

AUTHENTIC LEADERSHIP, PSYCHOLOGICAL CAPITAL, WORK ENGAGEMENT
AND SAFETY BEHAVIOUR IN A CONSTRUCTION ENVIRONMENT

By

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DECLARATION

I, Gillian Turner (s221138498), hereby declare that the thesis for Doctor of Philosophy (Human Resource Management) to be awarded is my own work and that it has not previously been submitted for assessment or completion of any postgraduate qualification to another University for another qualification.



Gillian Turner

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ABSTRACT

Research purpose: The purpose of the study was (1) to investigate the relationship between authentic leadership, psychological capital (PsyCap), work engagement, and employees' safety behaviour, and (2) to develop and test a theoretical model comprising of all four constructs as informed by the literature review and data collected. In essence, the goal is to develop recommendations to support and contribute to the overall effectiveness of the construction industry based on the findings of the study. The study will assist South African businesses in the construction domain to manage their demanding work environment and minimise the number of occupational safety violations and injuries.

Research motivation: Studies that explore safety from more recently acknowledged leadership theories are in short supply. This study is addressed through the lens of Positive Organisational Behaviour (POB) to situate authentic leadership and PsyCap as measurable constructs that can be developed to have a positive impact on work engagement and safety behaviour. This approach is especially significant in the South African construction environment because of the growing emphasis on the health and safety concerns. In essence, this study links a contemporary leadership theory, psychological constructs, and associated outcomes distinctively to a given industry within the South African context, that is work engagement and safety behaviour.

Research design, approach, and method: This study follows a cross-sectional approach to investigate the relationship between authentic leadership, PsyCap, work engagement, and safety behaviour in a construction environment. Convenience sampling was employed to recruit full-time employed workers across hierarchical levels, ranging from blue-collar workers (installation technicians, paving installers, and maintenance technicians) to white-collar workers (supervisors, line managers, senior managers, and other administrative employees), working in the South African construction industry. Both paper-and-pencil and online questionnaires were utilised to collect data for the study. Two hundred paper-and-pencil questionnaires were distributed, and 89 online questionnaires were accessed by potential respondents, with a total of 198 completed questionnaires. A response rate of 65.41% was realised. Quantitative techniques were used to analyse the data: Reliability assessment, Confirmatory factor analysis (CFA), correlation analysis, independent t-test, analysis of variance (ANOVA), and structural equation modelling (SEM).

Main findings: All hypotheses were supported. The results indicate that there is an association between the constructs in the study. Specifically, the relationship between authentic leadership and safety behaviour is mediated by PsyCap and work engagement. The research provides valuable input as significant differences were noted across all constructs and demographic variables, except age.

Limitations: The results should be interpreted, bearing in mind that there is limited literature available on the relationship between the constructs in the study when applied to the South African context. Furthermore, the limitations primarily revolved around the research design. Specifically, the questionnaire was completed at one point in time and the use of convenience sampling may be associated with possible sampling bias. In response to the COVID-19 pandemic and lockdown which limited group gatherings and contact, a change in the data collection method was necessary. That is, the data collection method changed from a paper-and-pencil version to the online administration of the questionnaire. This resulted in a six-month delay in the completion of data collection. Finally, the wording of certain items may have contributed to central tendency in responses.

Future research: It is suggested that future studies should investigate the relationship between the constructs using larger samples, different occupations, alternative South African industries, and explore the long-term effects of these constructs in the South African workplace by adopting a longitudinal research design. This can also be considered in relation to possible interventions to improve leadership authenticity and increase PsyCap and work engagement, with the intention of mitigating adverse safety events in the construction industry. In addition, future studies should also consider how this relationship can be influenced by different ethnic and cultural groups to gain a better understanding of how differences in ethnicity manifests in the constructs. Researchers should also explore the constructs as a group-level phenomenon and consider explanations from an alternative theoretical framework.

Keywords: *Authentic leadership, psychological capital, work engagement, safety behaviour, South Africa, construction industry.*

DEFINITIONS OF KEY TERMS

There are several significant terms used in this study that are clarified below. It is important to note that these definitions are specific to the context of positive organisational behaviour (POB), leadership, and occupational safety.

Leadership: The art of motivating others to understand what task needs to be performed, how it should be done, and facilitating efforts to achieve mutual goals (Yukl, 2002).

Authentic Leadership: An approach to leadership that accentuates the leader's legitimacy through honest relationships (Henderson & Hoy, 1983).

Authentic leader: A person who is genuine, self-aware, and mission driven to foster trust and establish an ethical framework to achieve organisational success (Whitehead, 2009).

Psychological Capital (PsyCap): "positive psychological state of development" (Luthans, Avolio, Avey, & Norman, 2007, p. 3).

Engagement: Being committed, enthusiastic, and absorbed in activity (Schaufeli, 2012).

Work engagement: Involvement and focused effort to execute work tasks (Schaufeli, 2013).

Safety performance: Work behaviour that demonstrates adherence to organisational safety regulations (Sverke, Låstad, Hellgren, Richter, & Näswall, 2019).

Safety behaviour: Any form of conduct that prevents the likelihood of physical harm and involve employees monitoring and adapting their behaviour to improve their safety at work (Beus, Dhanani, & McCord, 2015).

Safety compliance: Obeying safety rules and protocols (Clarke, 2013).

Safety participation: Partaking in safety-related activities (Clarke, 2013).

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Organisations are constantly faced with social, economic, and political pressures that typically have a negative bearing on the way businesses operate, types of leadership styles adopted, and work performance. This adds to a host of additional problems experienced in the work environment that affect employee wellbeing, such as feelings of hopelessness and depression (Du Plessis & Barkhuizen, 2012; Azam, 2020). To mitigate negative outcomes, managers and business leaders need to adopt effective leadership practices and modify business models to empower and engage their employees to achieve optimal organisational and human performance (Beal, Stavros, & Cole, 2013). Storm and Rothmann (2003) assert that much consideration is given to the dark side of psychology, thereby focusing on weaknesses and dysfunction. As such, the advent of positive psychology instituted a general tendency to shift efforts towards appreciating human strengths, fulfilment, flourishing, and resilience that enable individuals and communities to thrive (Storm & Rothmann, 2003).

Positive organisational behaviour (POB) emanates from positive psychology and is demarcated as “the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today's workplace” (Luthans, 2002a, p. 59). In general, POB aims at developing strengths, instead of trying to improve weaknesses as these capacities are both measurable and developable (Luthans, 2002a; Luthans, 2002b; Nelson & Cooper, 2007). POB capacities consist of both leader and human resource strengths, and psychological capacities, namely self-efficacy, hope, optimism, and resiliency (Luthans, 2002a; Mayer & Vanderheiden, 2020).

Taking into account the above description of POB, it is essential to analyse more in depth the influence of leadership on the employees' performance. Notwithstanding the fact that leadership is recognised as a legitimate discipline, it remains a suppositious concept (Rosenbach, Taylor, & Youndt, 2018). Leadership is “all about getting people

to work together to make things happen that might not otherwise occur or to prevent things from happening that would ordinarily take place” (Rosenbach et al., 2018, p. 3).

Many years of leadership research focussed primarily on organisational outcomes associated with traditional leadership theories, such as employee well-being (Van Dierendonck, Haynes, Borrill, & Stride, 2004), employee satisfaction (Berson & Linton, 2005), and employee creativity (Zhang & Bartol, 2010). However, the focus has recently shifted to consider more contemporary forms of leadership as a means for fostering organisational effectiveness (Lyuboyunikoya, Legood, Turner, & Mamakouka, 2017). Leadership as a subject matter has been investigated from numerous perspectives. However, investigations of leadership from an ethical and authentic perspective are in relatively short supply (George, Corbishley, Khayesi, Haas, & Tihanyi, 2016; Kim & Thapa, 2018). Despite the reality that ethical and authentic leadership are similar concepts, it should be noted that they are not the same. According to Yasir and Mohamad (2016), ethical leadership specifically focuses on moral and ethical aspects of behaviour, whereas authentic leadership do not specifically focus on ethical behaviour. This means that authentic leaders may or may not always be ethical in their undertakings.

Friedman and Gerstein (2017) argue that leadership ought to be authentic for an organisation to be successful in the long run. Luthans and Avolio (2003, p. 244) also expressed “a need for a theory-driven model identifying the specific construct variables and relationships that can guide authentic leader development and suggest researchable propositions”. As such, increased attention is being paid to the subject matter of authentic leadership and its effect on a host of organisationally relevant outcomes as demonstrated in the organisational psychology literature (Luthans & Avolio, 2003; Gardner, Cogliser, Davis, & Dickens, 2011; Braun & Peus, 2018).

To better understand authentic leadership, it is necessary to consider Luthans and Avolio’s (2003) theoretical idea that authentic leadership is a leadership approach whereby follower-trust is built on an ethical foundation, developed through honest relationships between the leader and follower who values the leader’s input. In basic terms, authentic leaders exemplify ethical values, share information, accept followers’ inputs, and disclose their personal opinions to discourage undesirable workplace

behaviours with the intention of promoting ethical conduct amongst their followers (Joo & Jo, 2017). Correspondingly, Walumbwa, Lawler and Avolio (2007, p. 94) describe authentic leadership as “a pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development”. To this end, it is clear that leaders’ authenticity is rooted in positive psychological capital (PsyCap) such as optimism, self-confidence, hope, and resilience as contributors to positive organisational and employee outcomes (Joo & Jo, 2017).

Given the recent emphasis on authentic leadership and its positive nature, one could speculate that organisations can potentially enhance employee engagement, commitment, and performance through clear communication and leading by example (Penger & Černe, 2014; Boiral, Talbot, & Paillé, 2015). The notion that authentic leadership fosters positive behaviour is supported by numerous studies in both leadership and safety climate research (Joo & Jo, 2017; Dirik & Seren-Intepeler, 2017). Alok and Isreal (2012) reported that authentic leadership indirectly relates to work engagement, which plays a role in enhancing work-related outcomes such as safety at work. Work engagement refers to the positive work-related state of mind whereby employees have high energy levels and are passionate about their work, while being absorbed in their work (Schaufeli, Salanova, González-Romá, & Bakker, 2002). According to Eid, Mearns, Larsson, Laberg, and Johnsen (2012), authentic leadership and PsyCap embody two constructs that stimulate member commitment to safety, thereby reducing the total number of observed and recorded accidents and injuries in hazardous work environments. All things considered, authentic leadership and PsyCap may determine the extent to which employees are engaged in their work and ultimately affect their safety behaviour.

1.2 PROBLEM STATEMENT

A large body of research has accumulated under the rubric of conventional leadership theories, such as transformational and transactional leadership, and its influence on

overall occupational safety (Choi & Behling, 1997). However, there remains a paucity in the literature that explores safety from more recently acknowledged leadership theories. Remarkably, within this large body of research, scant empirical research has linked contemporary leadership theories, psychological constructs, and associated outcomes distinctively to a given industry within the South African context. For example, construction is widely known for its dangerous and demanding work conditions and, consequently its legal obligation to adhere to strict safety rules and procedures (Skeepers & Mbohwa, 2015). Yet, scholars have largely overlooked the construction industry as a rich source of information to understand the potential influence leadership authenticity and PsyCap on employees' work engagement levels and performance indicators specific to this industry, such as employees' safety behaviour (Skeepers & Mbohwa, 2015; Wu, Li, & Fang, 2017). The South African Health and Safety accord aims for zero harm to employees by eliminating work-related fatalities and injuries (Ref from below). According to the Department of Labour (2017), a total of 313 million occupational injuries are recorded by construction workers annually which translates to 86 000 injuries daily. These numbers suggest that the South African construction industry falls short of this goal (South African Government News Service, 2012).

In addition to the abovementioned, there is limited progress in the understanding of how leaders who adopt an authentic approach, influence employees' PsyCap, stimulate work engagement levels and, ultimately their safety behaviour. This limitation may partially be ascribed to the notion that existing leadership research conducted in South Africa focuses mainly on blue-collar workers and that low literacy levels and language difficulties may have a bearing on the research results (Lee & Mohammed, 2006). As such, it is critical to broaden the scope of research to include both blue-collar and white-collar workers with the intention of observing the extent to which authentic leadership influences employees' PsyCap, work engagement and safety behaviour.

While blue-collar workers represent jobs that necessitate manual labour, white-collar workers signify employees who perform administrative, professional, supervisory, and managerial work with decision-making powers (Parietti, 2019). As such, white-collar workers' participation in occupational safety is key to the implementation and

preservation of safety practices (Zhang, Chen, Fu, Yan, & Kim, 2016). Kouabenan, Ngueutsa and Mbaye (2015) maintain that line management's involvement in safety-related actions reduces employees' risk-taking behaviour. Furthermore, senior management's involvement in safety has been proven to be a driving force behind the realisation of safety performance as their influence can override the effects of the line manager and supervisor (Guo & Yiu, 2015; Unnikrishnan, Iqbal, Singh, & Nimkar, 2015). That is, safety behaviour largely relies on senior managers' attitude toward safety and leadership style as employees will work more safely when senior management emphasises safety in its policies and procedures (Zhang et al., 2016).

The literature advises that the degree to which white-collar workers are involved in safety practices is inspired by the leadership style adopted by the superiors and safety behaviour. The latter notion is supported by the perception that occupational safety also extends to the legions of white-collar workers as they may encounter safety hazards, such as slips and falls on staircases (Carter, 2016). According to Karakaya and Yilmaz (2013, p. 232), organisations are the "sum of systematic operations created by people who come together in order to achieve their common goals". This line of reasoning further encourages widening the scope of inquiry to include both blue- and white-collar workers as these two categories of employees do not function in isolation. It is, therefore, necessary for leaders to ensure that safety rules and the application thereof are consistent across all hierarchical levels. For example, blue-collar workers' participation in safety practices are not only influenced by their managers and supervisors, but also by their colleagues who are employed in white-collar positions.

All things considered, there is limited progress in understanding the association between authentic leadership, PsyCap, employees' levels work engagement and safety behaviour. In sum, there is a need to determine if and how authentic leadership contributes towards increased levels of PsyCap that, in turn, leads to improved work engagement and ultimately yield improved safety behaviour.

In line with the main aim of the study, the study sets out to answer the following research questions:

- To what extent is authentic leadership related to PsyCap, work engagement, and safety behaviour?
- Within the realm of POB, can a valid model of the relationships among the study variables be built?

1.3 RESEARCH OBJECTIVES

The primary objective the study was twofold: (1) to investigate the relationship between authentic leadership, PsyCap, work engagement levels, and employees' safety behaviour, and (2) to develop and test a theoretical model comprising of all four constructs as informed by the literature review and data collected. That is, theoretical relationships between the constructs are tested.

The secondary objectives of the study were to:

- Undertake a literature review into authentic leadership, PsyCap, work engagement, and safety behaviour to gain insight into these constructs. The investigation includes the factors of each construct, causes, and consequences;
- Conduct an empirical investigation to test the proposed theoretical model and to scrutinise the relationships between authentic leadership as the independent variable, PsyCap, work engagement and safety behaviour as the dependent variables;
- Provide input into the impact of demography on each construct which may assist human resource management decisions that are typically informed by demographics; and
- Develop recommendations based on the findings of the study and it is hoped that these recommendations will support and contribute to the overall effectiveness of the construction industry.

The study will assist South African businesses in the construction domain to manage their demanding work environment and, minimise the number of occupational safety violations and injuries.

1.4 SCOPE OF THE STUDY

It is apparent in the literature that more contemporary leadership theories and positive psychological factors are increasingly being considered to improve organisational effectiveness. For this reason, the study is rooted in two overarching research spheres, namely leadership and positive organisational behaviour.

The empirical research will be limited to the South African construction industry because: (1) occupational safety issues including workplace-related accidents and injuries continue to be an area of concern, and (2) South Africa is not widely known for its outstanding leadership capacity to drive positive outcomes (South African Board of People Practices, 2017). Case in point, Miguel de Gracia (Group General Manager of South and East SC Johnson) stated that “there is a need for leadership development in corporate Southern Africa, emphasizing the importance of teamwork, management for results, and speed/excellence in execution” (as cited in Eckert & Rweyongoza, 2015, p. 13).

