-walls-that-keep-them-out>.

Gil, AG, Vega, WA & Dimas, JM 1994, 'Acculturative stress and personal adjustment among Hispanic adolescent boys', *Journal of Community Psychology*, vol. 22, no. 1, pp. 43–54.

Goldberg, DP, Gater, R, Sartorius, N, Ustun, TB, Piccinelli, M, Gureje, O et al. 1997, 'The validity of two versions of the GHQ in the WHO study of mental illness in general health care', *Psychological Medicine*, vol. 27, no. 1, pp. 191–7.

Gopalkrishnan, N 2018, 'Cultural diversity and mental health: considerations for policy and practice', *Frontiers in Public Health*, vol. 6, p. 179.

Gopalkrishnan, N & Babacan, H 2015, 'Cultural diversity and mental health', *Australasian Psychiatry*, vol. 23, no. 6_suppl, pp. 6–8.

Greenberg, J & Baron, R 1992, *Behaviour in organizations*, Allyn & Bacon, Boston.

Gudykunst, WB 1993, 'Toward a theory of effective interpersonal and intergroup communication: an anxiety/uncertainty management (AUM) perspective', in R Wiseman, & J. Koester (eds.), *Intercultural communication competence*, SAGE, Newbury Park, CA, pp. 33–71.

Gudykunst, WB 1998, 'Applying anxiety/uncertainty management (AUM) theory to intercultural adjustment training', *International Journal of Intercultural Relations*, vol. 22, no. 2, pp. 227–50.

Gudykunst, WB & Kim, YY 1997, *Communicating with strangers: an approach to intercultural communication*, McGraw-Hill, New York.

Gullestrup, J, Lequertier, B & Martin, G 2011, 'MATES in construction: impact of a multimodal, community-based program for suicide prevention in the construction industry', *International Journal of Environmental Research and Public Health*, vol. 8, no. 11, pp. 4180–96.

Haan, N 1977, *Coping and defending: processes of self-environment*, Academic Press, New York.

Haan, N 1993, 'The assessment of coping, defense, and stress', in L Goldberger & S Breznitz (eds.), *Handbook of stress: theoretical and clinical aspects*, 2nd edn, Free Press, New York, pp. 258–73.

Hair, JF, Black, WC, Babin, BJ & Anderson, RE 2010, *Multivariate data analysis*, Prentice Hall, Englewood Cliffs, NJ.

Hair, JF, Celsi, M, Money, AH, Samouel, P & Page, MJ 2016, *Essentials of business research methods*, 3rd edn, Sharpe, Armonk, NY.

Hair, JF, Hult, GTM, Ringle, C & Sarstedt, M 2017, *A primer on partial least squares structural equation modeling (PLS-SEM)*, 2nd edn, SAGE Publications, Los Angeles

Hair, JF, Ringle, CM & Sarstedt, M 2011, 'PLS-SEM: indeed a silver bullet', *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139–52.

Hair Jr, JF, Sarstedt, M, Ringle, CM & Gudergan, SP 2017, *Advanced issues in partial least squares structural equation modeling*, SAGE Publications.

Hallberg, UE, Johansson, G & Schaufeli, WB 2007, 'Type A behavior and work situation: associations with burnout and work engagement', *Scandinavian Journal of Psychology*, vol. 48, no. 2, pp. 135–42.

Hallowell, MR & Yugar-Arias, IF 2016, 'Exploring fundamental causes of safety challenges faced by Hispanic construction workers in the US using photovoice', *Safety Science*, vol. 82, pp. 199–211.

Hammer, MR, Gudykunst, WB & Wiseman, RL 1978, 'Dimensions of intercultural effectiveness: an exploratory study', *International Journal of Intercultural Relations*, vol. 2, no. 4, pp. 382–93.

Hancock, GR 2003, 'Fortune cookies, measurement error, and experimental design', *Journal of Modern Applied Statistical Methods*, vol. 2, no. 2, pp. 293–305.

Harpham, T, Reichenheim, M, Oser, R, Thomas, E, Hamid, N, Jaswal, S et al. 2003, 'Measuring mental health in a cost-effective manner', *Health Policy and Planning*, vol. 18, no. 3, pp. 344–9.

Harrison, RV 1978, 'Person–environment fit and job stress', in CL Cooper & R Paye (eds.), *Stress at work*, John Wiley & Sons, New York, pp. 175–205.

Hartel, C, Hanrahan, S & Cerin, E 2005, 'Developing the task and ego orientation at work questionnaire', *ANZAM*: *proceedings of the 19th Australian and New Zealand Academy of Management Conference,* ANZAM, Canberra, ACT.

Härtel, CE & Fujimoto, Y 2000, 'Diversity is not the problem—openness to perceived dissimilarity is', *Journal of Management & Organization*, vol. 6, no. 1, pp. 14–27.

Härtel, CE & Ma, RMM 2006, 'How emotions shape the processes and outcomes of cross cultural communication and negotiation: an affective events theory perspective', in Proceedings of the 48th Annual Meeting of the Academy of International Business, p. 143.

Havermans, BM, Brouwers, EP, Hoek, RJ, Anema, JR, van der Beek, AJ & Boot, CR 2018, 'Work stress prevention needs of employees and supervisors', *BMC Public Health*, vol. 18, no. 1, pp. 1–11.

Haynes, NS & Love, PED 2004, 'Psychological adjustment and coping among construction project managers', *Construction Management and Economics*, vol. 22, no. 2, pp. 129–40.

Haynes, SG, Levine, S, Scotch, NA, Feinleib, M & Kannel, WB 1978, 'The relationship of psychosocial factors to coronary heart disease in the Framingham study', *American Journal of Epidemiology*, vol. 107, no. 5, pp. 362–83.

Heaney, CA, House, JS, Israel, BA & Mero, RP 1995, 'The relationship of organizational and social coping resources to employee coping behaviour: a longitudinal analysis', *Work and Stress*, vol. 9, no. 4, pp. 416–31.

Heider, F 1958, *The psychology of interpersonal relations*, Wiley, New York.

Hendrix, WH, Ovalle, NK & Troxler, RG 1985, 'Behavioral and physiological consequences of stress and its antecedent factors', *Journal of Applied Psychology*, vol. 70, no. 1, pp. 188–201.

Henry, J 2005, 'The healthy organization', in ASG Antoniou & CL Cooper (eds.), *Research companion to organizational health psychology*, Edward Elgar, Cheltenham, pp. 382–91.

Henseler, J & Chin, WW 2010, 'A comparison of approaches for the analysis of interaction effects between latent variables using partial least squares path modeling', *Structural Equation Modeling*, vol. 17, no. 1, pp. 82–109.

Henseler, J, Ringle, CM & Sarstedt, M 2015, 'A new criterion for assessing discriminant validity in variance-based structural equation modeling', *Journal of the Academy of Marketing Science*, vol. 43, no. 1, pp. 115–35.

Henseler, J, Ringle, CM & Sinkovics, RR 2009, 'The use of partial least squares path modeling in international marketing', *Advances in International Marketing*, vol. 20, pp. 277–319.

Herrman, H & Jané-Llopis, E 2012, 'The status of mental health promotion', *Public Health Reviews*, vol. 34, no. 2, pp. 1–21.

Hoeymans, N, Garssen, AA, Westert, GP & Verhaak, PF 2004, 'Measuring mental health of the Dutch population: a comparison of the GHQ-12 and the MHI-5', *Health and Quality of Life Outcomes*, vol. 2, no. 1, pp. 1–6.

Hofstede, G, Hofstede, GJ & Minkov, M 2010, *Cultures and organizations: software of the mind*, 2nd edn, McGraw-Hill, New York.

Holahan, CJ, Moos, RH & Schaefer, JA 1996, 'Coping, stress resistance, and growth: conceptualizing adaptive functioning', in M Zeider & NS Endler (eds.), *Handbook of coping: theory, research, applications*, John Wiley & Sons, New York, pp. 24–43.

Hong, CC, Ramayah, T & Subramaniam, C 2018, 'The relationship between critical success factors, internal control and safety performance in the Malaysian manufacturing sector', *Safety Science*, vol. 104, pp. 179–88.

HSC 1993, *ACSNI study group on human factors. 3rd report: Organising for safety*, HMSO, London.

Hulland, J 1999, 'Use of partial least squares (PLS) in strategic management research: a review of four recent studies', *Strategic Management Journal*, vol. 20, no. 2, pp. 195–204.

Hwang, H & Takane, Y 2004, 'Generalized structured component analysis', *Psychometrika*, vol. 69, no. 1, pp. 81–99.

Iacobucci, D 2010, 'Structural equations modeling: Fit Indices, sample size, and advanced topics', *Journal of Consumer Psychology*, vol. 20, no. 1, pp. 90–8.

Ilies, R, Schwind, KM, Wagner, DT, Johnson, MD, DeRue, DS & Ilgen, DR 2007, 'When can employees have a family life? The effects of daily workload and affect on work–family conflict and social behaviors at home', *Journal of Applied Psychology*, vol. 92, no. 5, pp. 1368–79.

Incolink 2019, *Incolink Apprentice Guide*, viewed 09 January 2023, <https://d7kulbmmtvghi.cloudfront.net/images/Downloads/incolink-apprentice-guide.pdf>.

Ivancevich, JM, Matteson, MT & Preston, C 1982, 'Occupational stress, Type A behavior, and physical well being', *Academy of Management Journal*, vol. 25, no. 2, pp. 373–91.

Jackson, LT & Van De Vijver, FJ 2018, 'Multiculturalism in the workplace: Model and test', *SA Journal of Human Resource Management*, vol. 16, no. 1, pp. 1–15.