1.5 DELIMITATIONS

There are several boundaries to the study that need to be acknowledged. First, authentic leadership has mainly been studied from a broad psychological perspective, that is, theoretical assumptions about the impact of authentic leadership on employees’ psychological capabilities which may trigger positive employee outcomes (for example, job satisfaction). This limits the availability of literature on alternative conclusions, such as employees’ adherence to organisational policies and procedures, and whether psychological capabilities may also complement or supplement authentic leadership. However, the focus on psychological capabilities and its associated outcomes are used as a point of reference to investigate the relationship between authentic leadership, PsyCap, work engagement, and employees’ safety behaviour.

Second, the empirical research is limited to the South African construction industry for reasons mentioned relating to occupational safety issues and leadership capacity to drive positive outcomes. This means that the results may not be generalisable to other South African industries.

Finally, the study explores only employees' perceptions on leadership, PsyCap, work engagement, and safety behaviour. In other words, employees' perceptions are not compared to their actual performance and on-duty injury statistics.

1.6 FRAMEWORK OF THE STUDY

The study is divided into five separate chapters to reflect the research process in its entirety. Each chapter introduces the core aims of the given chapter.

Chapter one outlines the overall foundation of the research by explaining the research problem, objectives, scope, delimitations, and discusses the research framework.

Chapter two constitutes the literature review and contains definitions and background of the South African construction industry. In addition, this chapter discusses each construct and explains the factors that constitute each construct, original theoretical models, potential causes, the impact of demography, and consequences. The theoretical relationship between authentic leadership, PsyCap, work engagement, and safety behaviour is acknowledged, along with the conceptual model and study hypotheses.

Chapter three addresses the research methodology. This chapter clarifies the research process and contains explanations for the research design, sampling aspects, and the rationale behind the chosen data collection method. The data processing and data analysis process is also addressed in this chapter, along with ethical considerations.

Chapter four contains the presentation of the data collected through paper-and-pencil and online questionnaires. The presentation of the findings has been facilitated through tables.

Chapter five comprises discussions and analyses of the results to address the research objectives. Findings of the literature review are compared with the results of this study. Finally, this chapter outlines the theoretical and practical implications of the research findings, acknowledges the limitations of the study, and provides recommendations for future research.

1.7 CONCLUSION

The study is addressed through the lens of POB to situate authentic leadership and PsyCap as measurable constructs that can be developed to have a positive impact on work engagement and safety behaviour. The POB approach is especially significant in the South African construction environment because of the growing emphasis on the health and safety concerns (Okonkwo, 2019).

According to Eid et al. (2012), authentic leadership is a behavioural pattern that draws upon and encourages both PsyCap and ethics. To this end, authentic leaders facilitate positive developmental states in their followers, that is, PsyCap elements which work adaptively together and influence optimal human functioning (Youssef & Luthans, 2007). It is positively related to work engagement as it represents a rewarding work-related state of mind that is an important driver of job performance (Simons & Buitendach, 2013; Paek, Schuckert, Kim, & Lee, 2015). In essence, authentic leadership should contribute to positive mindset in followers, influence their decision-making, and eventually safety behaviour, given that the appropriate job resources are available (Eid et al., 2012).

The next chapter considers the theoretical underpinning and literature related to authentic leadership, PsyCap, work engagement, and safety behaviour. The chapter explores diverse aspects to better understand each construct and how they are theoretically related.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The objective of this review is to provide a theoretical foundation of the study by exploring the relevant theories and components that underpin authentic leadership, PsyCap, work engagement and safety behaviour. This section also provides an overview of the South African construction industry to demonstrate the significance of safety behaviour, work engagement, PsyCap, and authentic leadership within a construction environment. It is important to recognise that most human resource management decisions acknowledge demographics since they influence work behaviour and productivity (Kipkebut, 2013). However, the literature that highlights the impact of demography on each construct is limited. Therefore, the current study investigates the association and variations between the constructs in the study and several demographic characteristics of the sample. Finally, the review appraises the theoretical relationship the constructs in the study.

2.2 SOUTH AFRICAN CONSTRUCTION INDUSTRY

Skeepers and Mbohwa (2015) report that the South African construction industry plays a pivotal role in the effective and efficient delivery of the country's infrastructure and the development thereof. The latter statement is supported by South African labour statistics that shows its significant contribution to employment and, in turn, economic growth. The South African Labour Force Survey (2018), construction as the second-largest benefactor of increased employment rates: Transport (54 000 jobs), followed by construction (45 000 jobs), mining (38 000 jobs), private households (22 000 jobs), and utilities (18 000 jobs) (Statistics South Africa, 2018). Despite these positive impressions shaped by each industry's contribution to employment rates through job creation, South Africa continues to be confronted with the challenge of addressing the vexing issue of failure to achieve acceptable occupational health and safety standards (Skeepers & Mbohwa, 2015). Construction, as one of South Africa's leading industries in job creation and by default, a noteworthy contributor to economic growth, makes for

a strong case to appreciate the relationship between a more-contemporary leadership approach and employee outcomes that are archetypal of the industry.

Construction denotes an extraordinarily complex and hazardous environment which necessitates the need for strict health and safety practices to mitigate associated consequences such as on-duty injuries and death (Skeepers & Mbohwa, 2015). Subsequently, South African companies must implement and monitor appropriate safety procedures, safety equipment, and personal protective equipment (PPE) in accordance with relevant legislation and regulations. This implies that employees must engage in the appropriate safety procedures, utilise the correct safety equipment, and wear the correct PPE while carrying out specific tasks. For example, employees must secure ladders, ensure rope access, and wear harnesses and hard hats while working at heights (Fang, Ding, Luo, & Love, 2018). According to Section 14 of the Occupational Health and Safety Act No. 85 of 1993, construction workers are obliged to wear PPE issued by the employer and to utilise safety equipment in accordance with the instructions given by the employer. In addition to the legal ramifications, workplace incidents and accidents have financial implications, such as higher injury-on-duty claims, employee absence, and in turn, reduced performance outputs (Maseko, 2016; Jinnett, Schwatka, Tenney, Brockbank, & Newman, 2017). This should put occupational health and safety issues and the management thereof at the top of the priority list for all employers and employees.

Organisational leaders are responsible for the performance of an organisation and the achievement of business goals. Kaiser, Hogan and Craig (2008) suggest that members of management must have the appropriate skillsets and approaches to leadership in order to yield positive results from the employees entrusted to them. In line with this argument, researchers continue to study the different performance indicators and related employee conduct as informed by leadership tactics. It is, therefore, understandable that occupational health and safety is everyone's responsibility, from the Chief Executive Officer to construction site workers (Occupational Care South Africa, 2016).

Hofmann and Morgeson (1999) argue that employees are increasingly more committed to safety when they perceive their leaders to be ethical and supportive.

Unfortunately, available fatality statistics are indicative of the need for better leadership in the South African construction industry to positively influence employee safety. According to the national statistics drawn from the records of the Federated Employers Mutual Assurance Company (FEMA, 2019), the construction industry has observed a worrying amount of workplace accidents reported between 2016 and 2018. The statistics indicate that a total of 8553 accidents were reported in 2016, 8364 in 2017, and 7779 in 2018 among construction workers across the country. The main causes of accidents were “struck-by” incidents (33.94% in 2016, 32.01% in 2017, and 32.42% in 2018) and “fall on to different levels” incidents (11.57% in 2016, 10.96% in 2017, and 11.53% in 2018). To clarify, “struck-by” incidents refer to employees being hit by vehicles such as motor-vehicles, trucks, lorries, and forklifts. To “fall on to different levels” incidents refer to employees working above ground/floor level who fall a distance, such as from ladders and rooftops. To prevent this from happening, organisations need to instil in employees an awareness of safety behaviour and a willingness to engage in safety-related activities.

2.3 SAFETY BEHAVIOUR

Safety behaviour is defined as “workplace behaviors that affect the extent to which individuals, or the workplace in general, are free from physical threat or harm” (Beus, Dhanani, & McCord, 2015, p. 485). According to Griffin and Neal (2000), this behaviour includes intentional or unintentional actions that either mitigate physical danger or harm (safe behaviour) or conduct that subject people to physical danger or harm (unsafe behaviour).

Safety in the workplace has long been understood as a source of direct costs (employee compensation payments, medical expenses, legal services, etc.) and indirect costs (training, lost productivity, increased absenteeism, etc.) to an organisation (Neal & Griffin, 2002). As such, more attention is being paid to the need to proactively manage safety with the intention of improving employee safety, while avoiding substantial financial loss (Parker, Axtell, & Turner, 2001; Neal & Griffin, 2002). Research primarily focused on the concept of safety climate to manage safety, however the literature expanded to include safety from an organisational behaviour

perspective to identify the root causes of safety performance and, in so doing safety behaviour (Vinodkumar & Bhasi, 2010; Griffin & Kabanoff, 2001; Sverke et al., 2019).

Figure 1 provides a schematic representation of safety behaviour and suggests that the safety climate influences safety compliance and safety participation in safety behaviour. The literature indicates that a strong safety climate within an organisation could improve the level of safety compliance and participation, and in turn, result in lower injuries and accidents rates (Gillen, Baltz, Gassel, Kirsch, & Vaccaro, 2002; Sui, Phillips, & Leung, 2004).

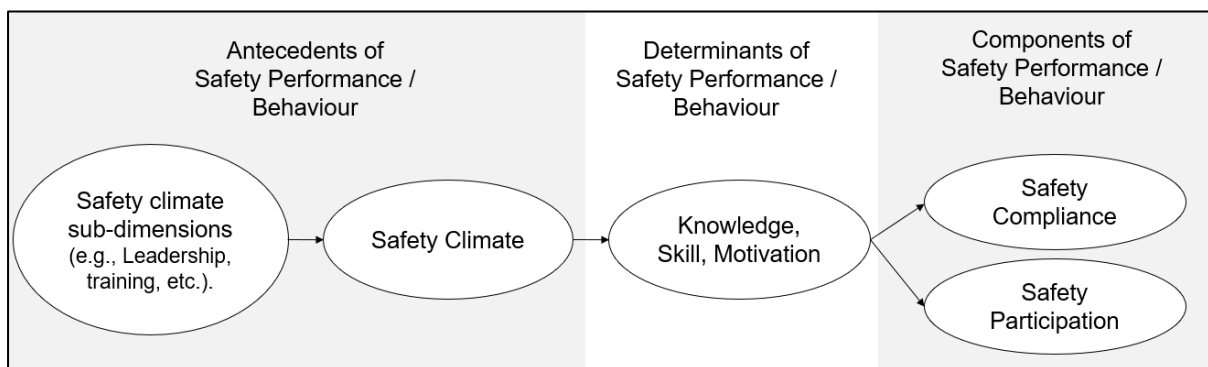


Figure 1: Safety behaviour model (Neal & Griffin, 2002).

Neal and Griffin (2002) differentiate between two types of safety behaviour, namely safety compliance and safety participation. These behaviours are described below. The determinants of safety behaviour exemplify the factors that are directly responsible for differences in behaviour, that is knowledge, skill, and motivation (Campbell, Gasser, & Oswald, 1996). According to Campbell et al. (1996), if employees do not have adequate knowledge and skill to comply with safety rules or partake in safety activities, then they will not be able to perform such actions. The antecedent of safety performance is represented by safety climate which is perceptions of company procedures, policies, and practices concerning workplace safety (Neal & Griffin, 2002). It is considered to affect behaviour through its effect on employee knowledge, skill, and motivation (Neal & Griffin, 2002). Examples include ability, personality, leadership, training, and the like.

In essence, the model shows the link between authentic leadership and safety behaviour. Leadership influences the safety culture within an organisation which

impacts employees' safety compliance and their participation in safety-related practices (Skeepers & Mbohwa, 2015).

2.3.1 Safety behaviour factors

According to Griffin and Neal (2000), safety behaviour is typically conceived in terms of safety performance. For this reason, the essence of safety performance is discussed to offer a better understanding of safety behaviour as these terms are often used interchangeably.

2.3.1.1 Safety performance

Safety performance is determined by leader concern for employee wellbeing, appropriateness of safety training, access to safety equipment, communication, safety management systems, and participation in occupational safety (Griffin & Hart, 2000). To this end, Neal and Griffin (2006) explain that safety performance has an effect on the number of accidents which shows the importance of employees' behaviour in safety outcomes. It is, therefore, useful to acknowledge theories of job performance when conceptualising the link between safety performance and safety behaviour (Griffin & Neal, 2000).

Campbell (1990) outlines job performance as the required actions and behaviours needed to achieve individual and organisational goals. Nowadays, job performance is observed as phenomenon encompassing three separate types of performance behaviours, specifically task performance, contextual performance, and counterproductive behaviours (Rotundo & Sackett, 2002; Lievens, Conway, & De Corte, 2008).

First, task performance is the act of carrying out work duties and responsibilities that are appraised to determine how well employees perform their key job tasks (Sverke et al., 2019). It concerns the behaviours that narrate the way employees perform tasks that are generally communicated in a job description (Murphy, 1989). Second, contextual performance is regarded as the organisational citizenship behaviours that positively impacts the work climate and therefore plays a part in organisational goal

achievement (Hoffman & Dilchert, 2012). It signifies the behaviours that enable smooth functioning and the promotion of changes, such as helping co-workers and participating in several projects (Hoffman & Dilchert, 2012; Sverke et al., 2019). Finally, counterproductive behaviours encapsulate the harmful side of job performance as it relates to undesirable behaviours that obstruct goal achievement (Sackett & De Vore, 2001). Examples include negligence in the performance of duties, failing to comply with employer policies and harassment (Sverke et al., 2019). This typically occurs when employees retaliate against job dissatisfaction or unfair treatment (Sverke et al., 2019).

This overall interpretation of job performance is useful for recognising safety performance as the behaviours embedded in contextual performance. This ultimately results in the employee's contribution to the overall wellbeing of the organisation (Christian, Bradley, Wallace, & Burke, 2009). Specifically, safety performance refers to the conduct that is in accordance with health and safety rules and regulations within an organisation (Sverke et al., 2019). This implies that when an employee engages in safety performance that they are less likely to make errors that may result in accidents or injuries. However, safety behaviour that is non-compliant is counterproductive because of the violation of safety rules that endangers the employee's and the organisation's safety (Beus et al., 2015).

2.3.1.2 Forms of safety behaviour

Neal and Griffin (2002) tested a model of safety performance comprising of two components, namely safety compliance and safety participation. These two components of safety performance represent the behaviours that individuals perform at work and is, therefore considered as the two distinct forms of safety behaviour (Neal & Griffin, 2002).

According to Neal and Griffin (2006), safety compliance denotes the core activities that need to be carried out by individuals to realise and maintain workplace safety. Examples are following safety policies and procedures and engaging in the associated safety behaviours. Safety participation, on the other hand, refers to the covert behaviours that are demonstrated by helping others to create an environment that

supports safety and taking initiative to be safe (Neal & Griffin, 2006). Safety participation includes acts of attending safety meetings and helping co-workers with safety-related issues. It is important for employees to engage in both of these behaviours to enhance safety behaviour in the workplace.

2.3.2 Potential causes of safety behaviour

The literature provides several factors that influence workplace safety behaviour that are grouped under two broad categories, namely personal and organisational aspects (Manjula & De Silva, 2018). These are to be discussed below.

2.3.2.1 Personal aspects

Personal aspects encapsulate the dispositional characteristics of the employee that can be conceptualised in terms of three interconnected factors (Gyekye, 2010): (1) Age, knowledge, and experience, (2) self-esteem, and (3) performance pressure and coping strategies.

Employees' age, knowledge and experience have been proven to influence individual safety behaviour as older employees tend to display more positive attitudes toward safety and they are more safety-cautious than younger employees (Siu, Phillips, & Leung, 2004; Seixas, Blecker, Camp, & Neitzel, 2008). However, employees' inclination to participate in risk-taking behaviour tends to fade as they age and, consequently, older employees act more safely for their own protection (Manjula & De Silva, 2018). This suggests that younger employees are more likely to get injured, when compared to their older counterparts (Manjula & De Silva, 2018). However, there is an inclination for younger and new employees to observe what older employees do and then reproduce the same conduct (Choudhry & Fang, 2008). The latter relates to the popular saying that 'with age comes experience' and, therefore it is plausible that more experienced employees are well acquainted with safety rules and regulations. Case in point, employees with more workplace experience than others are less likely to behave in an unsafe manner (Siu et al., 2004; Masood & Choudhry, 2012).

According to Manjula and De Silva (2018, p. 50), “experience let the workers know what sort of danger they are dealing with and what would the consequences be of work-related accidents”. Employees’ experience is not only influenced by on-the-job work experience, by also by the level of theoretical and practical safety knowledge they have ascertained which enables them to understand and appreciate the purpose of health and safety procedures (Idirimanna & Jayawardena, 2011; Manjula & De Silva, 2018). However, experience is also dangerous in term of safety behaviour due to the increase in comfort level with the task. For example, a study conducted by Gherardi and Nicolini (2002) reveal that experienced employees become overconfident in their ability to perform dangerous tasks, thereby taking shortcuts, and reducing overall carefulness.

Employees’ self-esteem also plays a role in the degree to which safe workplace behaviours are conducted. For example, Choudhry and Fang (2008) found that employees often feel uncomfortable following safety procedures to avoid being mocked by others (for example, choosing not to wear the correct PPE). In addition, employees who want to be recognised for their ‘braveness’ and to obtain a promotion conduct risky jobs to exhibit their self-esteem (Choudhry & Fang, 2008). Often, this entails taking extra risks and some sort of unsafe behaviour that is in breach of safety policy and procedure (Choudhry & Fang, 2008). Employees may give into peer pressure whereby they feel the need to conform the group, albeit the group may be acting in the wrong (e.g., failing to wear safety gloves because it is uncomfortable).

Finally, performance pressure exerted on employees influences the degree to which they engage in safe work behaviours. Proof positive, employees are often compelled to complete projects and work tasks quickly, resulting in a lack of adherence to safety rules and increased accident rates (Manjula & De Silva, 2018). Several studies have concluded that one of the most reported causes of unsafe behaviour is pressure to meet unrealistic deadlines (Flin, Mearns, O'Connor, & Bryden, 2000; Mohamed, 2002). In due course, employees engage in certain coping strategies to deal and manage with stress caused by workplace pressure to perform and meet deadlines. Specifically, construction employees are constantly exposed to physical threats to their health and safety, along with pressure exerted to get the job done. Often in construction there are performance bonuses for meeting target or project deadlines,

and sometimes if the organisation does not meet their deadlines, they are fined or subject to pay penalty fees. This causes managers and supervisors to put additional pressure on employees to complete tasks. In turn, performance pressure may increase the likelihood of safety hazards whereby unsafe coping mechanisms are applied. Employees who face a high level of work-related stress place their mental and physical health at risk when using unsafe coping mechanisms, inadvertently affecting occupational health and safety performance (Brenda & Steve, 2006).

Coping strategies affect one's cognitive and behavioural efforts to combat a stressful encounter, which can either yield positive or negative consequences (Brenda & Steve, 2006). Examples of positive psychological coping strategies include rational problem solving, humour, wishful thinking, and seeking support. These are some of the most frequently reported coping strategies for employees who work in a construction environment (Brenda & Steve, 2006). In addition, employees who take care of their physical health (eat healthy, exercise regularly, and sleep plenty) are more equipped to effectively deal with work-related pressures, without compromising the application of safety procedures (Manjula & De Silva, 2018). However, employees who exhibit low self-esteem are more likely to adopt unhealthy coping strategies when working under constant managerial pressure and demands (Bamberger & Bacharach, 2006; Manjula & De Silva, 2018).

Drawing from previous studies of construction workers (Remier, 1979) and railroad workers (Bacharach, Bamberger, & Sonnenstuhl, 2018), unhealthy coping mechanisms in the form of substance abuse on or off the job is indicative of employees' efforts to resist managerial control and deal with work pressure and deadlines. This may interfere with the employee's ability to fulfill safe work behaviours and, in turn, may have considerable destructive personal, social, and occupational consequences (Bamberger & Bacharach, 2006). In basic terms, substance abuse can put employees at risk of injury, as drugs or alcohol impairs judgement and alters risk perception (Manjula & De Silva, 2018).

2.3.2.2 Organisational aspects

There are five noteworthy organisational aspects that contribute to safety behaviour. First, Neal and Griffin (2002) claim that leadership is a critical determinant of safety as leaders play a vital role in creating a workplace climate that promotes safety. Leaders act as role models and must ensure that their teams have sufficient knowledge, skills, and motivation to execute their tasks safely (Neal & Griffin, 2002). If employees do not have the knowledge, skill, or motivation to comply with safety regulations, they typically choose not to carry out the actions associated with safety activities (Neal & Griffin, 2002). Alternatively, whether employees engage in safety behaviours may depend on the leader's behaviour that they are modelling (Hoffmeister, et al., 2014). In general, it is conjectured that when leaders encourage self-confidence and behave in admirable ways it will cause employees to identify with them and, consequently motivate them to work towards the same goals (Nielsen et al., 2008). For example, the implementation of behaviour-based safety programmes has demonstrated to be an effective leadership approach for increasing the occurrence of safe behaviours (DePasquale & Geller, 1999; Choudhry, 2014).

Second, leaders' commitment to safety is central to the promotion of safe behaviours among employees (Choudhry, Fang, & Mohamed, 2007). Manjula and De Silva (2018, p. 51) report that "there is so little that can be expected from workers regarding safety if the top management's attitude to safety is dull". For example, if a manager walks in a construction site and is not wearing a safety shoes, a hard hat, high visibility vest and other required PPE, then followers will learn from that behaviour. By implication, if leaders do not advocate for safety and demonstrate safety behaviours, then one cannot expect employees to do so. Third, the furnishing and use of the correct tools and PPE are preconditions for improving safety behaviour (Choudhry & Fang, 2008). It is used to protect employees against known health and safety risks associated with specific tasks. For example, goggles must be provided to employees and should be worn to protect their eyes from dust, metal, or wood chips when using power tools.

Fourth, employees must be trained on the basic principles of the occupational health and safety, minimum requirements for compliance, management controls, and record keeping (Occupational Health and Safety Act 85 of 1993, 2004). In other words, employees must receive orientation and refresher training with regards to the

organisation's health and safety management system, namely policies, procedures, employer and employee responsibilities, resources, objectives, implementation, and maintenance of health and safety standards (Belebo, Santos, & Silva, 2014). Finally, health and safety monitoring systems must be implemented to monitor employees' attitudes and behaviours toward safety to identify and manage potential problems (Mohamed, 2003). This includes appointing health and safety officers to conduct regular audits and to report on successes and failures.

2.3.3 Impact of demography

According to Hinze (1997), employees' perceptions about safety in the workplace and associated behaviours are affected by their demographic characteristics, such as gender, age, job category, experience, and education. Jones and Preziosi (2009) discovered that females in a safety group (workplace safety programme) tend to observe higher safety ratings than males. However, females that were not in a safety group and males (regardless of group) demonstrated equal safety ratings (Jones & Preziosi, 2009). This means that females in the safety group followed the rules and had the most positive perceptions about workplace safety. The authors also found that there is a statistically significant difference between population group and safety.

It has been recorded that employees' age and accident risk are inversely related as older employees are typically more safety conscious and have more knowledge and experience when compared to younger employees (Choudhry & Fang, 2008; Jackson & Loomis, 2002; Salminen, 1996). The latter can be linked to employment tenure, where by Jones and Preziosi (2009) maintain that length of employment is a significant predictor of safety.

In general, the logical assumption would be that safety behaviour should increase, alternatively the occurrence of workplace injuries should decrease with age and employment tenure.

2.3.4 Consequences of safety behaviour

Employees who behave unsafely at work are frequently faced with negative consequences, such as loss of income and financial wellbeing, and increased healthcare costs and stress (Maine Department of Labor, 2013). However, employees who embrace safe workplace behaviours not only protect themselves, but also significantly improve an organisation's financial performance by reducing incident costs, insurance premiums, and operating costs (Cooper, 2010; Amissah, Agyei-Baffour, Badu, Agyeman, & Badu, 2019). Safe behaviours reduce the cost of workers' compensation insurance and lessens the financial impact on production losses, equipment damage, hiring and training of new employees, and lost work time (Maine Department of Labor, 2013).

In addition to this, safe workplace behaviours lead to observable advantages that augment workplace experiences and work systems (Griffin & Hart, 2000; Neal & Griffin, 2006). Case in point, a study conducted by DePasquale and Geller (1999) revealed that the following rewards are enjoyed when leaders attain employees' buy-in to the principles of behavioural safety: (1) trust in leadership and co-workers, (2) individual and group accountability, (3) greater involvement and voluntary participation in safety-related activities, and (4) satisfaction with training interventions.

Even though occupational health and safety is driven by the behaviour of frontline employees, leaders play a vital role in advocating, modelling, and strengthening such behaviours (Health and Safety Authority, 2013). The positive outcomes of safe workplace behaviours may not be observed without strong leadership attesting the importance of thereof (Health and Safety Authority, 2013). This highlights the value of leadership in encouraging a safe workplace.

Because employees working in high-risk environments are exposed to diverse workplace demands, such as physically demanding work and working with dangerous equipment, leaders are responsible for ensuring that the degree of exposure to risk is alleviated through the provision of job resources (Nahrgang, Morheson, & Hofmann, 2011). Employees with adequate job resources are more likely to be engaged in their work activities and therefore more likely to comply with safety procedures and activities (Nahrgang et al., 2011).

2.4 WORK ENGAGEMENT

Engagement is defined as the “harnessing of organization members’ selves to their work roles: in engagement, people employ and express themselves physically, cognitively, emotionally, and mentally during role performances” (Kahn, 1990, p. 694). More recently, Macey, Schneider, Barbera and Young (2009) describe it as focused energy and discretionary effort directed toward achieving organisational goals. These definitions demonstrate that work engagement is largely conceived in terms of affective organisational commitment (the persistent emotional attachment to and desire to stay with the organisation) and extra-role behaviour (behaviour that encourages effective organisational functioning) (Schaufeli, 2012).

Over the past two decades, work engagement has become an increasingly more popular concept in the organisational context (Bakker & Albrecht, 2018). This is attributable to the positive outcomes it has at both the individual level (growth and development) and group level (performance quality) (Bakker, Demerouti, & Sanz-Vergel, 2014; Schaufeli, 2012). For this reason, organisations are increasingly more concerned with employees’ psychological connection with their work and their commitment to high performance standards (Bakker, Albrecht, & Leiter, 2011).

2.4.1 Work engagement factors

Work engagement is regarded as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli & Bakker, 2004, p. 295). In basic terms, engaged employees should experience their work as stimulating time-devotion efforts, that is also a meaningful pursuit to exercise full concentration (Bakker & Demerouti, 2008).

2.4.1.1 Vigour

Vigour refers to high energy levels and mental resilience at work (Bakker & Demerouti, 2008). According to Shirom (2007), vigour is a positive affect experienced at work that is influenced by important elements in one’s work and work environment. That is, vigorous employees feel physically strong, emotionally energetic, and possess

cognitive liveliness (Shirom, 2003; Shirom, 2007). Latham and Pinder (2005) maintain that vigour relates to work motivation as it is considered to be a set of energetic forces that determine the level of intensity and direction of work-related behaviour. To this end, goal-directed behaviour is facilitated by vigour and, therefore prompts employees to engage in their work (Fredrickson, 2002; Watson, 2002).

2.4.1.2 Dedication

Dedication refers to being involved in one's work to the extent that one is enthusiastic and experiences a sense of meaning and challenge (Bakker & Demerouti, 2008). It captures self-disciplined work behaviours that help employees persevere during challenging times and offer to perform tasks that are not outlined in their job descriptions (Liu, Liu, Mills, & Fan, 2013). These behaviours include motivated acts, such as following organisational rules, working hard, taking initiative, and helping co-workers (Van Scotter & Motowidlo, 1996).

Dedicated and enthusiastic employees typically engage in proactive work-related behaviours as a means of promoting and sustaining positive work situations (Sonnentag, 2003). This means that dedication serves as a motivational foundation for job performance as there is an expectancy of task success and behaviour that is goal oriented (Van Scotter & Motowidlo, 1996).

2.4.1.3 Absorption

Absorption refers to being fully immersed in one's work, whereby time elapses quickly (Bakker & Demerouti, 2008; Bakker & Albrecht, 2018). According to Ho, Wong, and Lee (2011, p. 39), absorption denotes "the intensity of focus and immersion that one experiences when working, and individuals who are absorbed would be deeply engrossed and not easily distracted by other activities".

It is important to note that absorption differs from attention. Attention is merely the number of cognitive resources expended to concentrate on a given task or action, whereas absorption is a much more intense level of concentration and immersion in

one's work (Rothbard, 2001). In other words, employees with high levels of absorption experience work as fun and not compulsory (Schaufeli, et al., 2001).

2.4.2 Potential causes of work engagement

Figure 2 provides a representation of work engagement as outlined by the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2008). This model is useful in understanding how work engagement affects individual and organisational performance (Bakker & Demerouti, 2008).

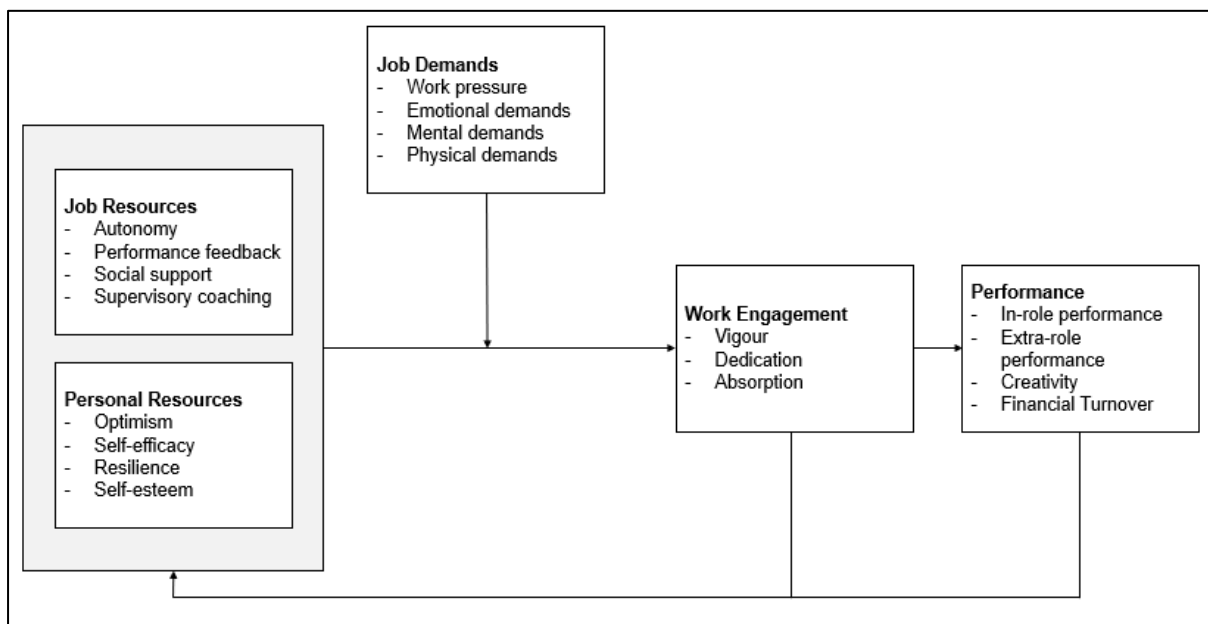


Figure 2: Work engagement model (Bakker & Demerouti, 2008).

The model shown in Figure 2 assumes that both job and personal resources predict work engagement in relation to the presence of job demands. Furthermore, work engagement is also related to performance which, in turn, illustrates that both work engagement and performance are influenced by employees' resources. In relation to the construction environment that is commonly perceived as complex and hazardous, the model demonstrates how work engagement is critical to achieve occupational health and safety.

In line with the above-depicted model, the potential causes of work engagement are addressed through the lens of the JD-R model. The model explores ways in which burnout and work engagement may be produced by two specific sets of working conditions that are present in all work environments, namely job demands and job resources (Schaufeli, Bakker, & Van Rhenen, 2009). In addition, the literature consistently shows a distinction between job and personal resources that drive work engagement (Christian, Garza, & Slaughter, 2011; Schaufeli, 2012; Bakker & Albrecht, 2018).

Irrespective of the occupation, the doctrine of the JD-R model is that job demands may conjure strain processes, while job resources stimulate motivational processes (Bakker & Demerouti, 2008). Consequently, employees' work engagement levels are determined by the trade-off between job demands and job resources.