Jamal, M 1990, 'Relationship of job stress and Type-A behavior to employees' job satisfaction, organizational commitment, psychosomatic health problems, and turnover motivation', *Human Relations*, vol. 43, no. 8, pp. 727–38.

Jehn, KA, Northcraft, GB & Neale, MA 1999, 'Why differences make a difference: a field study of diversity, conflict and performance in workgroups', *Administrative Science Quarterly*, vol. 44, no. 4, pp. 741–63.

Johnson, JL, Cullen, JB, Sakano, T & Takenouchi, H 1996, 'Setting the stage for trust and strategic integration in Japanese–US cooperative alliances', *Journal of International Business Studies*, vol. 27, no. 5, pp. 981–1004.

Johnson, S, Cooper, C, Cartwright, S, Donald, I, Taylor, P & Millet, C 2005, 'The experience of work-related stress across occupations', *Journal of Managerial Psychology*, vol. 20, no. 2, pp. 178–87.

Joiner, J, Thomas, E & Walker, RL 2002, 'Construct validity of a measure of acculturative stress in African Americans', *Psychological Assessment*, vol. 14, no. 4, p. 462–6.

Joiner, TA 2001, 'The influence of national culture and organizational culture alignment on job stress and performance: evidence from Greece', *Journal of Managerial Psychology*, vol. 16, no. 3, pp. 229–42.

Jordan, PJ & Lawrence, SA 2009, 'Emotional intelligence in teams: development and initial validation of the short version of the Workgroup Emotional Intelligence Profile (WEIP-S)', *Journal of Management Organization*, vol. 15, no. 4, pp. 452–69.

Joubert, YT 2017, 'Workplace diversity in South Africa: Its qualities and management', *Journal of Psychology in Africa*, vol. 27, no, 4, pp. 367–371.

Kahn, RL, & Byosiere, P. 1992, 'Stress in organizations', in MD Dunnette & LM Hough (eds.), *Handbook of industrial and organizational psychology*, 2nd edn, vol. 3, Consulting Psychologists Press, Palo Alto, CA, pp. 571–650.

Kahn, RL, Wolfe, DM, Quinn, RP, Snoek, JD & Rosenthal, RA 1964, *Organizational stress: studies in role conflict and ambiguity*, Wiley, New York.

Kamardeen, I & Sunindijo, RY 2017, 'Personal characteristics moderate work stress in construction professionals', *Journal of Construction Engineering and Management*, vol. 143, no. 10.

Kanner, AD, Coyne, JC, Schaefer, C & Lazarus, RS 1981, 'Comparison of two modes of stress measurement: daily hassles and uplifts versus major life events', *Journal of Behavioral Medicine*, vol. 4, no. 1, pp. 1–39.

Kaplan, D 2008, *Structural equation modeling: foundations and extensions*, 2nd edn, SAGE Publications, Thousand Oaks, CA.

Karasek, JRA 1979, 'Job demands, job decision latitude, and mental strain: implications for job redesign', *Administrative Science Quarterly*, vol. 24, no. 2, pp. 285–308.

Karim, AU 2003, 'A developmental progression model for intercultural consciousness: a leadership imperative', *Journal of Education for Business*, vol. 79, no. 1, pp. 34–9.

Kelloway, EK & Day, AL 2005, 'Building healthy workplaces: what we know so far', *Canadian Journal of Behavioural Science*, vol. 37, no. 4, p. 223–235.

Keppel, G & Wickens, TD 2003, *Design and analysis: a researcher's handbook*, 4th edn, Prentice Hall, Englewood Cliffs, NJ.

Kessler, RC, Andrews, G, Colpe, LJ, Hiripi, E, Mroczek, DK, Normand, S-L et al. 2002, 'Short screening scales to monitor population prevalences and trends in non-specific psychological distress', *Psychological Medicine*, vol. 32, no. 6, pp. 959–76.

Kessler, RC, Barker, PR, Colpe, LJ, Epstein, JF, Gfroerer, JC, Hiripi, E et al. 2003, 'Screening for serious mental illness in the general population', *Archives of General Psychiatry*, vol. 60, no. 2, pp. 184–9.

Kessler, RC, Chiu, WT, Demler, O & Walters, EE 2005, 'Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication', *Archives of General Psychiatry*, vol. 62, no. 6, pp. 617–27.

Keyes, CLM 2009, 'Toward a science of mental health', in SJ Lopez & CR Snyder (eds.), *The Oxford handbook of positive psychology,* 2nd edn, Oxford University Press, New York, pp. 89–96.

King, J 2018, *Measuring mental health outcomes in built environment research–Choosing the right screening assessment tools*, Centre for Urban Design and Mental Health.

Kirkcaldy, BD, Cooper, CL & Furnham, A 1998, 'The relationship between type A, internality–externality, emotional distress and perceived health', *Personality and Individual Differences*, vol. 26, no. 2, pp. 223–35.

Kirkcaldy, BD, Furnham, A & Cooper, CL 1994, 'Police personality, jobs satisfaction and health', *Studia Psychologica*, vol. 36, no. 1, p. 55.

Kirkcaldy, BD, Shephard, RJ & Furnham, AF 2002, 'The influence of type A behaviour and locus of control upon job satisfaction and occupational health', *Personality and Individual Differences*, vol. 33, no. 8, pp. 1361–71.

Kissi, E, Babon-Ayeng, P & Agyekum, AK 2022, 'Benefits of multicultural project team setting: views of professionals in the Ghanaian construction industry', *EPiC Series in Built Environment*, vol. 3, pp. 110-120.

Kline, R 2011, *Principles and practice of structural equation modeling*, 3rd edn, Guilford Press, New York.

Kline, RB 2015, *Principles and practice of structural equation modeling*, 4th edn, Guilford Press, New York.

Koehler, M, Koenigsmann, M & Frommer, J 2009, 'Coping with illness and subjective theories of illness in adult patients with haematological malignancies: systematic review', *Critical Reviews in Oncology/Hematology*, vol. 69, no. 3, pp. 237–57.

Kornhauser, A 1965, *Mental health of the industrial worker: a Detroit study*, Wiley, New York.

Kroeber, AL & Kluckhohn, C 1952, *Culture: a critical review of concepts and definitions*, Peabody Museum, Cambridge, MA

Krohne, HW 2002, 'Stress and coping theories', in NJ Smelser & PB Baltes (eds), *International Encyclopedia of the Social and Behavioral Sciences*, vol. 22, pp. 15163–70.

Kumar, R 2014, *Research methodology: a step-by-step guide for beginners*, 4th edn, SAGE Publications, Los Angeles.

Kumar, R 2019, *Research methodology: a step-by-step guide for beginners*, 5th edn, SAGE Publications, Thousand Oaks, CA.

Kundu, SC 2001, 'Managing cross cultural diversity', *Delhi Business Review*, vol. 2, no. 2.

Kuo, BC 2014, 'Coping, acculturation, and psychological adaptation among migrants: a theoretical and empirical review and synthesis of the literature', *Health Psychology Behavioral Medicine: An Open Access Journal*, vol. 2, no. 1, pp. 16–33.

Kuoribo, E, Amoah, P, Kissi, E, Edwards, DJ, Gyampo, JA & Thwala, WD 2022, 'Analysing the effect of multicultural workforce/teams on construction productivity', *Journal of Engineering, Design and Technology*, ahead-of-print.

LaFromboise, T, Coleman, HL & Gerton, J 1993, 'Psychological impact of biculturalism: evidence and theory', *Psychological Bulletin*, vol. 114, no. 3, pp. 395–412.

LaMontagne, AD, Martin, A, Page, KM, Reavley, NJ, Noblet, AJ, Milner, AJ et al. 2014, 'Workplace mental health: developing an integrated intervention approach', *BMC Psychiatry*, vol. 14, no. 1, pp. 1–11.

Langdon, RR & Sawang, S 2018, 'Construction workers' well-being: what leads to depression, anxiety, and stress?', *Journal of Construction Engineering and Management*, vol. 144, no. 2, p. 04017100.

Lazarus, RS 1966, *Psychological stress and the coping process*, McGraw-Hill, New York.

Lazarus, RS & Folkman, S 1984, *Stress, appraisal, and coping*, Springer, New York.

Lazarus, RS & Folkman, S 1987, 'Transactional theory and research on emotions and coping', *European Journal of Personality*, vol. 1, no. 3, pp. 141–69.

Lazarus, RS & Launier, R 1978, 'Stress-related transactions between person and environment', in *Perspectives in Interactional Psychology*, Springer, Boston, MA, pp. 287–327.

Leiba-O'Sullivan, S 1999, 'The distinction between stable and dynamic cross-cultural competencies: Implications for expatriate trainability', *Journal of International Business Studies*, vol. 30, no. 4, pp. 709–25.

Leighton, A & Murphy, J 1961, 'Cultures as causative of mental disorder', *Milbank Memorial Fund Quarterly*, vol. 38, pp. 341–83.

Leitner, K & Resch, MG 2005, 'Do the effects of job stressors on health persist over time? A longitudinal study with observational stressor measures', *Journal of Occupational Health Psychology*, vol. 10, no. 1, pp. 18–30.

Leung, K, Ang, S & Tan, ML 2014, 'Intercultural competence', *Annual Review of Organizational Psychology and Organizational Behavior*, vol. 1, no. 1, pp. 489–519.

Leung, MY & Chan, IYS 2012, 'Exploring stressors of Hong Kong expatriate construction professionals in mainland China: focus group study', *Journal of Construction Engineering and Management*, vol. 138, no. 1, pp. 78–88.

Leung, MY, Chan, IYS & Cooper, CL 2015, *Stress management in the construction industry*, Wiley Blackwell, Chichester, UK.

Leung, MY, Chan, YS & Yu, J 2009, 'Integrated model for the stressors and stresses of construction project managers in Hong Kong', *Journal of Construction Engineering and Management*, vol. 135, no. 2, pp. 126–34.

Leung, MY, Chan, YS & Yuen, KW 2010, 'Impacts of stressors and stress on the injury incidents of construction workers in Hong Kong', *Journal of Construction Engineering and Management*, vol. 136, no. 10, pp. 1093–103.

Leung, MY, Liang, Q & Chan, IYS 2017, 'Development of a stressors–stress–performance–outcome model for expatriate construction professionals', *Journal of Construction Engineering and Management*, vol. 143, no. 5, p. 04016121.

Leung, MY, Ng, ST, Skitmore, M & Cheung, SO 2005, 'Critical stressors influencing construction estimators in Hong Kong', *Construction Management and Economics*, vol. 23, no. 1, pp. 33–43.

Leung, MY, Skitmore, M & Chan, YS 2007, 'Subjective and objective stress in construction cost estimation', *Construction Management and Economics*, vol. 25, no. 10, pp. 1063–75.

Leung, MY, Zhang, H & Skitmore, M 2008, 'Effects of organizational supports on the stress of construction estimation participants', *Journal of Construction Engineering and Management*, vol. 134, no. 2, pp. 84–93.

Lewin, K 1951, *Field theory in social science*, Harper & Row, New York.

Li, C, Li, H & Niu, J 2016, 'Intercultural stressors of Chinese immigrant students: voices of Chinese-American mental health professionals', *Asian American Journal of Psychology*, vol. 7, no. 1, pp. 64–73.

Li, H, Luo, X, Ke, X, Dai, Q, Zheng, W, Zhang, C et al. 2017, 'Major depressive disorder and suicide risk among adult outpatients at several general hospitals in a Chinese Han population', *PloS one*, vol. 12, no. 10, p. e0186143.

Liang, Q, Leung, MY & Cooper, C 2018, 'Focus group study to explore critical factors for managing stress of construction workers', *Journal of Construction Engineering and Management*, vol. 144, no. 5, p. 04018023.

Liang, Q, Leung, MY & Zhang, S 2021, 'Examining the critical factors for managing workplace stress in the construction industry: a cross-regional study', *Journal of Management in Engineering*, vol. 37, no. 5, p. 04021045.

Li, PP 2019, *Influences of risk tolerance, perception and safety climate on unsafe behaviour in construction: workers and managers*, thesis, Swinburne University of Technology Melbourne (Australia), viewed 06 May 2021, <https://researchbank.swinburne.edu.au/file/9b98ed0f-82c9-44b5-82a0-8533224c3075/1/Pengpeng%20Li%20Thesis.pdf>.

Ling, FYY, Dulaimi, MF & Chua, M 2013, 'Strategies for managing migrant construction workers from China, India, and the Philippines', *Journal of Professional Issues in Engineering Education and Practice*, vol. 139, no. 1, pp. 19–26.

Lingard, H & Sublet, A 2002, 'The impact of job and organizational demands on marital or relationship satisfaction and conflict among Australian civil engineers', *Construction Management and Economics*, vol. 20, no. 6, pp. 507–21.

Lingard, H & Turner, M 2017, 'Promoting construction workers' health: a multi-level system perspective', *Construction Management and Economics*, vol. 35, no. 5, pp. 239–53.

Little, TD, Bovaird, JA & Widaman, KF 2006, 'On the merits of orthogonalizing powered and product terms: implications for modeling interactions among latent variables', *Structural equation modeling*, vol. 13, no. 4, pp. 497–519.

Liu, Q, Ye, G & Feng, Y 2019, 'Workers' safety behaviors in the off-site manufacturing plant', *Engineering, Construction and Architectural Management*, vol. 27, no. 3, pp. 765–84.

Livneh, H & Martz, E 2007, 'An introduction to coping theory and research', in E Martz & H Livneh (eds.), *Coping with chronic illness and disability: theoretical, empirical, and clinical aspects*, Springer, New York, pp. 3–27.

Lleras, C 2005, 'Path analysis', *Encyclopedia of Social Measurement*, vol. 3, no. 1, pp. 25–30.

Lloyd, S & Hartel, C 2010, 'Intercultural competencies for culturally diverse work teams', *Journal of Managerial Psychology*, vol. 25, no. 8, pp. 845–75.

Lofquist, LH & Dawis, RV 1969, *Adjustment to work*, Appleton-Century-Crofts, New York.

Logan, S, Steel, Z & Hunt, C 2014, 'A systematic review of effective intercultural communication in mental health', *Cross-Cultural Communication*, vol. 10, no. 5, pp. 1–11.

Logan, SL 2019, *Cognitive appraisal and coping in vicarious traumatization: a theoretical framework and recommendations for supervisors*, dissertation, Chester, PA, Widener University.

Lohmöller, J-B 1989, *Latent variable path modeling with partial least squares*, Springer Science & Business Media, Heidelberg, Germany.

Loosemore, M, Alkilani, SZ & Hammad, AWA 2021, 'The job-seeking experiences of migrants and refugees in the Australian construction industry', *Building Research & Information*, vol. 49, no. 8, pp. 912–29.

Loosemore, M & Chau, DW 2002, 'Racial discrimination towards Asian operatives in the Australian construction industry', *Construction Management and Economics*, vol. 20, no. 1, pp. 91–102.

Loosemore, M & Lam, ASY 2004, 'The locus of control: a determinant of opportunistic behaviour in construction health and safety', *Construction Management and Economics*, vol. 22, no. 4, pp. 385–94.

Loosemore, M & Lee, P 2002, 'Communication problems with ethnic minorities in the construction industry', *International Journal of Project Management*, vol. 20, no. 7, pp. 517–24.

Loosemore, M, Phua, F, Dunn, K & Ozguc, U 2010, 'Operatives' experiences of cultural diversity on Australian construction sites', *Construction Management and Economics*, vol. 28, no. 2, pp. 177–88.

Loosemore, M, Phua, FTT, Dunn, K & Ozguc, U 2011, 'The politics of sameness in the Australian construction industry: comparing operative and manager attitudes towards

cultural diversity', *Engineering, Construction and Architectural Management*, vol. 18, no. 4, pp. 363–80.

Love, PE & Edwards, DJ 2005, 'Taking the pulse of UK construction project managers' health', *Engineering, Construction Architectural Management*, vol. 12, no. 1, pp. 88–101.

Love, PED, Edwards, DJ & Irani, Z 2010, 'Work stress, support, and mental health in construction', *Journal of Construction Engineering Management*, vol. 136, no. 6, pp. 650–8.

Lovibond, PF & Lovibond, SH 1995, 'The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories', *Behaviour Research Therapy*, vol. 33, no. 3, pp. 335–43.

MacDonald, AP 1973, 'Internal-external locus of control', in JP Robinson & PR Shaver (eds.), *Measures of social psychological attitudes*, Institute for Social Research, The University of Michigan, Ann Arbor, MI.

Macionis, JJ & Gerber, L 1999, *Sociology*, Prentice Hall Allyn and Bacon, Scarborough, Ontario.

Maheen, H, LaMontagne, AD & King, T 2020, *Suicide in the construction industry: 2001–2018*, MATES in Construction, Melbourne.

Maqsoom, A, Mughees, A, Khan, AK & Arif, MI 2018, 'Labor Productivity in Construction Industry: Investigating the Influence of Internal Psychosocial Stressors', in *ICCREM 2018: analysis of real estate and the construction industry – proceedings of the international conference on construction and real estate management 2018*, American Society of Civil Engineers (ASCE), pp. 10–7, viewed 08 May 2021, Scopus.

Marsella, AJ 1985, 'Culture, self, and mental disorder', in AJ Marsella, G DeVos & E Hsu (eds.), *Culture and self: Asian and Western perspectives*, Tavistock Press, London, pp. 281–308.

Marsella, AJ 1987, 'The measurement of depressive experience and disorder across cultures', in AJ Marsella, R Hirtschfeld & M Katz (eds.), *The measurement of depression*, Guilford Press, New York, pp. 376–97.

Marsella, AJ 1998, 'Urbanization, mental health, and social deviancy: a review of issues and research', *American Psychologist*, vol. 53, no. 6, pp. 624–34.

Marsella, AJ, Austin, A & Grant, B 2005, *Cultures in transition: Social change and psychosocial adaptation in the Pacific Islands*, Springer, New York.

Marsella, AJ & Scheuer, A 1993, 'Coping: definitions, conceptualizations, and issues', *Integrative Psychiatry*, vol. 9, pp. 124–34.

Marsella, AJ & Yamada, AM 2000, 'Culture and mental health: an introduction and overview of foundations, concepts, and issues', in I Cuéllar & FA Paniagua (eds.), *Handbook of multicultural mental health*, Academic Press, San Diego, pp. 3–24.

Martin, G, Swannell, S, Milner, A & Gullestrup, J 2016, 'Mates in Construction suicide prevention program: a five year review', *Journal of Community Medicine & Health Education*, vol. 6, no. 465, pp. 2161–711.

Maslach, C, Schaufeli, WB & Leiter, MP 2001, 'Job burnout', *Annual Review of Psychology*, vol. 52, no. 1, pp. 397–422.