2.4.2.1 Job demands

Job demands include physical, psychological, and social elements of a job that necessitate sustained effort and, eventually result in physical and/or psychological costs (Demerouti & Bakker, 2011; Hakanen, Schaufeli, & Ahola, 2008). For example, high work pressure, irregular work hours, or unfavourable physical work environment (Demerouti & Bakker, 2011). In this case, construction workers are typically faced with a dangerous work environment, long work hours to meet targets and project deadlines, and physically demanding work that leaves them fatigued.

Job demands may translate to stressors that entail prolonged efforts to maintain expected levels of performance (Hakanen, Schaufeli, & Ahola, 2008). In basic terms, stressed employees are challenged with the barter of protecting performance goals and the mental effort needed in order to achieve those goals (Schaufeli et al., 2009). Accordingly, continued exposure to high job demands invokes a health impairment process that exhausts employees' physical and psychological resources which, in turn, lead to fatigue and irritability (Demerouti & Bakker, 2011).

It is no secret that employees are often faced with sundry job demands which can have noteworthy effects on their wellbeing and performance (Rich, LePine, & Crawford, 2010). Even more so, employees who operate in high-risk environments are

presented with additional job demands, including exposure to hazardous materials or manual labour which may lead to an entirely different set of outcomes for employees, such as on-duty injuries, workplace accidents and fatalities (Nahrgang et al., 2011). From an occupational health and safety point of view, organisations are responsible for mitigating and reducing job demands so as to eliminate performance errors that could, otherwise have been avoided. Scholars reiterate that job demands are manageable and discovered that employees demonstrate the best performance in resourceful and motivational challenging work environments, as employees are likely to be more determined to pursue their goals (Demerouti & Cropanzano, 2010). This, however, necessitates the availability and accessibility of adequate job resources (Bakker et al., 2012).

2.4.2.2 Job resources

Job resources capture the observed (physical) and perceived (social) aspects of a job that influence job performance (Schaufeli & Bakker, 2004). In basic terms, having job resources may lead to reduced pressure experienced from job demands, increased growth, and learning and development (Schaufeli et al., 2002; Rich et al., 2010). Examples of job resources include co-worker support, managerial support, training, appreciation, and feedback (Bakker, Tims, & Derks, 2012).

Research suggests that managerial employees facilitate employee engagement and performance as they influence both job demands and resources by establishing resourceful work environments, encouraging, and recognising employees, and providing feedback (Harter, Schmidt, & Hayes, 2002; Nielsen, Randall, Yarker, & Brenner, 2008). In this case, job resources play an extrinsic motivational role due to the environment that encourages employees' willingness to devote their time and energy to work tasks (Bakker et al., 2012). For example, employees are given the opportunity to improve on certain areas through performance feedback which, in turn, increases the likelihood of successful goal achievement (Schaufeli & Bakker, 2004; Bakker et al., 2012). Employees are, therefore, equally responsible for mobilising their own job challenges and resources as managers are not always available to provide feedback (Bakker et al., 2012). Employees need to be proactive and optimise their

own work environment to manage these demands and challenges (Bakker et al., 2012). This implies creating opportunities for growth, building connections with colleagues and networking.

2.4.2.3 Personal resources

Personal resources are positive self-evaluations associated with resiliency and denotes an employee's ability to effectively control their environment (Hobfoll, Johnson, Ennis, & Jackson, 2003). Examples of personal resources include self-efficacy, hope, optimism, and resilience (also known as PsyCap) (Van Wingerden, Bakker, & Derks, 2016). Proof positive, employees who has high levels of PsyCap are typically more engaged in their work because of their ability to mobilise their job resources (see Section 2.5) (Xanthopoulou, Bakker, Demerouti and Schaufeli, 2009). In general, job resources and personal resources buffer the impact of job demands (Bakker et al., 2014). When employees have both job- and personal resources, they are better able to carry out their duties and responsibilities in a manner that meets or exceeds performance expectations.

2.4.3 Impact of demography

The literature provides conflicting results on studies that have examined variation in work engagement in relation to employees' demographic characteristics.

According to Schaufeli and Bakker (2004), employees' work engagement levels are affected by their demographical characteristics. For example, Coetzee and De Villiers (2010) discovered that there are notable differences in work engagement levels between males and females. Specifically, the authors noted that women tend to be more engaged in their work than their male counterparts. On the other hand, Ariani (2013) found no statistical significance between work engagement levels and employees' gender. In addition, Naruse et al. (2013) found that merely age demonstrates a statistical correlation with work engagement. This means that as employees grow older, their work engagement levels are expected in increase. This line of reasoning may lead to the rational conclusion that engagement levels should, therefore also be affected by length of service. Hasanati (2018) found that employees

with more years of employment experience higher work engagement as their tenure allows them to understand and absorb the work environment both physically and socially. However, Cheruiyot and Korir (2016) did not find a statistically significant relationship between work engagement and employment tenure.

Smulders (2006) maintains that employees who occupy positions that allow for greater autonomy and control exhibit higher work engagement levels. Consequently, one may argue that employees in supervisor and managerial positions are likely to benefit from higher work engagement when compared to employees in job categories that are lower in the hierarchy.

2.4.4 Consequences of work engagement

There is a constant push-and-pull towards achieving balance to avoid dysfunctional workplace engagement. That is, under-engaged employees are withdrawn from their work and tend to conceal their lack of productivity by shifting the performance burden (MacCormick, Dery, & Kolb, 2012). On the other hand, over-engaged employees invest extreme levels of concentration and duration of efforts towards their work (MacCormick, Dery, & Kolb, 2012). Macey and Schneider (2008) posit that high engagement is characterised by work absorption in that employees are eager, dedicated, and overly concerned with their work. Consequently, they have fewer psychological resources at their disposal as they invest a great amount of energy and attention in their work, thereby reducing the availability of psychological resources to address other duties and responsibilities (Macey & Schneider, 2008). This indicates that employees with too high levels of engagement are more prone to burnout, which is a reaction that consists of fatigue, pessimism, and the absence of effectiveness (Fragoso et al., 2016, p. 479; Schaufeli, Taris, & Van Rhenen, 2008). According to Maslach and Leiter (1997), the primary component of burnout is exhaustion which result from long-term exposure to work demands. Proof positive, a study conducted by Schaufeli and Salanova (2007) yielded a moderately negative relationship between work engagement and burnout, with correlations ranging from -0.30 to -0.65. More recently, studies have shown that work engagement and burnout are strongly negatively correlated (Salmela-Aro & Read, 2017).

When optimal engagement is achieved, employees yield better performance outputs (Shimazu et al., 2010). High engagement levels translate to better service quality (Salanova, Agut, & Peiro, 2005). Harter, Schmidt, and Hayes (2002) show that employee engagement positively relates to customer satisfaction, productivity, safety, and profitability. However, there are numerous factors that must be considered to explore the actual consequences of employee engagement (e.g., wellbeing, extra-role behaviours, and job-related attitudes) (Shimazu, Schaufeli, Miyanaka, & Iwata, 2010). Specifically, engaged employees are more likely to be satisfied with their jobs, willing to “go the extra mile” and, in turn, are committed to the organisation (Demerouti, Bakker, De Jonge, Janssen, & Schaufeli, 2001; Schaufeli & Bakker, 2004). This is attributed to the belief that engaged employees exhibit proactive behaviour, learning motivation, and experience physical and mental health (Sonnentag, 2003).

Based on the causes and consequences of work engagement, it can be argued that employees with higher work engagement also demonstrate a high level of PsyCap (Paek, Schuckert, Kim, & Lee, 2015).

2.5 PSYCHOLOGICAL CAPITAL

PsyCap is defined as an individual’s positive psychological state that enables individuals to draw on the needed psychological strengths to fulfil challenging tasks, redirect paths in order to thrive and bounce back from hardship (Luthans et al., 2007). In addition to economic and human capital, organisations have come to recognise the importance of PsyCap on work attitudes, behaviours, and performance (Avey, Luthans, & Jensen, 2009; Choi & Lee, 2014).

PsyCap is a form of POB which signifies the emerging focus on a positive approach to measure, develop, and manage psychological resources in the workplace (Luthans, 2002a). Essentially, POB is the manner in which employees apply their positive psychological resources, such as PsyCap in order to improve individual outcomes as it allows them to build on strengths, rather than trying to improve weaknesses.

Figure 3 offers a visual representation of PsyCap as adapted from Newman et al. 2014. The essence of this framework is discussed below.

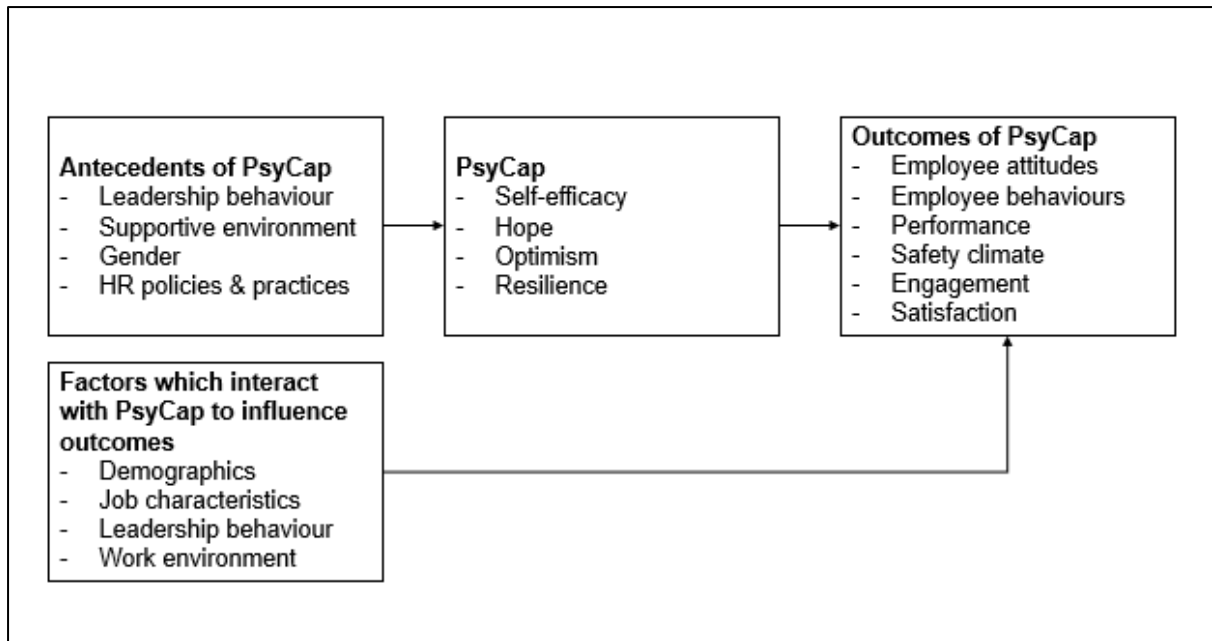


Figure 3: PsyCap model (adapted from Newman et al., 2014).

2.5.1 Psychological capital factors

The psychological components that embody PsyCap and that have satisfied scientific inclusion criteria to date include (1) self-efficacy to succeed at challenging tasks, (2) hope that goals will be achieved, (3) optimism to succeed now and in the future, and (4) resilience to succeed in the face of adversity (Luthans, Youssef, & Avolio, 2007). These factors are discussed below.

2.5.1.1 Self-efficacy

The concept of self-efficacy is derived from Bandura's (1977) social learning theory and is considered to make "a difference in how people feel, think, behave, and motivate themselves" (Zulkosky, 2009, p. 94). As such, Bandura (1994) explains that perceived self-efficacy is individuals' opinions about their abilities to produce specified levels of performance. Correspondingly, Stajkovic and Luthans (1998) portray self-efficacy as the belief about one's own capabilities to utilise motivation, cognitive resources, and the courses of action needed to effectively execute a specific task within a given context. The authors explain that it is an individual's belief about his/her ability to accomplish specific tasks and the necessary courses of action to ensure that

a specific task is completed. In support of this, Lunenburg (2011) argues that self-efficacy determines what tasks employees choose to learn, the goal they set for themselves, and affects their level of effort and persistence when learning difficult tasks.

Self-efficacy has been proven to positively influence work performance as employees with high self-efficacy are able to distinguish between high and low payoff activities (Bandura & Locke, 2003). Moreover, they can function independently and are not derailed by negative feedback or obstacles when pursuing career goals (Bandura & Locke, 2003; Luthans et al., 2007).

2.5.1.2 Hope

Snyder (2000, p. 8) conceptualises hope as the “perceived capabilities to produce routes to desired goals, along with the perceived motivation to use those routes”. His portrayal of hope incorporates two components, namely agency (goal directed determination) and pathways (planning of ways to meet goals). Agency embodies the motivational component to start and maintain the use of a particular pathway, while pathways represent an individual’s flexibility to mitigate setbacks by producing alternative routes to achieve the desired goal (Snyder, 2002; Geraghty, Wood, & Hyland, 2010). In basic terms, hope allows an employee to find ways to deal with change as problems are more likely to be perceived as learning opportunities, rather than obstacles (Beal, Stravos, & Cole, 2013).

This concept should not be seen as wishful thinking, but rather a state of mind whereby an employee can set realising goals and expectations to achieve them (Du Plessis M., 2014). Hope is typically developed and maintained through effective goal setting, that is, goals that are specific, measurable, attainable, realistic, and time bound (Luthans et al., 2007). For this reason, hope has been found to be positively related to work performance as employees with high levels of hope tend to motivate themselves and others to achieve goals and objectives (Luthans et al., 2007).

2.5.1.3 Optimism

Optimism adopts a broader perspective than hope which can be explained through its theoretical rationalisation of both positive and negative events to set realistic goals (Youssef & Luthans, 2007). More specifically, optimism is the predisposition to seek and make a positive attribution to personal and work-related circumstances, while expecting a favourable outcome (Seligman, 1998; Seckinger, Langerak, Mishra, & Mishra, 2010). It lessens a sense of guilt when an employee is faced external problems that threaten goal achievement and allows for a positive orientation towards change (Seligman, 1998; Youssef & Luthans, 2007).

Optimism is associated with positive performance in both work and personal life domains, such as education (Seligman, 2002). In general, organisations benefit from employing optimistic individuals as they are inclined to deal readily deal with obstacles and changes than pessimistic employees (Luthans et al., 2007).

2.5.1.4 Resilience

Resilience involves an individual's ability to maintain positive adjustment, coping successfully, and bouncing back when facing positive and challenging events (Luthans, 2002b). Gurman and Saks (2011) explain that resilience is typically developed through training programmes in order to promote specialised knowledge and the ability to commit and recover from mistakes which, in turn, foster work engagement and improved performance.

Avey et al. (2009) maintain that employees must be able to draw from PsyCap to help combat the dysfunctional effects of stress that may, eventually lead to higher employee turnover rates. Resilient employees are, therefore better equipped to deal with constant change as they are typically open to new learning experiences and demonstrate greater levels of emotional stability when faced with changing workplace demands (Avey et al., 2009). Therefore, resilience has continuously been proven to be positively related to commendable work performance (Luthans et al., 2007).

2.5.2 Potential causes of psychological capital

The literature offers two overarching categories of potential factors which lead to or inhibit PsyCap, namely the work environment and job characteristics (Avey, 2014; Newman, Ucbasaran, Zhu, & Hirst, 2014; Sameer, Mohamed, & Mohamad, 2019).

2.5.2.1 Work environment

A work environment conducive to PsyCap is shaped and maintained by various factors. First, supportive leaders are known to be a crucial contributing factor of employees' PsyCap. In this respect, employees expect their supervisors and managers to support them by supplying resources, providing guidance, and offer support (Cimen & Ozgan, 2018). Luthans, Norman, Avolio, and Avey (2008) maintain that the provision of workplace support enables the development of PsyCap as it provides employees with hope to pursue alternative ways to achieve their goals and helps them to recover from setbacks. That is, the attainment of feasible performance can be observed when employees function in an environment that supports the development of PsyCap. For example, Nigah, Davis, and Hurrell (2012) noticed that socialising systems, such as a "buddy-system" used to onboard new employees, result in higher PsyCap among new recruits.