MATES in Construction 2018, *The Australian Building and Construction Industry – blueprint for better mental health and suicide prevention 2018–2022*, viewed 18 June 2020, <https://www.constructionblueprint.com.au/wp-content/uploads/Blueprint-for-Better-Mental-Health-Report.pdf>.

MATES in Construction 2020, viewed 21 April 2020, <http://matesinconstruction.org.au/>.

Matsudaira, T 2006, 'Measures of psychological acculturation: a review', *Transcultural Psychiatry*, vol. 43, no. 3, pp. 462–87.

Matthews, KA 1982, 'Psychological perspectives on the type A behavior pattern', *Psychological Bulletin*, vol. 91, no. 2, pp. 293–323.

McCord, AL, Draucker, CB & Bigatti, S 2019, 'Cultural stressors and depressive symptoms in Latino/a adolescents: an integrative review', *Journal of the American Psychiatric Nurses Association*, vol. 25, no. 1, pp. 49–65.

McCrae, RR 1984, 'Situational determinants of coping responses: loss, threat, and challenge', *Journal of Personality and Social Psychology*, vol. 46, no. 4, pp. 919–28.

McGrath, JE 1976, 'Stress and behavior in organizations', in MD Dunnette (ed.), *Handbook of industrial and organizational psychology*, Rand McNally, Chicago, IL.

McLain, D 1993, 'The Mstat-I: a new measure of an individual'S tolerance for ambiguity', *Educational and Psychological Measurement*, vol. 53, no. 1, pp. 183–9.

Menninger, K 1954, 'Regulatory devices of the ego under major stress', *International Journal of Psycho-Analysis*, vol. 35, no. 4, pp. 412–20.

Migowski, ER, Oliveira Júnior, N, Riegel, F & Migowski, SA 2018, 'Interpersonal relationships and safety culture in Brazilian health care organisations', *Journal of Nursing Management*, vol. 26, no. 7, pp. 851–7.

Milner, A 2016, *Suicide in the construction industry: Report by Deakin University for MATES in Construction*, viewed 20 June 2020, <http://micaus. bpndw46jvgfycmdxu. maxcdn-edge. com/wpcontent/uploads//11/MIC-Annual-suicide-report-MIC-and-Deakin-University. pdf>.

Milner, A & Law, PCF 2017, *Summary report: mental health in the construction industry*, University of Melbourne, Melbourne.

Minchin, J, Edward, R, Glagola, CR, Guo, K & Languell, JL 2006, 'Case for drug testing of construction workers', *Journal of Management in Engineering*, vol. 22, no. 1, pp. 43–50.

Moieni, R, Mousaferiadis, P & Sorezano, CO 2017, 'A practical approach to measuring cultural diversity on Australian organizations and schools', *International Journal of Social Science and Humanity*, vol. 7, no. 12, pp. 735–739.

Montazeri, A, Harirchi, AM, Shariati, M, Garmaroudi, G, Ebadi, M & Fateh, A 2003, 'The 12-item General Health Questionnaire (GHQ-12): translation and validation study of the Iranian version', *Health and Quality of Life Outcomes*, vol. 1, no. 1, pp. 1–4.

Moser, CA & Kalton, G 1989, *Survey methods in social investigation*, 2nd edn, Gower, Aldershot.

Moss, R 1993, 'Coping Responses Inventory–adult form professional manual*'*, Psychological Assessments, Inc, Odessa, FL.

Motowidlo, SJ, Packard, JS & Manning, MR 1986, 'Occupational stress: its causes and consequences for job performance', *Journal of Applied Psychology*, vol. 71, no. 4, pp. 618–629.

Murphy, SA 2000, *Mental health and the workplace: a multidisciplinary examination of the individual and organizational antecedents and outcomes of stress, anxiety and depressed mood*, thesis, Canada, Carleton University.

Murray, HA 1959, 'Preparations for the scaffold of a comprehensive system', in S Koch (ed.), *Psychology: a study of a science*, vol. 3, McGraw-Hill, New York, pp. 7–54.

Nair, RL, White, RMB, Roosa, MW & Zeiders, KH 2013, 'Cultural stressors and mental health symptoms among Mexican Americans: a prospective study examining the impact of the family and neighborhood context', *Journal of Youth and Adolescence*, vol. 42, no. 10, pp. 1611–23.

Naoum, SG, Herrero, C, Egbu, C & Fong, D 2018, 'Integrated model for the stressors, stress, stress-coping behaviour of construction project managers in the UK', *International Journal of Managing Projects in Business*, vol. 11, no. 3, pp. 761–82.

Neisser, U 1976, *Cognition and reality*, Freeman, San Francisco.

Netsereab, TB, Kifle, MM, Tesfagiorgis, RB, Habteab, SG, Weldeabzgi, YK & Tesfamariam, OZ 2018, 'Validation of the WHO self-reporting questionnaire-20 (SRQ-20) item in primary health care settings in Eritrea', *International Journal of Mental Health Systems*, vol. 12, no. 1, pp. 1–9.

Neuman, W 2013, *Social research methods: qualitative and quantitative approaches*, Pearson Education UK, Harlow.

New York City Department of Health and Mental Hygiene 2003, *There is no health without mental health*, NYC Vital Signs, viewed 06 May 2022, <www.nyc.gov/health/survey.>.

Newton, TJ & Keenan, A 1990, 'The moderating effect of the Type A behavior pattern and locus of control upon the relationship between change in job demands and change in psychological strain', *Human Relations*, vol. 43, no. 12, pp. 1229–55.

Ng, ST, Skitmore, RM & Leung, TKC 2005, 'Manageability of stress among construction project participants', *Engineering, Construction and Architectural Management*, vol. 12, no. 3, pp. 264–82.

Nunnally, JC & Bernstein, IH 1994, 'The assessment of reliability', *Psychometric Theory*, vol. 3, pp. 248–92.

Nwaogu, JM, Chan, AP, Hon, CK & Darko, A 2019, 'Review of global mental health research in the construction industry: a science mapping approach', *Engineering, Construction and Architectural Management*, vol. 27, no. 2, pp. 385–410.

Nwaogu, JM, Chan, AP & Naslund, JA 2022, 'Measures to improve the mental health of construction personnel based on experts' opinion', *Journal of Management in Engineering*, vol. 38, no. 4, p. 04022019.

Nwaogu, JM, Chan, AP & Tetteh, MO 2022, 'Staff resilience and coping behavior as protective factors for mental health among construction tradesmen', *Journal of Engineering, Design and Technology*, vol. 20, no. 3, pp. 671–95.

Office for National Statistics 2017, *Sickness absence in the labour market: 2016*, Office for National Statistics, Newport, UK.

Office for National Statistics 2018, *Migrant labour force within the UK's construction industry: August 2018*, viewed July 26 2022, <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/int ernationalmigration/articles/migrantlabourforcewithintheconstructionindustry/august2 018>.

Okubo, Y, Natsume, S, Usui, K, Amaya, M & Tsuboi, R 2011, 'Low-dose, short-term ciclosporin (Neoral®) therapy is effective in improving patients' quality of life as assessed by Skindex-16 and GHQ-28 in mild to severe psoriasis patients', *The Journal of Dermatology*, vol. 38, no. 5, pp. 465–72.

Omeje, HO, Okereke, GKO, Asogwa, JO, Obe, PI, Nwaodo, SI, Ariyo, SO et al. 2021, 'Occupational stress among Nigerian construction trade artisans in the building construction sector: An intervention study', *Medicine*, vol. 100, no. 20, p. e26028.

Palmer, KT, D'Angelo, S, Harris, EC, Linaker, C & Coggon, D 2014, 'The role of mental health problems and common psychotropic drug treatments in accidental injury at work: a case–control study', *Occupational and Environmental Medicine*, vol. 71, no. 5, pp. 308–12.

Pan, J-Y, Fu Keung Wong, D, Joubert, L & Chan, CLW 2007, 'Acculturative stressor and meaning of life as predictors of negative affect in acculturation: a cross-cultural comparative study between Chinese international students in Australia and Hong Kong', *Australian New Zealand Journal of Psychiatry*, vol. 41, no. 9, pp. 740–50.

Pancer, SM, Hunsberger, B, Pratt, MW & Alisat, S 2000, 'Cognitive complexity of expectations and adjustment to university in the first year', *Journal of Adolescent Research*, vol. 15, no. 1, pp. 38–57.

Park, H, Sprince, NL, Lewis, MQ, Burmeister, LF, Whitten, PS & Zwerling, C 2001, 'Risk factors for work-related injury among male farmers in Iowa: a prospective cohort study', *Journal of Occupational and Environmental Medicine*, vol. 43, no. 6, pp. 542–7.

Parkes, KR, Mendham, CA & von Rabenau, C 1994, 'Social support and the demand–discretion model of job stress: Tests of additive and interactive effects in two samples', *Journal of Vocational Behavior*, vol. 44, no. 1, pp. 91–113.

Pasca, R & Wagner, SL 2011, 'Occupational stress in the multicultural workplace', *Journal of Immigrant and Minority Health*, vol. 13, no. 4, pp. 697–705.

Patton, MQ 1990, *Qualitative evaluations and research methods*, 2nd edn, SAGE Publications, Newbury Park, CA.

Pearl, J 2012, 'The causal foundations of structural equation modeling', in RH Hoyle (ed.), *Handbook of structural equation modeling*, Guilford Press, New York, pp. 68–91.

Pettersson, A, Modin, S, Wahlström, R, af Winklerfelt Hammarberg, S & Krakau, I 2018, 'The Mini-International Neuropsychiatric Interview is useful and well accepted as part of the clinical assessment for depression and anxiety in primary care: a mixed-methods study', *BMC =Family Practice*, vol. 19, no. 1, pp. 1–13.

Pevalin, DJ 2000, 'Multiple applications of the GHQ-12 in a general population sample: an investigation of long-term retest effects', *Social Psychiatry and Psychiatric Epidemiology*, vol. 35, no. 11, pp. 508–12.

Pidd, K, Duraisingam, V, Roche, A & Trifonoff, A 2017, 'Young construction workers: substance use, mental health, and workplace psychosocial factors', *Advances in Dual Diagnosis*, vol. 10, no. 4, pp. 155–68.

Pless, NM & Maak, T 2004, 'Building an inclusive diversity culture: principles, processes and practice', *Journal of Business Ethics*, vol. 54, no. 2, pp. 129–147.

Prince, M, Patel, V, Saxena, S, Maj, M, Maselko, J, Phillips, MR et al. 2007, 'No health without mental health', *The Lancet*, vol. 370, no. 9590, pp. 859–77.

Prochaska, JJ, Sung, HY, Max, W, Shi, Y & Ong, M 2012, 'Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization', *International Journal of Methods in Psychiatric Research*, vol. 21, no. 2, pp. 88–97.

Radnitz, CL & Tiersky, L 2007, 'Psychodynamic and cognitive theories of coping', in E Martz & H Livneh (eds.), *Coping with chronic illness and disability: theoretical, empirical, and clinical aspects*, Springer, Boston, MA, pp. 29–48.

Rahman, RRRA, Aman, O, Adnan, H, Ahmad, MA & Darus, NM 2014, 'Factors of relationship between occupational stress, developing training needs and performance enhancement of SMEs' Employees in Melaka', *International Journal of Economics, Finance and Management*, vol. 3, no. 4, pp. 183–96.

Ralston, DA, Gustafson, DJ, Cheung, FM & Terpstra, RH 1993, 'Differences in managerial values: a study of US, Hong Kong and PRC managers', *Journal of International Business Studies*, vol. 24, no. 2, pp. 249–75.

Ramayah, T, Cheah, J, Chuah, F, Ting, H & Memon, MA 2018, *Partial least squares structural equation modeling (PLS-SEM) using smartPLS 3.0: an updated and practical guide to statistical analysis*, 2nd edn, Pearson, Kuala Lumpur, Malaysia.

Rees-Evans, D 2020, *Understanding mental health in the built environment*, Chartered Institute of Building (CIOB), Bracknell, UK.

Riedel, J, Wiesmann, U & Hannich, HJ 2011, 'An integrative theoretical framework of acculturation and salutogenesis', *International Review of Psychiatry*, vol. 23, no. 6, pp. 555–64.

Rigdon, EE, Ringle, CM & Sarstedt, M 2010, 'Structural modeling of heterogeneous data with partial least squares', in NK Malhotra (ed.), *Review of marketing research*, Sharpe, Armonk, NY, pp. 255–96.

Ringle, C, Wende, S & Becker, J 2015, *SmartPLS 3*, SmartPLS GmbH, Boenningstedt.

Ringle, CM, Sarstedt, M & Straub, DW 2012, 'Editor's comments: a critical look at the use of PLS-SEM in"MIS Quarterly"', *MIS Quarterly*, vol. 36, no. 1, pp. iii–xiv.

Robbins, SP 1983, *Organization theory: the structure and design of organizations*, Prentice Hall, Englewood Cliffs, NJ.

Roberts, JA, Lapidus, RS & Chonko, LB 1997, 'Salespeople and stress: the moderating role of locus of control on work stressors and felt stress', *Journal of Marketing Theory and Practice*, vol. 5, no. 3, pp. 93–108.

Robertson, IT, Cooper, CL, Williams, J & Williams, J 1990, 'The validity of the occupational stress indicator', *Work and Stress*, vol. 4, no. 1, pp. 29–39.

Robson, D & Gray, R 2007, 'Serious mental illness and physical health problems: a discussion paper', *International Journal of Nursing Studies*, vol. 44, no. 3, pp. 457–66.

Rock, B, Catherin, N, Mathew, T, Navshin, S, Kurian, H, Sherrin, S et al. 2016, 'Alcohol use and mental health among migrant workers', *Indian Journal of Public Health Research and Development*, vol. 7, no. 4, pp. 169–73.

Rodell, JB, & Judge, TA 2009, 'Can "good" stressors spark "bad" behaviors? The mediating role of emotions in links of challenge and hindrance stressors with citizenship and counterproductive behaviors', *Journal of Applied Psychology*, vol. 94, no. 6, pp. 1438–51.

Rosenblatt, V 2011, 'The impact of institutional processes, social networks, and culture on diffusion of global work values in multinational organizations', *Cross Cultural Management: An International Journal*, vol. 18, no. 1, pp. 105–21.

Rotter, JB 1954, *Social learning and clinical psychology*, Prentice Hall, New York.

Rotter, JB 1966, 'Generalized expectancies for internal versus external control of reinforcement', *Psychological Monographs*, vol. 80, no. 1, pp. 1–28.

Roussi, P & Vassilaki, E 2001, 'The applicability of the multiaxial model of coping to a Greek population', *Anxiety, Stress & Coping*, vol. 14, no. 2, pp. 125–47.

Sadeghniiat-Haghighi, K & Yazdi, Z 2015, 'Fatigue management in the workplace', *Industrial Psychiatry Journal*, vol. 24, no. 1, pp. 12–17.

Salancik, GR & Pfeffer, J 1978, 'A social information processing approach to job attitudes and task design', *Administrative Science Quarterly*, vol. 23, no. 2, pp. 224–53.

Sam, DL & Berry, JW 2010, 'Acculturation: when individuals and groups of different cultural backgrounds meet', *Perspectives on Psychological Science*, vol. 5, no. 4, pp. 472–81.

Sandhu, MA & Khan, A 2018, 'Improving performance of construction projects: multi-cultural perspective', *International Journal of Business Excellence*, vol. 14, no. 1, pp. 87–100.

Sang, K, Dainty, A & Ison, S 2007, 'Warning: working in construction may be harmful to your psychological well-being!', in A Dainty, S Green & B Bahilhole (eds.), *People and Culture in Construction: A Reader*, Taylor & Francis, London, pp. 127–43.

Särndal, C-E, Swensson, B & Wretman, J 2003, *Model assisted survey sampling*, Springer, New York.

Sarstedt, M, Hair Jr, JF, Cheah, J-H, Becker, J-M & Ringle, CM 2019, 'How to specify, estimate, and validate higher-order constructs in PLS-SEM', *Australasian Marketing Journal*, vol. 27, no. 3, pp. 197–211.

Sartorius, N & Janca, A 1996, 'Psychiatric assessment instruments developed by the World Health Organization', *Social Psychiatry and Psychiatric Epidemiology*, vol. 31, no. 2, pp. 55–69.

Schäfer, SK, Sopp, MR, Staginnus, M, Lass-Hennemann, J & Michael, T 2020, 'Correlates of mental health in occupations at risk for traumatization: a cross-sectional study', *BMC Psychiatry*, vol. 20, no. 1, pp. 1–14.

Schinke, SP & Gilchrist, L 1993, 'Ethics in research', in RM Grinnell (ed.), *Social work, research and* evaluation, 4th edn, FE Peacock, Itasca, IL.

Schmitz, P 1992, 'Acculturation styles and health', in S Iwawaki, Y Kashima & K Leung (eds.), *Innovations in cross-cultural psychology*, Swets and Zeitlinger, Amsterdam, pp. 360–70.

Schmitz, P 2003, 'Psychosocial factors of immigration and emigration: an introduction', in L Adler & U Gielen (eds.), *Migration: immigration and emigration in international perspective*, Praeger, Westport, CT, pp. 23–50.

Schonfeld, IS 1992, 'A longitudinal study of occupational stressors and depressive symptoms in first-year female teachers', *Teaching and Teacher Education*, vol. 8, no. 2, pp. 151–8.

Schreiber, JB, Nora, A, Stage, FK, Barlow, EA & King, J 2006, 'Reporting structural equation modeling and confirmatory factor analysis results: a review', *The Journal of Educational Research*, vol. 99, no. 6, pp. 323–38.

Schwartz, SJ, Unger, JB, Baezconde-Garbanati, L, Zamboanga, BL, Lorenzo-Blanco, EI, Des Rosiers, SE et al. 2015, 'Trajectories of cultural stressors and effects on mental health and substance use among Hispanic immigrant adolescents', *Journal of Adolescent Health*, vol. 56, no. 4, pp. 433–9.

Schwarzer, R 2000, 'Manage stress at work through preventive and proactive coping', in EA Locke (ed.), *The Blackwell handbook of principles of organizational behavior*, Blackwell, Oxford, pp. 342–55.

Scott-Young, CM, Turner, M & Holdsworth, S 2018, 'Fit for work? Comparative mental health of built environment undergraduates', *Proceeding of the 34th Annual ARCOM Conference, ARCOM 2018*. Association of Researchers in Construction Management, pp. 331–40, viewed 16 December 2020, Scopus.

Seaman, CE 1995, 'Real world research–a resource for social scientists and practitioner-researchers', *British Food Journal*, vol. 97, no. 10, p. 44.

Seligman, M 1992, *Helplessness: on depression, development, and death*, Freeman, New York.

Seligman, ME 2002, 'Positive psychology, positive prevention, and positive therapy', in CR Snyder & SJ Lopez (eds.), *Handbook of positive psychology*, Oxford University Press, New York, pp. 3–12.

Seligman, ME 2008, 'Positive health', *Applied Psychology: An International Review*, vol. 57, no. s1, pp. 3–18.