This further implies that organisational leaders who exhibit positive traits have a positive impact on the development of others' PsyCap, such as patience, understanding, trust, friendliness, and flexibility (Cimen & Ozgan, 2018; Newman et al., 2014). In addition, when leaders communicate and delegate effectively, ensure work-life balance mechanisms are in place, and provide vocational guidance, their followers' PsyCap increases (Cimen & Ozgan, 2018). However, leaders can also damage the development of PsyCap when they adopt a bureaucratic approach, fail to acknowledge good performance, and spread fear by demanding perfection and unfairly disciplining employees (Cimen & Ozgan, 2018).

Second, co-workers and the physical workplace setting have been shown to be another key factor in developing PsyCap. This means that employees and their co-workers who share experiences, pursue common goals, and work together to achieve their goals are more likely to exhibit high PsyCap (Cimen & Ozgan, 2018). The latter

is further aided by working in clean and hygienic work conditions, coupled with access to sufficient resources and equipment (Cimen & Ozgan, 2018).

2.5.2.2 Job characteristics

Hackman and Oldham (1975) present the job characteristics theory to explain how organisations can use these dimensions to inspire positive work-related attitudes and improved performance, namely task significance, autonomy, feedback, skills variety, and identity. In essence, the theory suggests that job dimensions create the presence or absence of critical psychological states that will result in positive or negative outcomes pertaining to motivation and performance (Hackman & Oldham, 1975; Sameer et al., 2019).

These critical psychological states include “(1) experienced meaningfulness of the work, (2) experienced responsibility for the outcomes of the work, and (3) knowledge of the results of the work activities” (Hackman & Oldham, 1975, p. 160). In other words, the extent to which a person experiences meaningfulness is influenced by the extent to which he/she can enjoy skill variety and task significance. For example, an employee who constantly faces difficult tasks may report lower levels of PsyCap, given that, for example self-efficacy determines what tasks an employee can perform and what tasks he/she can master (Avey, 2014; Lunenburg, 2011). However, when an employee who experiences success in a challenging job, his/her PsyCap is likely to increase (Avey, 2014). The same holds true for “experienced responsibility” as it is augmented by sovereignty and information that is retrieved when regular feedback is given (Hackman & Oldham, 1975). These psychological states are important in the workplace, as they combat job stress and anxiety, while improving employee wellbeing and performance outcomes (Avey et al., 2011).

2.5.3 Impact of demography

Similar to safety behaviour and work engagement, previous study results are contradictory when exploring PsyCap variation in relation to demographic characteristics.

Prasad and Sandhyavani (2019) report that employees' gender, age, experience, and educational level influence employees' PsyCap, while designation has no effect. Correspondingly, Bonanno (2004) found that males report higher levels of PsyCap. However, a study conducted by Caza, Bagozzi, Wooley, Levy, and Caza (2010) did not yield any variation in PsyCap responses based on gender.

The same holds true when other demographic characteristics are considered. Luthans, Avolio, Walumbwa, and Li (2005) found that age is positively related to PsyCap. This implies that older employees are more likely to exhibit higher PsyCap when compared to younger employees. Harris (2012) noticed that occupational category plays a role in overall PsyCap. Nevertheless, Beal III, Stravos, and Cole (2013) report that there are no noteworthy differences in age, gender, and employment tenure.

2.5.4 Consequences of psychological capital

The PsyCap literature boasts an abundance of positive outcomes observed at the individual, group, and organisational level. Case in point, Walumbwa, Peterson, Avolio, and Hartnell (2010) argue that there is a trickle-down effect applicable, whereby individual's PsyCap is transferred to teams, departments, and eventually to the organisation.

At the individual level, several studies have explored the relationship between PsyCap and desirable employee attitudes, such as job satisfaction (Bergheim, Nielson, Mearns, & Eid, 2015) and organisational commitment (Kim, Seo, Kim, & Min, 2015). The general standpoint is that employees with high PsyCap have positive expectations and believe in their abilities to deal with work-related challenges (Newman et al., 2014). PsyCap has also been proven to positively affect employee negativity and undesirable workplace behaviours, such as pessimism toward change and turnover intention (Avey, Reichard, Luthans, & Mhatre, 2011), and counterproductive and deviant behaviour (Avey, Hughes, Norman, & Luthans, 2008). Moreover, Avey, Luthans, and Youssef (2010, p. 439) report that "PsyCap's agentic thinking has a motivating impact that can enhance internalization, determination, and pathways thinking, which contradict with the 'giving up' and despair associated with cynicism."

To a large extent, positivity widens the spectrum of problem-solving skills and adaptive mechanisms, while creating intellectual and psychological resource defences (Fredrickson & Joiner, 2002). When positivity is applied to daily work performance, it will result in improved performance and emotional wellbeing (Fredrickson & Joiner, 2002).

The impact of individual employees' high PsyCap has also been found to aggregate to the group level, thereby naturally improving group performance (Clapp-Smith, Vogelgesang, & Avey, 2009; Walumbwa, Luthans, Avey, & Oke, 2011). Employees function optimally as group cohesiveness is realised and shared goals are achieved through knowledge-sharing and teamwork (Walumbwa et al., 2011). In the long run, teams with high PsyCap cascade to the organisational level. McKenny, Short, and Payne (2013) confirm that PsyCap strongly relates to organisations' financial performance as individual and team PsyCap dimensions can be elevated to the organisation (organisational hope, optimism, confidence, and resilience) (McKenny et al., 2013). In basic terms, organisations are positioned to enjoy the fruitfulness of decreased employee absenteeism (Avey, Patera, & West, 2006) and employee turnover (Abbas, Raja, Darr, & Bouckenoghe, 2014), and increased commitment (Pillay, Buitendach, & Kanengoni, 2014).

By the same token, if one acknowledges that individual, group, and organisational outcomes are driven by organisational leaders, it is necessary to delve into the realm of authentic leadership as it is rooted in positive emotions, hope, self-confidence, and goal achievement (Joo & Jo, 2017). Therefore, it is postulated that a positive relationship exists between PsyCap and authentic leadership.

2.6 AUTHENTIC LEADERSHIP

Authentic leadership is a process that is based on positive psychological capacities and a highly developed business context, which results in superior self-awareness and self-regulated leadership and follower behaviour that promotes self-development (Luthans & Avolio, 2003).

The field of leadership research has expanded over the years and, consequently a great deal of knowledge has been gained about this multifaceted phenomenon

(Cooper, Scandura, & Schriesheim, 2005). More recently, authentic leadership has been the topic of interest in both academia and business as the concept adds to the traditional leadership framework to acknowledge a more positive leadership style that is sufficient for developing leaders (Cooper et al., 2005; Luthans & Avolio, 2003).

According to Oren (2019), employees respond well to authentic leaders and are willing to go the extra mile for them which results in increased performance output and higher profit margins. In relation to the construction industry, authentic leaders can motivate employees in terms of health and safety practices to accomplish challenging tasks, such as decreasing the prevalence of workplace injuries and fatalities (Ofori, 2008).

Figure 4 demonstrates the authentic leadership model (Avolio et al., 2004).

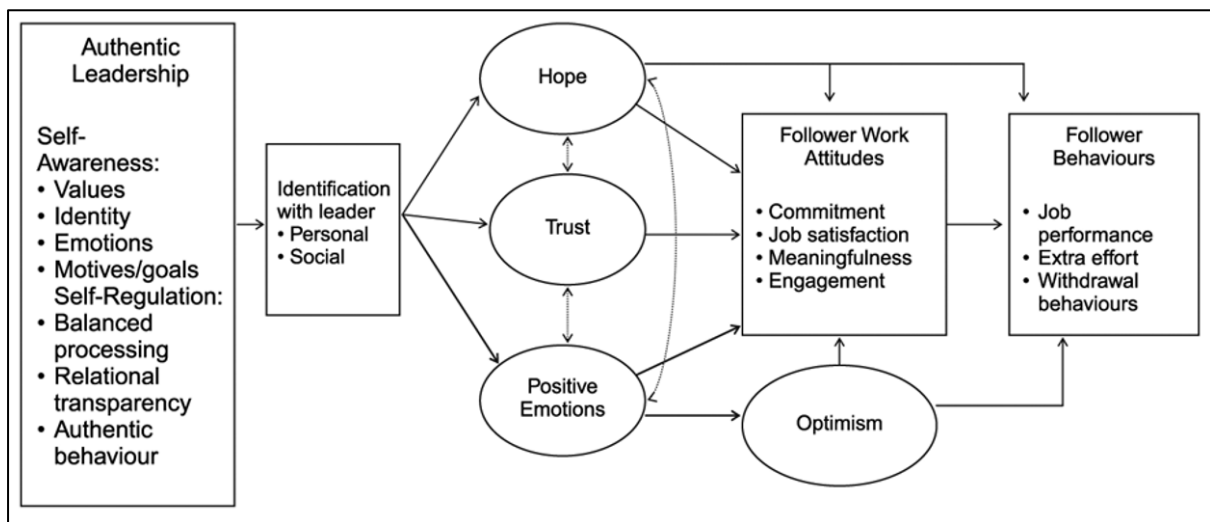


Figure 4: Authentic leadership model (Avolio et al., 2004).

The model depicted above acknowledges that there is a process that links authentic leadership to employees' attitudes and behaviour. In essence, the model shows that there are intervening variables (hope, trust, positive emotions, and optimism) at play. Interestingly, all constructs presented in the authentic leadership model are states that can be developed and show its relation to PsyCap (Avolio et al., 2004).

2.6.1 Authentic leadership factors

To better understand what constitutes authentic leadership, Gardner, Avolio, Luthans, May, and Walumbwa (2005) introduced a framework that focuses on two behaviours

on both the part of the leader and the follower, namely self-awareness and self-regulation.

Self-awareness is typically construed as the basic and fundamental awareness of one's capabilities, experience, and knowledge (Avolio & Gardner, 2005). It refers to leaders' ability to understand their own personal, values, motives, strengths and weaknesses and to recognise how followers view their leadership (Wang, Sui, Luthans, Wang, & Wu, 2014; Gill & Caza, 2018).

Self-regulation is the process through which leaders reveal their true selves to followers and act according to their values, in turn, they shape the self-regulatory processes of their followers (Avolio & Gardner, 2005). As such, it comprises of three integrating forms, namely transparency, ethical/moral perspective, and balanced processing (Gardner, et al., 2005; Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008). Therefore, authentic leadership, encompasses four primary characteristics: (1) self-awareness, (2) relational transparency, (3) ethical/moral perspective, and (4) balanced processing (Gardner et al., 2011). These are discussed below.

2.6.1.1 Self-awareness

Self-awareness is a prerequisite for authentic leadership and is demarcated as a higher-level concept which refers to the degree to which individuals are actively aware of their interpersonal relationships and/or interactions with others and of their internal states (Trudeau & Reich, 1995; Trapnell & Campbell, 1999; Riggio, 2014). This description recognises that that "there are individual differences in the extent to which people attend to or analyse their inner worlds" (Sutton, Williams, & Allinson, 2015, p. 611). In basic terms, it is the automatic process of understanding one's motives, emotions, and characteristics, how these self-aspects influence one's thoughts and behaviours, and being mindful of one's impact on others (Kernis, 2003; Ilies, Morgeson, & Nahrgang, 2005). George (2003) posits that self-awareness is accomplished when a person understands his/her passions and underlying motivations. In essence, the process of self-awareness enables an individual to compare him-/herself to internalised standards, and then make changes to reduce any inconsistency (Silvia & Duval, 2001).

2.6.1.2 Relational transparency

The concept of relational transparency is associated with honesty and truth-telling (Milton, 2009). This is attributable to the notion that relational transparency is the active process of “presenting one’s authentic self (as opposed to a fake or distorted self) to others” (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008, p. 95). Correspondingly, Goldman and Kernis (2002) explain that it is a process of self-disclosure whereby the leader openly communicates to others which, in turn, initiates the development of trust. This means that authentic leaders typically promote trust through the disclosure or expression of information, while trying to minimise displays of inappropriate emotions (Kernis, 2003). For example, authentic leaders are honest and straightforward in their dealings with their followers, so they do not have hidden agendas (Riggio, 2014).

2.6.1.3 Ethical/moral perspective

The literature designates ethics as the principles that govern right and wrong behaviour (Menzel, 2007), while morality is unwritten as the ability to distinguish between right and wrong conduct (Wart, 2003). Specific to authentic leadership, ethical/moral perspective is described as a transparent decision-making process whereby authentic leaders develop and draw upon reserves of moral capacity, efficacy, courage, and resiliency to address ethical issues and achieve trustworthy and sustained moral actions (May, Chan, Hodges, & Avolio, 2003).

The behaviour of authentic leaders’ rest on ethical and moral standards, especially when faced with external pressure, such as group and/or social pressure (Ilies et al., 2005). The authors further elaborate on this concept by maintaining that ethical/moral perspective produces transparent behaviours aimed at serving common interests which may, at times, conflict with the leader’s personal interests. In general, leaders must demonstrate ethical conduct and moral standards in their everyday decisions, discussions, and actions so that other employees can follow suit (Hassan & Ahmed, 2011).

2.6.1.4 Balanced processing

Balanced processing is the processing of self-relevant information while not distorting or denying internal experiences and external information (Yasir & Mohamad, 2016). That is, it is an individual's ability to objectively analyse relevant information before deciding on what action to take (Walumbwa et al., 2008).

Fundamentally, it means that authentic leaders do not misrepresent, overstate, or disregard information as they try to avoid bias by analysing all data before making a decision (Valsania, León, Alonso, & Cantisano, 2012). In general, authenticity forms the base for all the four components of authentic leadership (Caza et al., 2010). Case in point, Starratt (2017, p. 91) highlights that “being authentic does not mean being perfect; rather, it means accepting oneself with whatever talents and whatever limitations and imperfections one has. It also means being ‘upfront’ in one’s relationships, being present to the other person, being there in the now of the moment”.

2.6.2 Potential causes of authentic leadership

According to Boateng, Kyeremeh, Amoako, and David (2018), various leadership abilities are essential to the presence of authentic leadership practices. Specifically, leader self-learning and self-consistency have been recognised as forerunners of authentic leadership (Boateng et al., 2018; Peus, Wesche, Streicher, Braun, & Frey, 2012). These are constant processes of comprehending one’s own abilities and limitations, in conjunction with the degree of consistency between one’s values, beliefs, and actions (Peus et al., 2012). Leaders must be transparent about their values to be perceived as authentic, while demonstrating uniformity between their values, beliefs, and actions (Peus et al., 2012). Interestingly, this correlates with the factors of authentic leadership as noted in Section 2.6.1. In addition to self-learning and self-consistency, the degree of a leader’s self-monitoring processes is central to the context of authentic leadership. It reflects how susceptible a person is to construct an image that aligns with others’ desires and expectations (Gangestad & Snyder, 2000; Tate, 2008). As maintained by Tate (2008), low self-monitoring triggers a higher degree of authentic leadership abilities as both low self-monitors and authentic leaders act in manner that echoes their values and beliefs.

Authentic leaders exhibit positive psychological traits which enable them to give priority to developing others into leaders, such as confidence, hope, optimism, and resilience (PsyCap) (Luthans & Avolio, 2003). Like PsyCap, authentic leadership is rooted in POB as identified positive psychological capabilities have been proven to be state-like and therefore play a critical role in developing employees and teams to thrive (Luthans & Avolio, 2003). Jensen and Luthans (2006) assert that leaders with high PsyCap are likely to become authentic leaders. This is valid due to three reasons: (1) leaders who set and communicate goals clearly foster a hopeful work environment, (2) leaders are persuasive and can help their followers anticipate future occasions, and (3) resilient leaders are equipped to work in challenging situations and can encourage their followers to do the same (Jensen & Luthans, 2006).

2.6.3 Impact of demography

While some argue that leadership cannot be measured by demographic factors, others maintain that demographics are important to acknowledge as it provides a better understanding of leadership (Aldoory & Toth, 2004). Notwithstanding the extensive research available on leadership and demography, consensus has yet to be reached among researchers (Aldoory & Toth, 2004; Sürücü, Yeşilada, & Maşlakçı, 2018).

Research conducted by Woolley, Caza, and Levy (2011) suggest that leadership authenticity vary by gender, whereby the behaviours produce different outcomes among males and females. According to Cagle (1988), a leader's age is an important characteristic associated with leader maturity and style. On the other hand, Van Vugt (2006) argue that the relationship between age and leadership is more multifaceted. For example, gender and a mixture of age and education (maturity) may be determinants of authentic leadership (Barbuto, Fritz, Matkin, & Marx, 2007).