Seligman, ME & Csikszentmihalyi, M 2014, 'Positive psychology: an introduction', in *Flow and the foundations of positive psychology*, Springer, Dordrecht, pp. 279–98.

Selye, H 1975, 'Confusion and controversy in the stress field', *Journal of Human Stress*, vol. 1, no. 2, pp. 37–44.

Sheehan, DV, Lecrubier, Y, Sheehan, KH, Amorim, P, Janavs, J, Weiller, E et al. 1998, 'The Mini-International Neuropsychiatric Interview (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10', *Journal of Clinical Psychiatry*, vol. 59, no. 20, pp. 22–33.

Shiely, J-C, Bayliss, MS & Keller, SD 1997, *SF-36 Health Survey annotated bibliography*, The Health Institute, New England Medical Centre, Boston, MA.

Shin, E-S, Shin, T-S & Cho, Y-C 2016, 'Relationship of type A behavior pattern and psychosocial stress with fatigue symptoms in manufacturing workers', *Indian Journal of Science and Technology*, vol. 9, no. 39, p. 103237.

Shin, S & Lee, E 2021, 'Relationships among the internal health locus of control, mental health problems, and subjective well-being of adults in South Korea', *Healthcare*, vol. 9, no. 11, p. 1588.

Sin, NL & Lyubomirsky, S 2009, 'Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis', *Journal of Clinical Psychology*, vol. 65, no. 5, pp. 467–87.

Singh, B, Winkel, DE & Selvarajan, TT 2013, 'Managing diversity at work: does psychological safety hold the key to racial differences in employee performance?', *Journal of Occupational and Organizational Psychology*, vol. 86, no. 2, pp. 242–63.

Siniavskaia, N 2020, 'Immigrant workers in the construction labor force', *Special Studies*, March 3, NAHB Economics and Housing Policy Group.

Skaalvik, EM 1997, 'Self-enhancing and self-defeating ego orientation: relations with task and avoidance orientation, achievement, self-perceptions, and anxiety', *Journal of Educational Psychology*, vol. 89, no. 1, pp. 71–81.

Skinner, E & Wellborn, J 1994, 'Coping during childhood and adolescence: a motivational perspective', in D Featherman, R Lerner & M Perlmutter (eds.), *Life-span development and behavior*, 12 vols, Erlbaum, Hillsdale, NJ, pp. 91–133.

Skinner, EA & Zimmer-Gembeck, MJ 2007, 'The development of coping', *Annual Review of Psychology*, vol. 58, pp. 119–44.

Smith, KK, Kaminstein, DS & Makadok, RJ 1995, 'The health of the corporate body: illness and organizational dynamics', *The Journal of Applied Behavioral Science*, vol. 31, no. 3, pp. 328–51.

Snyder, C & Dinhoff, B 1999, 'Coping: where have you been?', in C Snyder (ed.), *Coping: the psychology of what works*, Oxford University Press, New York, pp. 3–19.

Snyder, H 2019, 'Literature review as a research methodology: an overview and guidelines', *Journal of business research*, vol. 104, pp. 333–339.

Song, E 2009, 'Coping with intercultural transactions in multicultural societies', *Social Behavior and Personality: an International Journal*, vol. 37, no. 2, pp. 273–87.

Sonnentag, S & Frese, M 2013, 'Stress in organizations', in IB Weiner (ed.), *Handbook of Psychology*, 2nd edn, John Wiley & Sons, Inc, Hoboken, NJ, pp. 560–92.

Spector, PE 2002, 'Employee control and occupational stress', *Current Directions in Psychological Science*, vol. 11, no. 4, pp. 133–6.

Spitzberg, BH 1983, 'Communication competence as knowledge, skill, and impression', *Communication Education*, vol. 32, no. 3, pp. 323–9.

Starren, A, Luijters, K, Drupsteen, L, Vilkevicius, G, Stulginskis, A, Eeckelaert, L et al. 2013, *Diverse cultures at work: ensuring safety and health through leadership and participation*, European Agency for Safety and Health at Work, Bilbao, Spain.

Statista 2020, *Number of foreign construction workers employed in Singapore from 2013 to 2019*, viewed 30 May 2022, <https://www.statista.com/statistics/1054354/singapore-foreign-construction-workers-employed/>.

Statista 2021, *Distribution of educational attainment level among employees in the construction industry in Australia as of May 2021*, viewed 09 January 2023. <https://www.statista.com/statistics/788314/australia-educational-attainment-level-in-the-construction-industry/>.

Steele, A & Sodhi, D 2006, 'Race, ethnic minorities and construction industry', in AW Gale & MJ Davidson (eds.), *Managing diversity equality in construction: initiatives and practice,* Taylor Francis, London, pp. 195–208.

Stein, GL, Gonzalez, LM & Huq, N 2012, 'Cultural stressors and the hopelessness model of depressive symptoms in Latino adolescents', *Journal of Youth Adolescence*, vol. 41, no. 10, pp. 1339–49.

Stein, N, Folkman, S, Trabasso, T & Richards, TA 1997, 'Appraisal and goal processes as predictors of psychological well-being in bereaved caregivers', *Journal of Personality and Social Psychology*, vol. 72, no. 4, pp. 872–84.

Stevenson, D & Farmer, P 2017, *Thriving at work: the Stevenson/Farmer review of mental health and employers*, Department for Work and Pensions and Department of Health, London.

Streiner, DL 2005, 'Finding our way: an introduction to path analysis', *The Canadian Journal of Psychiatry*, vol. 50, no. 2, pp. 115–22.

Suicide Mortality Review Committee 2016, 'Ngā Rāhui Hau Kura: Suicide Mortality Review Committee feasibility study 2014–15. report to the Ministry of Health, 31 May 2016', Suicide Mortality Review Committee, Wellington, New Zealand.

Sun, C, Hon, CK, Way, KA, Jimmieson, NL & Xia, B 2022, 'The relationship between psychosocial hazards and mental health in the construction industry: a meta-analysis', *Safety Science*, vol. 145, p. 105485.

Sunderland, M, Slade, T, Stewart, G & Andrews, G 2011, 'Estimating the prevalence of DSM-IV mental illness in the Australian general population using the Kessler Psychological Distress Scale', *Australian & New Zealand Journal of Psychiatry*, vol. 45, no. 10, pp. 880–9.

Sunidijo, RY & Kamardeen, I 2020 'Psychological challenges confronting graduate construction students in Australia', *International Journal of Construction Education and Research*, vol. 16, no. 3, pp. 151–166.

Sunindijo, RY & Zou, PX 2012, 'Political skill for developing construction safety climate', *Journal of Construction Engineering and Management*, vol. 138, no. 5, pp. 605–12.

Sutherland, V & Davidson, MJ 1989, 'Stress among construction site managers—a preliminary study', *Stress Medicine*, vol. 5, no. 4, pp. 221–35.

Tajfel, H & Turner, JC 1986, 'The social identity theory of inter-group behavior', in S Worchel & WG Austin (eds.), *Psychology of intergroup relations*, Nelson-Hall, Chicago, IL, pp. 7–24.

Tang, SF & Kirkbride, PS 1986, 'Developing conflict management skills in Hong Kong: an analysis of some cross-cultural implications', *Management Education and Development*, vol. 17, no. 3, pp. 287–301.

Tenenhaus, M, Vinzi, VE, Chatelin, Y-M & Lauro, C 2005, 'PLS path modeling', *Computational Statistics and Data Analysis*, vol. 48, no. 1, pp. 159–205.

Tijani, B, Jin, X & Osei-kyei, R 2021, 'A systematic review of mental stressors in the construction industry', *International Journal of Building Pathology and Adaptation*, vol. 39, no. 2, pp. 433–60.

Tjosvold, D, Chen, Y & Yu, Z-y 2003, *Conflict management for individual problem solving and team innovation in China*, viewed 20 December 2020, < https://papers.ssrn.com/sol3/papers.cfm?abstract_id=400460 >.

Torraco, RJ 2005, 'Writing integrative literature reviews: guidelines and examples', *Human Resource Development Review*, vol. 4, no. 3, pp. 356–367.

Torres, L & Rollock, D 2007, 'Acculturation and depression among Hispanics: the moderating effect of intercultural competence', *Cultural Diversity and Ethnic Minority Psychology*, vol. 13, no. 1, pp. 10–17.

Trinh, MT 2018, *Developing resilient safety culture for construction projects in Vietnam*, thesis, Ann Arbor, Western Sydney University (Australia), viewed 25 March 2022, ProQuest Dissertations & Theses A&I, <https://researchdirect.westernsydney.edu.au/islandora/object/uws%3A50145/datastream/PDF/view>.

Trinh, MT, Feng, Y & Mohamed, S 2019, 'Framework for measuring resilient safety culture in Vietnam's construction environment', *Journal of Construction Engineering and Management*, vol. 145, no. 2.

Turner, M & Lingard, H 2020, 'Examining the interaction between bodily pain and mental health of construction workers', *Construction Management and Economics*, vol. 38, no. 11, pp. 1–15.

USDHHS [US Department of Health and Human Services] 2001, *Mental health: culture, race, and ethnicity: a supplement to mental health: a report of the Surgeon General* US Surgeon General, Rockville, MD.

Venkatesh, V, Brown, SA & Bala, H 2013, 'Bridging the qualitative–quantitative divide: guidelines for conducting mixed methods research in information systems', *MIS Quarterly*, vol. 37, no. 1, pp. 21–54.

Vrugt, A, Oort, FJ & Zeeberg, C 2002, 'Goal orientations, perceived self-efficacy and study results amongst beginners and advanced students', *British Journal of Educational Psychology*, vol. 72, no. 3, pp. 385–97.

Wang, C, Mohd-Rahim, FA, Chan, YY & Abdul-Rahman, H 2017, 'Fuzzy mapping on psychological disorders in construction management', *Journal of Construction Engineering and Management*, vol. 143, no. 2.

Wang, P & Chan, PS 1995, 'Top management perception of strategic information processing in a turbulent environment', *Leadership & Organization Development Journal*, vol. 16, no. 7, pp. 33–43.

Wang, Y-W, Davidson, MM, Yakushko, OF, Savoy, HB, Tan, JA & Bleier, JK 2003, 'The scale of ethnocultural empathy: development, validation, and reliability', *Journal of Counseling Psychology*, vol. 50, no. 2, pp. 221–234.

Ward, C 1996, 'Acculturation', in DLR Bhagat (ed.), *Handbook of Intercultural Training*, 2nd edn, SAGE Publications, Newbury Park, CA, pp. 124–47.

Ward, C & Kennedy, A 1992, 'Locus of control, mood disturbance, and social difficulty during cross-cultural transitions', *International Journal of Intercultural Relations*, vol. 16, no. 2, pp. 175–94.

Ware, J, Kosinski, M & Keller, S 2001, *SF-36 physical and mental health summary scales: a user's manual*, vol. 1994 The Health Institute, Boston, MA.

Ware, J & John, E 2000, 'SF-36 health survey update', *Spine*, vol. 25, no. 24, pp. 3130–9.

Warr, P 1987, *Work, unemployment, and mental health*, Oxford University Press, New York.

Weick, KE 1979, *The social psychology of organizing*, 2nd edn, Addison-Wesley, Reading, MA.

Wetzels, M, Odekerken-Schröder, G & Van Oppen, C 2009, 'Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration', *MIS Quarterly*, vol. 33, no. 1, pp. 177–95.

WHO—*see* World Health Organization

Wong, J, Teo, M & Cheung, YKF 2010, 'Cultural determinants of stress in the construction industry', in Y Wang, J Yang. G Shen & J Wong (eds.), *Proceedings of 2010 International Conference on Construction and Real Estate Management*, vol. 1, China Architecture & Building Press, China, pp. 44–9.

Wong, JKW & Lin, AHQ 2014, 'Construction workplace discrimination: experiences of ethnic minority operatives in Hong Kong construction sites', *Engineering, Construction and Architectural Management*, vol. 21, no. 4, pp. 403–20.

Wong, PT, Reker, GT & Peacock, EJ 2006, 'A resource-congruence model of coping and the development of the coping schemas inventory', in PTP Wong & LCJ Wong (eds.), *Handbook of multicultural perspectives on stress and coping*, Springer, New York, pp. 223–83.

Wong, PTP & Wong, LCJ (eds.) 2006, *Handbook of multicultural perspectives on stress and coping*, Springer, New York.

Wong, PT, Wong, LC & Scott, C 2006, 'Beyond stress and coping: the positive psychology of transformation', in PTP Wong & LCJ Wong (eds.), *Handbook of multicultural perspectives on stress and coping*, Springer, New York, pp. 1–26.

World Health Organization 2001, *Strengthening mental health promotion: mental health is not just the absence of mental disorder*, WHO, Geneva.

World Health Organization 2004, *Promoting mental health: concepts, emerging evidence, practice: summary report*, WHO, Geneva.

World Health Organization 2014, 'Preventing suicide: A global imperative', WHO, Geneva.

World Health Organization 2017, *World health statistics 2017*, viewed 09 April 2022, <www.who.int/gho/publications/world_health_statistics/2017/en/ >.

Wu, C, Luo, X, Wang, T, Wang, Y & Sapkota, B 2018, 'Safety challenges and improvement strategies of ethnic minority construction workers: a case study in Hong Kong', *International Journal of Occupational Safety and Ergonomics*, vol. 26 no. 1, pp. 80–90.

Wu, ML 2010, *Structural equation modelling: operation and application of AMOS*, Chongqing University Press, Chongqing, China.

Yip, B & Rowlinson, S 2009, 'Job burnout among construction engineers working within consulting and contracting organizations', *Journal of Management in Engineering*, vol. 25, no. 3, pp. 122–30.

Yip, B, Rowlinson, S & Siu, OL 2008, 'Coping strategies as moderators in the relationship between role overload and burnout', *Construction Management and Economics*, vol. 26, no. 8, pp. 869–80.

Yost, AD & Lucas, MS 2002, 'Adjustment issues affecting employment for immigrants from the former Soviet Union', *Journal of Employment Counseling*, vol. 39, no. 4, pp. 153–70.

Zhang, D & Long, BC 2006, 'A multicultural perspective on work-related stress: development of a collective coping scale', in PTP Wong & LCJ Wong (eds.), *Handbook of multicultural perspectives on stress and coping*, Springer, New York, pp. 555–76.

Zou, PX, Sunindijo, RY & Dainty, AR 2014, 'A mixed methods research design for bridging the gap between research and practice in construction safety', *Safety Science*, vol. 70, pp. 316–26.

Zvolensky, MJ, Jardin, C, Garey, L, Robles, Z & Sharp, C 2016, 'Acculturative stress and experiential avoidance: relations to depression, suicide, and anxiety symptoms among minority college students', *Cognitive Behaviour Therapy*, vol. 45, no. 6, pp. 501–17.

Appendix A: Letter of human research ethics approval

WESTERN SYDNEY
UNIVERSITY

HUMAN RESEARCH ETHICS COMMITTEE

19 October 2020
Doctor Yingbin Feng
School of Built Environment

Dear Yingbin,

Project Title: "Managing mental health in the multicultural construction workforce"

HREC Approval Number: H14008
Risk Rating: Low

I am pleased to advise the above research project meets the requirements of the National Statement on Ethical Conduct in Human Research 2007 (Updated 2018).

Ethical approval for this project has been granted by the Western Sydney University Human Research Ethics Committee. This HREC is constituted and operates in accordance with the National Statement on Ethical Conduct in Human Research 2007 (Updated 2018).

Approval of this project is valid from 19 October 2020 until 19 October 2023.

This protocol covers the following researchers:

Yingbin Feng, Qinjun Liu, Kerry London

Summary of Conditions of Approval

1. A progress report will be due annually on the anniversary of the approval date.

2. A final report will be due at the expiration of the approval period.

3. Any amendments to the project must be approved by the Human Research Ethics Committee prior to being implemented. Amendments must be requested using the HREC Amendment Request Form.

4. Any serious or unexpected adverse events on participants must be reported to the Human Research Ethics Committee via the Human Ethics Officer as a matter of priority.

5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the Committee as a matter of priority.

6. Consent forms are to be retained within the archives of the School or Research Institute and made available to the Committee upon request.

7. Approval is only valid while you hold a position or are enrolled at Western Sydney University. You will need to transfer your project or seek fresh ethics approval from your new institution if you leave Western Sydney University.

8. Project specific conditions:
There are no specific conditions applicable.

Please quote the registration number and title as indicated above in the subject line on all future correspondence related to this project. All correspondence should be sent to humanethics@westernsydney.edu.au as this email address is closely monitored.

Yours sincerely

Professor Brett Bowden
Presiding Member,
Western Sydney University Human Research Ethics Committee

Appendix B: Questionnaire survey

PARTICIPANT INFORMATION SHEET

Project title: Managing mental health in the multicultural construction workforce

Project summary:

You are invited to participate in a research study being conducted by Ms Qinjun (Lavender) Liu, PhD Candidate, under the Supervision of Associate Professor Yingbin Feng and Professor Kerry London, from School of Built Environment at Western Sydney University. This research addresses the mental health issues of construction workers in a multi-cultural construction environment. It aims to achieve a sustained improvement of psychological well-being of construction workforce by effective coping strategies in a culturally diverse construction workplace.

Inclusion/Exclusion criteria

This study is looking recruit construction workers who are 1) at least 18 years of age, 2) have worked in construction industry for at least one year, 3) onsite workers, 4) have experience of working with people from different cultural backgrounds in a crew or a project.

What will I be asked to do?

You will be asked to complete this online questionnaire survey regarding workplace mental health issues in the construction industry.

How much of my time will I need to give?

You are expected to spend around 10-15 minutes to complete the questionnaire.

What benefits will I, and/or the broader community, receive for participating?

There is no direct benefit to individual participants. The research project is expected to benefit the construction workers and broader community by providing a framework of managing mental health and recommending effective coping strategies to enhance mental health in a multicultural construction environment.

Will the study involve any risk or discomfort for me? If so, what will be done to rectify it?

The potential risk might be inconvenience like giving up your time. This study may also involve some minor discomforts since some questions may remind you stressful events (e.g. work stress) which may cause personal distress. If you do not wish to answer a question, you may withdraw at any time during the questionnaire process. If you become upset or distressed as a result of your participation in the research project, you can contact Lifeline on 13 11 14 or BeyondBlue on 1300 22 4636.

Will the data and information that I have provided be disposed of?

No. Your data will be used as per Western Sydney University's Open Access Policy. This means that data collected from this study can be made available online and world-wide in perpetuity.

Can I withdraw from the study?

Participation is entirely voluntary and you are not obliged to be involved. If you do participate you can withdraw at any time. You can do this by closing the questionnaire. If you withdraw from the research, the researcher will not collect additional information from you and the data that have been collected from you will be deleted. Once you have submitted the questionnaire, however, we will not be able to withdraw your responses as the questionnaire is anonymous.