Eagly (2005) recommends that demographic characteristics, such as ethnicity, job category, and education, are important factors that can explain perceptions of leadership authenticity. Regrettably, limited empirical studies exist that explore authentic leadership in relation to these demographic characteristics.

2.6.4 Consequences of authentic leadership

It is no secret that leaders are essential in organisations to promote healthy work environments that influence employees' performance and organisational outcomes (Alilyyani, Wong, & Cummings, 2018). It is, therefore, important to keep in mind that leadership styles comprise of sets of perceptible and visible qualities derived from the leader's beliefs and values (Pinelli et al., 2018).

Extant research demonstrates the noteworthy relationship between authentic leadership and positive employee and organisational outcomes, such as creativity (Malik, Dhar, & Handa, 2016), employee wellbeing (Haung, 2017), job satisfaction and organisational commitment (Baek, Han, & Ryu, 2019), and overall performance at the individual, group, and organisational level (Lyuboynikoya et al., 2017).

The proven positive outcomes of authentic leadership are generally attributed to the way in which authentic leadership is transferred. To clarify, authentic leaders are superior to non-authentic leaders, especially during periods of change because of their self-awareness (Avolio & Gardner, 2005). This empowers them to regulate personal biases and allows them to maintain objectivity when reacting to information which, in turn, facilitates open and honest relationships with employees (Avolio & Gardner, 2005; Pinelli et al., 2018). Furthermore, their ability to positively influence others results in sustainable employer-employee relationships, leading to employee reciprocation consistent with the leader's values and beliefs (Ilies et al., 2005). In basic terms, leadership authenticity initiates a trickle-down effect from the leader to the follower whereby the positive behaviours transform others into authentic leaders (Luthans & Avolio, 2003). In support of this, leader-member exchange (LMX) theory proposes that an exchange relationship exists between each leader and his/her follower who has an influence on the follower's decision-making processes and overall conduct.

2.7 RELATIONSHIP BETWEEN THE CONSTRUCTS IN THE STUDY

A theoretical relationship between authentic leadership, PsyCap, work engagement, and safety behaviour can be derived from the literature. When looking at the schematic representation of each construct, it seems that they are interlinked.

Consistent with authentic leadership theory, leader self-awareness and self-regulation processes promote both positive psychological capacities and employee outcomes, such as heightened levels of PsyCap, work engagement, and sustainable performance (Gardner, Avolio, Luthans, May, & Walumbwa, 2005; Walumbwa et al., 2007; Joo & Jo, 2017). Gardner et al. (2005, p. 4) argue that authentic leaders “draw from the positive psychological states that accompany optimal self-esteem and psychological well-being, such as confidence, optimism, hope and resilience, to model and promote the development of these states in others”. In other words, an authentic leader’s actions are assumed to inspire followers to become authentic through positive modelling which is a form of social learning whereby employees learn through observation or instruction and incorporate acts of authenticity in their behaviour (Bandura, 1978; Gardner et al., 2005).

According to Mawritz, Mayer, Hoobler, Wayne, and Marinova (2012), social learning theory is typically used as the foundation to clarify the transfer of behaviours between leaders and followers. This is “by virtue of the supervisor’s assigned role, his/her status and power affect subordinate behaviour and outcomes, both positively and negatively as subordinates are likely to view their supervisor as an exemplar that they seek to learn from” (Turner, 2017, p. 9). The latter corresponds with Bandura’s (1986) suggestion that virtually everything can be learned when employees observe leaders’ behaviour, alternatively when they are directly subjected to it. Typically, employees of the same leader tend to model the leader’s behaviour to reciprocate norms in their own behaviour. As employees adopt certain behaviours from their leaders, they adjust the way in which they interpret information and appraise the work environment (Turner, 2017).

Through positive modelling, authentic leaders increase follower trust, promote the development of PsyCap, and increase engagement because they are consistent in their values and portray objectivity in their decision making (Banks, McCauley, Gardner, & Guler, 2016). Therefore, authentic leaders play a vital role in the development of their employees’ PsyCap to stimulate engagement and, ultimately improve performance (Luthans, Luthans, & Luthans, 2004; Du Plessis & Boshoff, 2018).

The PsyCap components share self-directed motivating processes such as intentionality and goal pursuit, in conjunction with the joint theme of “positive appraisal of circumstances and probability for success based on motivated effort and perseverance” (Luthans et al., 2007, p. 550). For example, Luthans and Youssef-Morgan (2017) explain that an optimistic employee is confident in their own ability and, therefore exhibit high self-efficacy. They will intentionally pursue challenging goals and by being hopeful, the employee promotes the pursuit of several ways towards attaining those goals. In this case, resilience will allow the employee to adapt to change and effectively deal with adverse events (Luthans & Youssef-Morgan, 2017). With this line of reasoning, it is understandable that employees are psychologically present and focussed when they have high levels of PsyCap (Rich et al., 2010; Thompson, Lemmon, & Walter, 2015). This is because PsyCap positively relates to work engagement (Sweetman & Luthans, 2010). Proof positive, Sweetman and Luthans (2010) assert that employees with high PsyCap are likely to be immersed in their work without being distracted (absorption), invest effort to get results (vigour), and identify with what they are busy with (dedication).

Engaged employees are more inclined to absorb information and participate in supportive practices to contribute to organisational improvement (Laschinger, Wong, & Greco, 2006; Joo, Lim, & Kim, 2016). This is further supported by the JD-R model that emphasises employees with high PsyCap are motivated to pursue goals, inevitably being more engaged in their work (Luthans, Youssef, & Avolio, 2007). To this end, it is understandable that authentic leadership and PsyCap facilitate positive leader-follower exchanges that produce desirable employee outcomes and sustained performance (Clapp-Smith, Vogelgesang, & Avey, 2009; Azanza, Gorgievski, Moriano, & Molero, 2018).

When considering safety behaviour as a performance outcome, it is anticipated that authentic leadership, PsyCap, and work engagement levels will promote greater compliance and participation in safety practices. Proof positive, PsyCap influences leader authenticity which, in turn, has a direct impact on safety outcomes (Eid et al., 2012). Safety-focused authentic leaders will develop safety-focused followers through modelling as they stimulate processes of positive organisational behaviour (Eid et al., 2012). Furthermore, a study conducted by Wang, Wang, and Wang (2018) verifies

that PsyCap directly impacts on employees' safety behaviour. In relation to work engagement, the work environment provides various resources as noted in Section 2.4.2 (p. 18). These resources not only reduce job demands and the associated physical and psychological adversities, but also prompt employee growth, satisfactory performance, and commitment (Bakker & Demerouti, 2007; Demerouti et al., 2001).

With regards to safety outcomes, access to appropriate resources, for instance safety training, PPE, and leader and co-worker support, should limit job demands and inspire employees to comply with safety rules and participate in safety-related activities (Nahrgang et al., 2011).

Although current theory assumes relationships between these constructs, the relationships have not been tested in a construction environment, specifically not in South Africa. At the same time, the study will test the prevalence of authentic leadership, PsyCap, and levels of work engagement across organisations in the South African construction environment and reveal areas that potentially could affect the safety behaviour of employees.

2.8 CONCEPTUAL MODEL AND HYPOTHESES

Figure 5 illustrates the theoretical relationship between the constructs in the study.

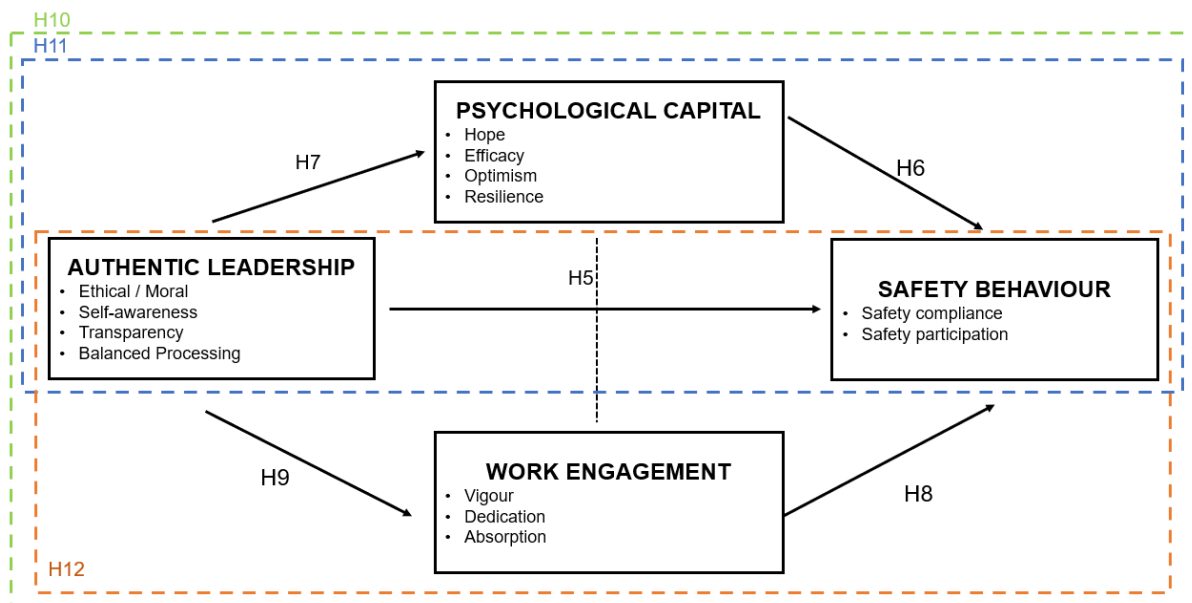


Figure 5: Hypothesised model of the mediating relationships between the constructs in the study.

Table 1 provides the hypotheses that were formulated, as derived from the literature, and hypothesised model.

Table 1: Study hypotheses

Null Hypothesis	Alternative Hypothesis
H1₀: There are no significant differences in the scores between safety behaviour and demographic variables.	H1: There are significant differences in the scores between safety behaviour and demographic variables.
H2₀: There are no significant differences in the scores between work engagement and demographic variables.	H2: There are significant differences in the scores between work engagement and demographic variables.
H3₀: There are no significant differences in the scores between PsyCap and demographic variables.	H3: There are significant differences in the scores between PsyCap and demographic variables.
H4₀: There are no significant differences in the scores between authentic leadership and demographic variables.	H4: There are significant differences in the scores between authentic leadership and demographic variables.
H5₀: There is no positive relationship between PsyCap and work engagement.	H5: There is a positive relationship between PsyCap and work engagement.
H6₀: There is no positive relationship between PsyCap and safety behaviour.	H6: There is a positive relationship between PsyCap and safety behaviour.

Null Hypothesis	Alternative Hypothesis
H7₀: There is no positive relationship between PsyCap and authentic leadership.	H7: There is a positive relationship between PsyCap and authentic leadership.
H8₀: There is no positive relationship between work engagement and safety behaviour.	H8: There is a positive relationship between work engagement and safety behaviour.
H9₀: There is a no positive relationship between work engagement and authentic leadership.	H9: There is a positive relationship between work engagement and authentic leadership.
H10₀: There is no positive relationship between authentic leadership, PsyCap, work engagement, and safety behaviour.	H10: There is a positive relationship between authentic leadership, PsyCap, work engagement, and safety behaviour.
H11₀: PsyCap does not mediate the relationship between authentic leadership and safety behaviour.	H11: PsyCap mediates the relationship between authentic leadership and safety behaviour.
H12₀: Work engagement does not mediate the relationship between authentic leadership and safety behaviour.	H12: Work engagement mediates the relationship between authentic leadership and safety behaviour.

The hypotheses were formulated based on the literature and will be tested and analysed in Chapters 4 and 5.

2.9 CONCLUSION

The construction industry is branded as one of the most accident-prone work environments across the globe, whereby most accidents are attributable to employees'

unsafe behaviours (Skeepers & Mbohwa, 2015; Manjula & De Silva, 2018). The magnitude of the accident rate in the South African construction industry is significantly high (Skeepers & Mbohwa, 2015). This necessitates a better understanding of the latent conditions in organisations that may affect occupational health and safety, such as leadership, psychological resources, work engagement, and favourable workplace outcomes. Scholars argue that authentic leaders exhibit high moral standards and ethical conduct in their everyday decisions and behaviours (Luthans & Avolio, 2003; Hassan & Ahmed, 2011; Wang et al., 2014). Consequently, they promote trusting relationships with their subordinates that translate into numerous positive outcomes (Hassan & Ahmed, 2011). The literature suggests that organisational leaders have the potential to reduce the number of reported workplace accidents through the process of authentic leadership that, in turn, influences the development of employees' PsyCap levels, work engagement, and safety behaviour.

The next chapter outlines the research methodology to offer information about the specific procedure used to identify, select, process, and analyse data about the constructs in the study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

Definitions of research have been advanced over the years and range from broad descriptions to more specific explanations. For example, Welman, Kruger, and Mitchell (2005, p. 2) define research as the “process that involves obtaining scientific knowledge by means of various objective methods and procedures”. In the same vein, Creswell (2008, p. 3) describes it as “a process of steps used to collect and analyze information to increase our understanding of a topic or issue”.

In general, research is conducted by proceeding through a distinct set of steps, that is, the scientific method of inquiry. According to Creswell (2008), researchers engage in six steps to reach conclusions about a given phenomenon: (1) identify the research problem, (2) review relevant literature, (3) clarify the research problem and specify a purpose for research, (4) gather data, (5) analyse and interpret the data, (6) report on the results and draw conclusions. However, research is more than participating in the major steps of the research process. This means due consideration has to be given to the appropriate research design which, in turn, will inform the method of data collection, the analysis thereof, and the final interpretation of results (Creswell, 2008).

This chapter describes the research process and provides information about the method that was used to conduct the research, along with an explanation for the use of the specific method. This includes a description of the different stages of the research, including participant selection, data collection, and data analysis. Finally, this chapter acknowledges the quality and rigour of the research design. That is, the reliability and validity aspects are considered, in conjunction with research ethics.

3.2 RESEARCH PARADIGM

There are several interesting notions held by purists about the positivist research paradigm, the paradigm in which this study can be situated. First, the positivist paradigm depends on quantifiable or measurable observations that lead to statistical analysis. Second, it claims that objectivity must be observed throughout the procedure (Johnson & Onwuegbuzie, 2004). Data collection efforts usually take the form of

questionnaires, experiments, or surveys, which allow the researcher to test and re-test research hypotheses in a quantifiable manner (Maree, 2010). However, there has been a slight shift away from positivism towards post-positivism which better represents contemporary quantitative research (Phillips & Burbules, 2000).

Post-positivism takes the standpoint that research elements are affected by well-developed theories and acknowledges that the researcher's background can influence what is observed (Robson, 2002). Science is based on specific procedures to confirm valid, accurate, and consistent observations. However, researchers may not always achieve this, as they could potentially bring an element of bias to the way in which the research findings are understood and described. According to Ryan (2006), post-positivist research principles emphasise meaning and knowledge creation to support social movements that aspire to illicit change and contribute towards social justice.

Consistent with the main principles of post-positivism, the study considers authentic leadership as an external phenomenon whereby observations form the basis of people's perceptions. The underlying assumption of the study is that science is automatous which means that this study's hypotheses can be accepted or rejected via the application of the selected sample, surveys, and related statistical analyses. A conclusion can therefore be reached about the relationship between authentic leadership, PsyCap, work engagement levels, and employees' safety behaviour.

3.3 RESEARCH DESIGN AND STRATEGY OF INQUIRY

A research design provides guidance about all aspects of a study, from evaluating the general theoretical ideas behind the inquiry to the comprehensive data collection and analysis procedure to reach conclusions about the research problem (Welman et al., 2005; Creswell & Creswell, 2017). The design allows researchers to execute their plans and expand on ideas that are well-grounded in the literature and recognised audiences that read and support research outputs (Creswell & Creswell, 2017). It is, therefore, necessary to specify the criteria for evaluation of a specific phenomenon, that is, the population and sample, sampling method, data collection procedure, and the analysis thereof (Welman et al., 2005).

The main aim of this study was to investigate the relationship between the four constructs and to examine the theoretical model. In view of that, a quantitative research design was used as it refers to the numerical investigation of a data set that permits an acceptable degree of objectivity used to describe observable phenomena in a way that can be generalised to the population being studied (Aliaga & Gunderson, 2003; Maree, 2010). This explanation highlights three important elements that the study adhered to, namely, objectivity, numerical data, and generalisability. The use of this design is generally supported by three understandings: Creswell's (2009) argument that the (1) definitive objective of a research design is to generate valid research findings, (2) former research publications have also adopted a quantitative approach to examine the same constructs, and (3) the assumption that measurement practices allow one to provide the necessary connection between factual observation and the scientific expression of authentic leadership, PsyCap, work engagement, and safety behaviour.

In support of the quantitative research design, the study followed a descriptive, non-experimental line of investigation to report on the relationship between the study variables. Descriptive research seeks to describe a phenomenon in an accurate and systematic manner (McCombes, 2019). In quantitative methods, descriptive research attempts to collect quantifiable information to be used for statistical analysis to describe a phenomenon as it stands, without manipulating the study variables (Bhat, 2019). It is, therefore, non-experimental as it is concerned about the validity of the measurements, rather than the validity of the effects (Reio Jr, 2016). Ultimately, a harmonising sub-type of descriptive and non-experimental research was employed, namely cross-sectional design as it has the advantage of measuring current attitudes or practices (Creswell, 2008). Maree (2010, p. 152) asserts that this design "is mainly used in descriptive studies in which the units that have been selected to take part in the research are measured on all the relevant variables at a specific time". In order describe and investigate the phenomenon, the data was collected at a specific point in time (Saunders, Lewis, & Thornhill, 2007). The cross-sectional design enables researchers to investigate current attitudes and opinions (ways in which individuals think about given topics), or practices (actual behaviour), along with the frequency and distribution of the phenomenon (Creswell, 2008).

In response to the overall research design, a specific strategy of inquiry must be applied to investigate individuals' attitudes, opinions, and practices (Creswell & Creswell, 2017). This is a step-by-step action plan that provides direction for design procedures and enables one to conduct research in an orderly fashion (Dinnen, 2014). In this case, survey research principles and practices were applied to collect the data. Survey research allowed the researcher to explain and clarify a phenomenon, identify comparisons, and to generalise from the sample to a given population (Maree & Pietersen, 2010).

3.4 POPULATION AND SAMPLE

Banerjee and Chaudhury (2010) explain that a study's population encapsulates the complete set of people with certain characteristics, while a sample represents a subset of the population. This section outlines the study's population, sample, sampling method, and sampling criteria used to aid data collection efforts.

3.4.1 Target population

According to Welman et al. (2005), a population is all elements of the study (individuals, groups, and organisations) that encompasses the total collection of all units of analysis about which the researcher wishes to make specific conclusions. In basic terms, it is the full entity under study from which a sample is taken (Welman et al., 2005).

The target population for this study was employees who operate in the South African construction industry. Specifically, research took place at two separate entities that offer the same construction services, whereby Entity 1 is situated in Cape Town and Entity 2 is situated in Johannesburg with active operations in both Johannesburg and Durban. For ease of reference, Entity 2 is separated to read: Entity 2A (Johannesburg) and Entity 2B (Durban). In total, the entities employed more than 300 staff members, whereby 258 members represented blue-collar workers and 42 represented white-collar workers.

3.4.2 Sample

According to Kenton (2019), a sample denotes a miniature version of a larger group. To better understand the sample of study, it is necessary to describe the sample characteristics as this allows one to ascertain the generalisability of the findings and to identify any possible limitations (Trochim, 2020). Moreover, reporting on sample characteristics enables the replication of similar future studies (Trochim, 2020). In this case, a total of 289 questionnaires were distributed. Specifically, 200 paper-and-pencil questionnaires were distributed, and 89 online questionnaires were accessed. A total of 148 paper-and-pencil questionnaires were completed, while 50 completed online questionnaire were recorded. Overall, this means an acceptable response rate of 65.41% was realised. Therefore, the total sample consisted of 198 full-time employed workers across hierarchical levels, ranging from blue-collar workers (installation technicians, paving installers, and maintenance technicians) to white-collar workers (supervisors, line managers, senior managers, and other administrative employees).

Table 2 summarises the demography of the sample. It should be noted that “Technician & Installer” includes Installation Technicians, Paving Installers, and Maintenance Technicians, while “Other” includes white-collar workers other than Supervisors and Managers, such as Administrative Personnel.

Table 2: Demography of sample.

	Technician & Installer	Supervisor	Manager	Other	Total Sample
Gender					
Male	70%	7%	9%	4%	89%
Female	0%	1%	5%	5%	11%
Age					
24 or under	14%	1%	2%	4%	19%
25-34	50%	6%	6%	2%	64%
35-49	13%	1%	5%	3%	22%
50-64	0%	0%	1%	0%	1%
65 or over	0%	0%	0%	1%	1%
Population group					
White	16%	5%	11%	6%	38%
African	29%	1%	1%	1%	32%
Foreign National	6%	0%	0%	0%	6%
Coloured	16%	2%	1%	1%	20%
Indian	3%	0%	2%	1%	6%
Employment tenure					
Less than 6 months	14%	1%	3%	2%	20%
6 months to 1 year	11%	1%	2%	1%	15%
1 to 2 years	12%	0%	4%	3%	19%
2 to 5 years	32%	6%	5%	4%	47%
6 to 10 years	1%	0%	1%	0%	2%
Location					
Cape Town	35%	7%	6%	6%	54%
Johannesburg	27%	1%	5%	3%	36%
Durban	8%	0%	3%	1%	12%
Total					
Total sample	70%	7%	14%	9%	100%

From Table 2, it is evident that most of the respondents were male (89%) and that 67% were between 25-34 years of age. The largest portion of the sample were

Technicians and Installers (70%). The racial breakdown indicates that the respondents were predominantly White (38%), followed by African (31%) and Coloured (20%). Nearly half the respondents (47%) reported that they were employed at their organisation between two to five years.

3.4.3 Sampling method

Sampling in quantitative research is concerned with the process of choosing a suitable subgroup of people that represents a relevant population so that research findings can be generalised back to a whole (Maree, 2010; Welman et al., 2005). In general, three important guidelines need to be considered and applied when selecting representative sample, namely participant accessibility, willingness to participate, and participants' suitable background and experience in relation to the phenomenon of interest (O'Neil, 2014). This study observed these three guidelines. More specifically, this justified the use of non-probability sampling to collect data, owing to participant accessibility and the fact that the sample was deliberately chosen to study the particular phenomenon (Maree, 2010). Therefore, a sub-type of non-probability sampling was utilised, namely convenience. Convenience sampling is a method of data collection from the identified population who are conveniently available to participate in the study (Maree, 2010). In other words, this sampling method involved getting participants from two construction companies that the researcher (also known as the 'principal investigator') had immediate and easy accessibility.

The advantage of convenience sampling is that the sample selection process can be continued until the required sample size is reached (Welman et al., 2005). In this case, the method realised the inclusion of a sample that met the predetermined selection criteria to ensure a representative sample participated in the study (see Section 3.4.5).

3.4.4 Selection criteria

The application of proper selection criteria enhances the validity of the study and ensures homogeneity of the sample population, thereby increasing the likelihood of finding a true relationship between the constructs in the study (Salkind, 2010). In convenience sampling, possible participants are selected if they meet certain criteria,

such as accessibility and willingness to participate (Dörnyei, 2007). Therefore, specific selection criteria were applied to identify potential participants who were included in the study (summarised in Table 3). It should be noted that selection criteria were based on demography and because of its broad nature, no participants were excluded from the study based on demography.

Table 3: Selection criteria.

Theme	Description
Job Title/ Category	The participants must represent the following job titles/ categories: Blue-collar workers (installation technicians, paving installers, and maintenance technicians) or White-collar workers (supervisors, line managers, senior managers, and other administrative personnel).
Employment tenure	The length of employment will not be considered.
Employment type	The participants must be full-time employed workers in a construction environment. This can include both permanent and non-permanent positions, such as fixed-term or temporary positions.
Gender	The participants can include both male and female employees.
Age	Employees who are aged 18 and over.
Population group	All racial groups will be included, namely African, Coloured, Indian, White, and Foreign Nationals (e.g., Zimbabwean).
Education	No formal education is required.
Location	Employees who are nationally geographically located: Entity 1 (Cape Town), Entity 2A (Johannesburg), and Entity 2B (Durban)

3.4.5 Sample size adequacy

The adequacy of a sample concerns the suitability of the sample composition and size as it affects the quality and validity of a study (Babbie & Mouton, 2001; Vasileiou, Barnett, Thorpe, & Young, 2018). There is much contradiction among researchers regarding the minimum sample size to achieve sufficient statistical power and overall fit. For example, Nevitt and Hancock (2001) recommend a minimum sample size of 100 is sufficient, while Tofighi and MacKinnon (2016) suggest a sample size of 50 or more. In the end, the minimum sample size should be determined by the degree to which it provides a sufficient representation of the population in terms of size and participant characteristics (Hair, Black, Babin, & Anderson, 2010).

Based on the size of the participating entities as the groups chosen from the larger statistical population (South African construction industry), it is accepted that this study's sample size of 198 respondents was an adequate representation of the population as the sample demography indicates that most of the sample was male Technicians and Installers. This can be generalised to the population as the construction industry is also characterised by the same markers, that is, a male-dominated industry from diverse racial groups (Ness, 2012; Aneke, 2015). In addition, the South African construction labour force consists predominantly of semi-skilled and skilled workers which is the same occupational category assigned to the Installers, Pavers, and Technicians who participated in the study (Construction Industry Development Board, 2019). The labour absorption rate for the age group between 25 to 34 years is also the majority (49%) among young construction workers in South Africa (Construction Industry Development Board, 2019).

Finally, the sample size is also considered to be an acceptable for the chosen methods of data analysis (see Section 3.5) (Bagozzi & Yi, 2012).

3.5 DATA COLLECTION

The data collection process was first initiated by a request for the use of paper-and-pencil versions of four surveys to be administered during group administration, namely the Safety Behaviour (a subscale of safety performance), Utrecht Work Engagement Scale (UWES), PsyCap Questionnaire (PCQ-24), and Authentic Leadership

Questionnaire (ALQ). The Safety Behaviour (subscale) and the UWES are freely available to researchers, however the authors were contacted to request permission as a courtesy (see Appendix A). Permission for the use of the PCQ-24 and ALQ was requested and granted by the respective publisher (see Appendix A). Thereafter, the researcher obtained ethical clearance to employ this data collection method from the Nelson Mandela University Research Ethics Committee: Human (REC-H) (reference number: H20-BES-HRM-007) (see Appendix B).

Data collection commenced with the group administration of the paper-and-pencil questionnaires to explore the relationship between authentic leadership, PsyCap, work engagement, and safety behaviour. In essence, social desirability in self-report questionnaires refers to a response bias that is the inclination to answer survey questions in a manner that the participant believes will be viewed favourably by others (Krumpal, 2013). The researcher acknowledged the possibility that the paper-and-pencil questionnaire results may have yielded more social desirability issues, compared to the administration of an online questionnaire. It is, however, important to note that during the group administration of the paper-and-pencil questionnaires, participants were aware that their answers will not be shared with anyone, and personal details will not be disclosed. The participants were also informed that individual results will not be disclosed, but rather revealed as a whole, that is, group-based results were reported. This assurance of confidentiality typically improves the likelihood of participants to answer truthfully (Sheperis, 2020).

Due to international pandemic brought on by the Corona Virus Disease (COVID-19) and the associated South African lockdown period that was initiated on 26 March 2020, the data collection method had to be amended to an online version of the paper-and-pencil questionnaire.

Because the PCQ-24 and ALQ are copyright material and an amendment in the method of data collection was required in response to the COVID-19 pandemic, the researcher requested permission from the respective publisher to convert from paper-and-pencil to online administration and distribution. Permission for the amendment was granted on 6 August 2020 (see Appendix C). Thereafter, a request for the

amendment of the data collection method was submitted and approved by the university's REC-H (reference number: H20-BES-HRM-007) (see Appendix D).

3.5.1 Group administration of questionnaires

Group administration of questionnaires is whereby researchers invite groups of respondents who are willing to participate in the study, to complete the questionnaires (Maree, 2010). To reiterate, the sample consisted of full-time employed employees categorised in two groups, namely blue-collar workers (installation technicians, paving installers, and maintenance technicians) and white-collar workers (supervisors, line managers, senior managers, and other administrative employees). It is important to note that for the blue-collar workers to perform their duties and contribute to the bottom line of the organisations, they spend a large part of their workdays travelling between client sites. They are not office-bound and, therefore could not complete the questionnaire while on duty.

The group sessions were arranged at each company's boardroom to provide an opportunity for completion of the questionnaires under similar circumstances. To reduce the risk of potential disturbances to daily operations, a total of ten sittings were arranged to collect data. Specifically, two timeslots per day for five days were reserved for each entity from which the sample is drawn, that is, Entity 1 (Cape Town), Entity 2A (Johannesburg), and Entity 2B (Durban). The duration of each timeslot was approximately 20 minutes, whereby the allotted time accounted for a reasonable period to explain how to complete the survey and to answer participants' questions. It should be noted that it took an average of 11 minutes to complete the paper-and-pencil questionnaire.

Figure 6 provides a basic overview of the sequence of data collection efforts, the venue, total days, and total sessions that were utilised to collect data through the group administration of paper-and-pencil questionnaires.

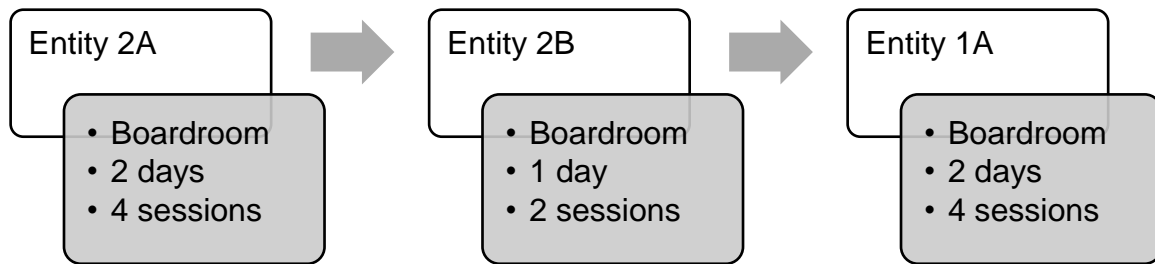


Figure 6: Summary of group administration sessions of the paper-and-pencil questionnaires.

The employees were invited to attend one of the sessions and complete one questionnaire which was physically distributed during the scheduled group administration sessions. Prior to the distribution of the questionnaires, the purpose of the study was explained to the respondents to obtain their written consent to participate. Upon completion of the questionnaires, the respondents were asked to place their questionnaires in a sealed collection box. In basic terms, it was a temporarily sealed container to prevent others from accessing the questionnaires until the close of each administration session. In this way, the questionnaires were to be only accessible by the researcher. Finally, the completed questionnaires were retrieved from the collection box and the hard copies are stored in a filing cabinet under lock and key.

3.5.1.1 Advantages

The advantages of this method outweigh the disadvantages. According to Maree and Pietersen (2010), the advantages of group administration of questionnaires include the following: Firstly, many respondents can complete the questionnaire in one sitting, that is, in a short space of time. Secondly, the researcher can explain the rating scales, check for accuracy, and assist with questions which may not be clear to the respondents during administration. Finally, an optimal response rate can be realised, while it is a relatively cheap and easy method to collect data. These advantages were observed throughout the group administration of questionnaires.

3.5.1.2 Disadvantages

Maree and Pietersen (2010) explain that there are some disadvantages to consider before this method of data collection is applied. First, different responses may be given when different administrators administer the questionnaire. Only one researcher administered the questionnaires to the respondents in the present study, eliminating the potential for variations due to different administrators administering a questionnaire to different groups. Second, the primary researcher had limited control over the conditions in which the questionnaire was administered. As such, results could have been influenced by personal factors, such as nervousness and attentiveness. In addition, external factors could have played a role. Given the sample of the study, the respondents' work conditions and operational requirements, the researcher attempted to gain as much control over the conditions by allocating timeslots for questionnaire administration on days where client installation slots are scheduled for one hour or less. The latter was a practical way to mitigate potential late arrivals to sites. Third, the group setting yielded the risk of participants feeling pressurised to complete the questionnaires which, in turn may eradicate voluntary participation. For this reason, the researcher first distributed and explained the informed consent form and that participation was voluntary. Thereafter, an opportunity was be provided for them to leave the venue before commencing with survey distribution. Alternatively, they could have remained seated and placed their empty questionnaires in the collection box should they have wished not to draw attention to themselves.