Can I tell other people about the study?

Yes, you can tell other people about the study by providing them with the Chief Investigators' contact details. They can contact the Chief Investigators to discuss their participation in the research project and obtain a copy of the information sheet.

What if I require further information?

Please contact Ms Qinjun (Lavender) Liu (19478760@student.westernsydney.edu.au) or Associate Professor Yingbin Feng (+61 449002405 or y.feng@westernsydney.edu.au) should you wish to discuss the research further.

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation

(REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome. This study has been approved by the Western Sydney University Human Research Ethics Committee. The Approval number is H14008.

For more information on this research, please refer to this link: **Participant Information Sheet.**

If you agree to participate in this survey, please select 'I consent, start questionnaire' below. If you do not consent you can select 'I do not consent' and you will automatically be taken to the end of the survey.

☐ I consent, start questionnaire   ☐ I do not consent

I – Background Information
Please answer the questions based on your experiences.

1. What is your gender?
☐ Male   ☐ Female

2. How old are you?
☐ 18-25   ☐ 26-35   ☐ 36-45   ☐ 46-55   ☐ 56-65   ☐ 66 or above

3. What is your highest education Level?
☐ School education (Primary school and Secondary school)
☐ Tertiary education (Higher education and Vocational education and training (VET)).

4. How long have you been working in the Australian construction industry?
☐ Below 5 years   ☐ 5-10 years   ☐ 11-20 years   ☐ 21 years or above

5. Which of the following best describes your job?
☐ Apprentice ☐ Labourer ☐ Operator ☐ Tradesperson ☐ Foreman/Supervisor ☐ Others___

6. What is your trade on the construction site?

□ Bricklayers and stonemasons   □ Building and construction labourers   □ Carpenters and joiners   □ Concrete workers   □ Crane, hoist and lift operators   □ Earthmoving and mobile plant operators   □ Electricians   □ Scaffolders   □ Glaziers   □ Painting trades workers   □ Plasterers   □ Plumbers   □ Roof tilers   □ Structural steel and welding trades workers   □ Wall and floor tilers   □ Others___

7. What cultural background do you identify yourself with?

□ Australian   □ Non-Australian_____

8. What is your first language?

□ English   □ Non-English_____

II – Determinants of Mental Health

Please rate the level of your agreement on the following statements based on your actual experiences.

1 – Strongly disagree; 2 – Disagree; 3 – Neutral; 4 – Agree; 5 – Strongly agree

A. Personal Characteristics

Statements	1	2	3	4	5
Type A behavioural pattern					
1. I often feel stressed at the end of the working day	□	□	□	□	□
2. I often think about work after work	□	□	□	□	□
3. I feel mentally and physically exhausted after work	□	□	□	□	□
4. I often feel uncertain, worried and dissatisfied with how well I've accomplished my task at work	□	□	□	□	□
5. I get impatient when I have to wait	□	□	□	□	□
6. I often feel stressed	□	□	□	□	□
7. I eat too quickly	□	□	□	□	□
8. I want to be best at everything	□	□	□	□	□
9. I can be described as domineering	□	□	□	□	□
10. I like to compete	□	□	□	□	□
Locus of control					
1. People's misfortunes result from the mistakes they make	□	□	□	□	□
2. Unfortunately, no matter how hard a person tries; his worth is often not recognised	□	□	□	□	□
3. Success is a matter of hard work	□	□	□	□	□
4. This world is run by the few people in power	□	□	□	□	□
5. When I make plans, I am almost certain that I can make them work	□	□	□	□	□

6. No matter how hard you try; some people just don't like you	☐	☐	☐	☐	☐
7. What happens to me is my own doing	☐	☐	☐	☐	☐
8. Many times we might just decide what to do by flipping a coin	☐	☐	☐	☐	☐

B. Environmental Stressors

Statements	1	2	3	4	5
Work Stressors					
Factors intrinsic to a job					
1. There is constant pressure to work every minute, with little opportunity to relax	☐	☐	☐	☐	☐
2. I am often required to work on multiple tasks at the same time	☐	☐	☐	☐	☐
3. The tasks I have to work on are often urgent and have tight deadlines	☐	☐	☐	☐	☐
Role in organisation					
1. I often have difficulty deciding between high productivity and high quality	☐	☐	☐	☐	☐
2. Things I do are often accepted by one person and not another	☐	☐	☐	☐	☐
3. I am often caught between conflicting demands from my supervisor and staff	☐	☐	☐	☐	☐
Career development					
1. I am working at a level lower than my ability (under promotion)	☐	☐	☐	☐	☐
2. There's threat of impending redundancy for my job	☐	☐	☐	☐	☐
3. There's an absence of any potential career advancement in my job	☐	☐	☐	☐	☐
Relationships at work					
1. I often feel not being respected enough by my colleagues	☐	☐	☐	☐	☐
2. I often do not trust those whom I am working with	☐	☐	☐	☐	☐
3. I dislike those whom I am working with	☐	☐	☐	☐	☐
Organisational structure and climate					
1. Even small matters have to be referred to someone higher up for the final decision	☐	☐	☐	☐	☐
2. Subordinates have to ask their superiors before they can do almost anything	☐	☐	☐	☐	☐
3. Any decision I make has to have my boss's approval	☐	☐	☐	☐	☐
Cultural stressors					
Racial discrimination					
1. I have experienced racist jokes or name-calling in the workplace	☐	☐	☐	☐	☐
2. I am feeling ignored and isolated in the workplace	☐	☐	☐	☐	☐
3. I have encountered repeated rude, offensive gestures in the workplace	☐	☐	☐	☐	☐
Language barriers					
1. I am not confident in communicating in a common language	☐	☐	☐	☐	☐

Statements					
2. I feel uncertain in reading and understanding the common language	☐	☐	☐	☐	☐
3. I am nervous in getting information in a common language	☐	☐	☐	☐	☐
Cultural value conflicts					
1. I often have problems with my team members because of different cultural customs	☐	☐	☐	☐	☐
2. I often get upset at my team members because they don't know my cultural customs	☐	☐	☐	☐	☐
3. I often feel uncomfortable having to choose between my own and other ways of doing things due to different cultural backgrounds	☐	☐	☐	☐	☐

III – Mental Health Outcomes

C. Psychological Distress

The following questions ask about how you have been feeling during **the past 30 days**. For each question, please select the answer that best describes how often you had this feeling.

1 – None of the time; 2 – A little of the time; 3 – Some of the time; 4 – Most of the time; 5 – All of the time

Statements	1	2	3	4	5
K6					
1. In the past 30 days, about how often did you feel nervous?	☐	☐	☐	☐	☐
2. In the past 30 days, about how often did you feel hopeless?	☐	☐	☐	☐	☐
3. In the past 30 days, about how often did you feel restless or fidgety?	☐	☐	☐	☐	☐
4. In the past 30 days, about how often did you feel so depressed that nothing could cheer you up?	☐	☐	☐	☐	☐
5. In the past 30 days, about how often did you feel that everything was an effort?	☐	☐	☐	☐	☐
6. In the past 30 days, about how often did you feel worthless?	☐	☐	☐	☐	☐

IV– Coping

D. Intercultural Coping

The following statements deal with reactions you may have to various situations. Indicate how true each of these statements is depending on how you feel about the situation.

1 – Not at all true; 2 – Barely true; 3 – Somewhat true; 4 – Completely true

Statements	1	2	3	4
Affective intercultural coping				
1. Be patient when communicating with team members from other racial or ethnic backgrounds, regardless of how poorly they speak English	☐	☐	☐	☐

2. Try to understand why colleagues want to keep their racial or ethnic cultural traditions instead of trying to fit into the mainstream	☐	☐	☐	☐
3. Be respectful when team members of different racial or ethnic backgrounds speak their language around me	☐	☐	☐	☐
4. Enjoy ambiguous situations	☐	☐	☐	☐
5. Positively tackle problems which are complex enough to be ambiguous	☐	☐	☐	☐
6. Solve the complex problem from several different perspectives	☐	☐	☐	☐
7. Show my appreciation of their cultural norms, when I interact with workmates from other racial or ethnic backgrounds	☐	☐	☐	☐
8. Express my concern about discrimination to colleagues from other racial or ethnic groups	☐	☐	☐	☐
9. Tell people who make racist jokes that I am offended even though they are not referring to my racial or ethnic group	☐	☐	☐	☐

Behavioural intercultural coping

1. Enter into meaningful dialogue with colleagues	☐	☐	☐	☐
2. Develop and maintain satisfying interpersonal relationships with workmates	☐	☐	☐	☐
3. Solve communication misunderstandings between myself and others	☐	☐	☐	☐
4. Talk to other people about the emotions I experience	☐	☐	☐	☐
5. If I feel down, I will do things that can make me feel better	☐	☐	☐	☐
6. Give a fair hearing to people's ideas	☐	☐	☐	☐
7. Seek a solution that will be good for our team	☐	☐	☐	☐
8. Treat conflict as a mutual problem to solve with team members	☐	☐	☐	☐
9. Combine the best of positions to make an effective decision	☐	☐	☐	☐

Cognitive intercultural coping

1. Perceive and evaluate a situation from a variety of aspects	☐	☐	☐	☐
2. Acquire differentiated and detailed information about a situation	☐	☐	☐	☐
3. Think deeply and more meaningfully about related challenge	☐	☐	☐	☐
4. Enjoy learning something	☐	☐	☐	☐
5. Learn a new skill which can make me put more effort into work	☐	☐	☐	☐
6. Achieve a higher standard than other workers in my area of work	☐	☐	☐	☐