3.5.2 Online administration of questionnaire

Online administration refers to an online version of the research questionnaire which is published on the internet and distributed by means of electronic communication methods, such as email (Sincero, 2012). The email includes valuable information and a link to the relevant questionnaire. To reiterate, the initiation of the South African lockdown period in response to the COVID-19 pandemic necessitated an amendment to the method of data collection. This was due to the health and safety concerns during group administration as COVID-19 is primarily transmitted through close contact with symptomatic people and contact with contaminated objects and surfaces (World Health Organization, 2020). As such, an online version of the paper-and-pencil

questionnaire was created to collect outstanding data from potential participants at Entity 1 (Cape Town). The online version was powered by Survey Monkey, a popular and free online survey tool used by scholars and business practitioners. Restricted access to the data was realised by means of a password that was merely available to the researcher.

The email addresses of the potential participants were used to create a distribution list for sending the unique hyperlink to the online questionnaire. Prior to the distributing the questionnaire hyperlink to the respondents, a list was generated by reviewing the completed informed consent forms that required the participants to provide their names and surnames. This enabled the researcher to ensure that the same participants do not complete the questionnaire for a second time, thereby merely identifying the potential remaining participants. The hyperlink was tested by human resource representatives to ensure that it was working and easily accessible. Thereafter, the responses were deleted from the questionnaire to ensure that the research responses would merely contain the data from the actual participants.

The email explained the purpose of the study, provided important information such as due date for completion and the link to survey. Respondents were granted two weeks to complete the questionnaire, which was considered a long enough period respond. A reminder was also sent out to participants toto encourage them to complete the questionnaire. At midnight of the deadline date for completion, the questionnaire was closed, and the hyperlink was deactivated. The online version did not necessitate identifying information from the participants. The first page of the questionnaire highlighted the following information about the survey: (1) the purpose of the study, (2) the amount of completion time needed, (3) voluntary participation, (4) confidentiality, and (5) the researcher's details. Participants were offered the choice whether they consent to participation or not. In cases where the participants declined consent, they were redirected to the end of the questionnaire without engaging or seeing any of the items.

3.5.2.1 Advantages

The use of online questionnaires presents numerous advantages and is shown to be one of the most widely used survey administration methods (Sincero, 2012). Case in point, online questionnaires are a practical data collection method as the distribution thereof is quick, easy, and inexpensive (Sutherland, 2019). In addition, researchers can reach a large group of participants who are geographically dispersed (Mikulsky, 2005). Researchers further benefit from immediate and accurate data for data analysis as the responses are downloaded, thereby eliminating time spent on data capturing (Mikulsky, 2005).

From a participant perspective, they find it easy and convenient to complete as they can choose to start at their leisure (Sutherland, 2019). Moreover, participants value high anonymity as the survey tool does not save Internet Protocol (IP) addresses and greater social distance that, in turn, increases the likelihood of more accurate and honest responses (Mikulsky, 2005). Case in point, this method of questionnaire distribution ensured that physical contact was avoided during the COVID-19 pandemic, thereby protecting participants from the potential risk of contracting the virus. Finally, the online questionnaire was mobile friendly and potential participants that work on site can participate by accessing their email and the questionnaire on their mobile devices. All potential participants had equal access to internet to complete the questionnaire.

3.5.2.2 Disadvantages

Despite the numerous advantages of online questionnaires, there remains practical and methodological disadvantages. According to Solomon (2001), slow internet connection may negatively impact on response rates and the degree of accuracy when responding to questions. A lack of internet connection may decrease the number of responses (Solomon, 2001). Another disadvantage is the risk the same participant completed the questionnaire more than once, thereby skewing the response data (Mikulsky, 2005). To reiterate, this risk was mitigated by reviewing the completed informed consent forms that necessitated the participants to provide the names and surnames. The list was used to eliminate email addresses from the online

questionnaire distribution list, thereby enabling the researcher to merely communicate the online questionnaire to the possible remaining participants. The online survey did not allow a survey to be completed more than once from the same IP address unless permission was granted by the researcher. Permission was granted to employees who did not have direct access to their own a computer or smart phone to complete the survey. Finally, a potential disadvantage included the fact that not all potential participants may have the time to complete the online questionnaire whilst working on site. This resulted in incomplete responses, albeit the questionnaire allowed a participant to resume if he or she was interrupted.

3.5.3 Measurement instruments

The following four measuring instruments were be combined into a composite questionnaire, namely the Safety Behaviour, UWES, PCQ-24, and ALQ. The composite questionnaire consisted of 63 items, excluding the items to report on the demography of the sample.

3.5.3.1 Safety Behaviour

To reiterate, safety behaviour is conceived in terms of safety performance as performance requires actions and behaviours needed to achieve goals (Campbell 1990; Griffin & Neal, 2000). As such, the originally proposed model of safety performance incorporated two dimensions of safety behaviour, namely compliance and participation (Neal & Griffin, 1997). However, the original 6-item scale reported low reliability coefficients for compliance with safety procedures (0.56) and participation in safety-related activities (0.66). For this reason, the scale was slightly amended to ensure greater reliability (Neal, Griffin, & Hart, 2000).

Neal et al. (2000) found that the amended 6-item scale yielded strong reliability coefficients: Safety compliance (0.94) and safety participation (0.89). A longitudinal study conducted by Neal and Griffin (2006) further supports the reliability of the subscale as indices of safety behaviour since it demonstrates strong reliability coefficients for both safety compliance (0.89) and safety participation (0.84). In addition, Nkhungulu (2014) investigated the antecedents and outcomes of health and

safety in the South African construction industry and reported an overall reliability of 0.96 on the safety performance subscale. It should be noted that the safety performance subscale can be used in isolation to measure safety behaviour as noted in many studies (Wang et al., 2018; Shen, Ju, Koh, Rowlinson, & Bridge, 2017).

This self-report questionnaire asks respondents to use a five-point scale ranging from 1= “never” to 5= “almost always”, to indicate the degree to which they comply with and participate in safety behaviour at work. Sample items include: “I use all the necessary safety equipment to do my job” and “I put in extra effort to improve the safety of the workplace”.

Although the subscale to measure safety behaviour is freely accessible to researchers, permission for use was granted.

3.5.3.2 UWES

The 17-item Utrecht Work Engagement Scale (UWES) was developed by Schaufeli et al. (2002). This self-report questionnaire consists of three subscales, namely vigour, dedication, and absorption. The respondents are required to utilise a seven-point scale ranging from 0= “never” to 6= “every day” to indicate how often they experience certain feelings / attitudes about their work. Sample items include: “when I get up in the morning, I feel like going to work”, “I am enthusiastic about my job”, and “time flies when I am working”.

The original scale demonstrated the following reliability coefficients: Vigour (0.68), dedication (0.80), and absorption (0.75) (Schaufeli et al., 2002). Storm and Rothmann (2003) investigated the validity and reliability of the UWES on a sample of 2396 workers in the South African Police Force. Their study indicated that the UWES yielded high internal consistency for all three work engagement components: Vigour (0.78), dedication (0.89), and absorption (0.78) (Storm & Rothmann, 2003).

The UWES is free for use for non-commercial scientific research, but as a courtesy the researcher contacted the creator of the questionnaire to request its use.

3.5.3.3 PCQ-24

Employees' PsyCap are typically measured with the PCQ-24 which is a 24-item questionnaire developed by Luthans et al. (2007). This self-report questionnaire contains first-person statements that must be rated on a six-point scale of agreement ranging from 1 = "Strongly disagree" to 6 = "Strongly agree". Each component is measured by six items. Sample items include: "I feel confident analyzing a long-term problem to find a solution", "if I should find myself in a jam at work, I could think of many ways to get out of it", and "when I have a setback at work, I have trouble recovering from it, moving on". There are three negatively worded items that require reverse scoring. That is, the items are phrased so that agreement with the item represented a relatively low level of response (Kulas, Klahr, & Knights, 2018). In other words, item responses with "1" must be scored as "6" and vice versa.

The original scale demonstrated pleasing reliabilities for each component: hope (0.88), resilience (0.89), self-efficacy (0.89), and optimism (0.89) (Luthans et al., 2007). Furthermore, Du Plessis (2014) reported an overall reliability of 0.91 on the PCQ-24 in the South African context.

Mind Garden, as the international publisher of the copyrighted PCQ-24, merely allows the reproduction three sample items for inclusion in research papers. Permission was granted by the publisher for the use of the questionnaire for both GPP and online.

3.5.3.4 ALQ

The 16-item Authentic Leadership Questionnaire (ALQ) was developed by Walumbwa, Avolio, Gardner, Wernsing, and Perterson (2008). This instrument requires respondents to indicate how they perceive immediate team leaders in relation to authentic leadership. The ALQ is a five-point scale ranging from 1= "Not at all" to 5= "Frequently, if not always". The items describe the behaviours that leaders could engage in and, therefore the respondents are asked to rate the frequency with which leaders engage in specific behaviour.

Self-awareness is measured by four items, relational transparency is measured by five items, internalised moral perspective is measured by four items, and moral balanced processing is measured by three items. Sample items include: My leader "says exactly

what he or she means”, “demonstrates beliefs that are consistent with actions”, and “seeks feedback to improve interactions with others”. There are no items that require reverse scoring.

The original scale yielded an acceptable standard of consistency as interpreted by Cronbach’s Alpha values for each of the following concepts of leadership authenticity: Self-awareness (0.92), relational transparency (0.87), internalised moral perspective (0.76), and moral balanced processing (0.81) (Walumbwa et al., 2008). In addition, a study conducted by Du Plessis (2014) in South Africa reported a Cronbach’s Alpha of 0.94, indicating high reliability.

Mind Garden, as the international publisher of the copyrighted ALQ, merely allows the reproduction of three sample items for inclusion in research papers.

3.5.3.5 Demographics

The composite questionnaire included a demographics section to determine what factors may influence the respondents’ answers. In addition, it enables one to compare subgroups to determine how their responses vary (Maree, 2010).

The demographics section of the composite questionnaire consisted of five questions to determine gender, age, population group (race), job title, and employment tenure. The respondents were prompted to indicate their response by ticking the appropriate box: Gender had two response options (male or female), age had five response options (24 or under, 25-34, 35-49, 50-64, 65 or over), population group had six response options (White, African, Foreign National, Coloured, Indian, Other), job title had six response options (technician / installer, paving installer, maintenance technician, supervisor, manager, other), and employment tenure had seven response options (less than 6 months, 6 months to 1 year, 1 to 2 years, 2 to 5 years, 6 to 10 years, 11 to 15 years, 16 or more years).

According to Teclaw, Prince, and Osatuke (2012), demographic questions are best placed at the end of a questionnaire in order to keep the interest of the respondent. Therefore, the composite questionnaire was concluded with the demographics section.

3.6 DATA PROCESSING

Data processing refers to the actions performed to translate a set of data into usable information (Francis, 2012). In this case, the data processing consisted of two main activities, namely data coding and data cleaning.

3.6.1 Data coding

The coding of data is the process by which responses are organised into categories or numerals, that is, responses are allocated to a specific category or numerical value (Francis, 2012). The data coding process was applicable to both the paper-and-pencil questionnaire and the online version.

First, numerical values were assigned to each entity from which the data was collected, along with the biographical response options to ensure that the data was captured in a concise and logical form. For example, Gender (1=Male, 2=Female).

Second, identifiable codes according to each construct in the study were created and allocated to each item: Authentic leadership (“AL”), PsyCap (“PC”), work engagement (“WE”), and safety behaviour (“SB”). Specifically, each code was followed by the question number as listed in the questionnaire. For example, “AL1” represents question 1 under authentic leadership. The response options to each question were also according to numerical value as noted in sections 3.5.3.1 to 3.5.3.4.

Third, a Microsoft Excel spreadsheet was prepared prior to capturing the paper-and-pencil questionnaire responses. The first row of the spreadsheet contains the question codes for each construct (AL1 to AL16, PC1 to PC24, WE1 to WE17, SB1 to SB6), followed by the entity and biographical information in the last five columns. Finally, the responses obtained from the paper-and-pencil questionnaires were manually captured in the Microsoft Excel spreadsheet. The online responses were downloaded in Excel format, and the data was copied into the researcher’s spreadsheet. This enabled the researcher to utilise a single spreadsheet that contains all participant responses and, in turn, facilitated the data cleaning process before the information was imported into SPSS for analysis.

3.6.2 Data cleaning

Data cleaning is the process identifying and correcting errors in the dataset to ensure that the information is accurate, reliable, and useable (Gimenez, 2018). The researcher identified and employed diagnostic filters to manually screen the dataset for errors. First, the total responses captured on the Microsoft Excel spreadsheet were matched with the number of completed paper-and-pencil questionnaires and total online responses. The dataset yielded the correct number of responses.

Second, column screening was performed whereby each column was inspected for non-numerical values, out of range values, and missing values. The dataset did not contain non-numerical or out of range values. However, a total of 13 responses were identified that contained missing values. According to Finchilescu and Morgan (2019), a common method to deal with missing values is to replace the missing number with the average of the participant's other scores. This is known as the 'pro-rated score' method, whereby the average of the items for the individual is calculated (Finchilescu & Morgan, 2019). This method demands one to determine the maximum number of questions a participant may miss (Finchilescu & Morgan, 2019). The general rule is that every participant should complete at least 75% of the items in order to be included in the data set (Finchilescu & Morgan, 2019). In other words, if more than 25% of the responses are missing, the participant's total response should be removed from the data set. In the present study, the researcher removed all the questionnaires that were not fully completed. Only questionnaires that were 100% completed by the participants are included in the data set to avoid problems caused by missing data and to the effect on the conclusions (Sauro, 2015).

3.7 DATA ANALYSIS

The data was analysed using the IBM SPSS version 25 statistical programme. In addition, Amos version 25 was used to conduct CFA, Mediation, and structural equation modelling (SEM). It is important to note that control variables are used to eliminate alternative explanations for the research findings, namely gender, age, and employment tenure. According to Welman et al. (2005), control variables enable one

to report on relationships between constructs more effectively as its constant state allows for the relationship to be tested and to get a better understanding thereof.

The following quantitative techniques were used to analyse the data in order to infer properties of the sample by testing the identified properties: Reliability assessment, Confirmatory factor analysis (CFA), correlation analysis, independent T-test, analysis of variance (ANOVA), and SEM.

Descriptive statistics were applied to determine the relationship between study variables, and to appraise the reliability of the measuring instrument (Pallant, 2020). In this study, measures of central tendency used were the mean, median, and mode while measures of variability included standard deviation and variance.

The internal reliability for each factor and scale was appraised by calculating the Cronbach Alpha coefficients of each instrument. In basic terms, the level of internal consistency was established between the items that measure the theoretical model (Pallant, 2020). The Cronbach's Alpha should be a value of 0.7 or higher (Tavakol & Dennick, 2011).

The overall structure and validity of the instruments were revalidated through the application of CFA. The original models' fit statistics were used to determine which model produced a better fit to the dataset. It should be noted that the fit statistics did not designate a poor fit between the factor structure and data. Therefore, the application of exploratory factor analysis (EFA) was unwarranted (Byrne, 2010).

The initial factor structure of each instrument was determined by reviewing the literature. This entailed identifying which items belonged to each sub-dimension of the instrument. The original measurement models were tested by capturing the structure as an input diagram in AMOS and linking the data to the diagram. To test model validity using CFA, it is necessary to ensure that all parameter estimates are statistically significant (p -value < 0.05) (Brown, 2015; Hair, Black, Babin, & Anderson, 2019). The model fit should be assessed after the parameter estimates are statistically significant (Hair et al., 2019). The results were interpreted using goodness of fit indices as it provides information regarding the degree of model fit to the dataset. In addition

to the chi square statistics, researchers should report at least one absolute fit index (RMSEA or SRMR) and one incremental fit index (CFI or NFI) (Hair et al., 2010).

Correlation and t-tests were conducted to obtain an overview of the underlying associations among the study variables and to interpret the quality of the model, along with the value of individual regression coefficients (Pallant, 2020). In addition, an analysis of variance (ANOVA) was conducted to understand if there are significant differences in the means of the constructs based on the demographic variables (Pallant, 2020).

The mediating effects between the study variables were determined through the application of SEM since it allowed the researcher to analyse the relationships between the variables in the theoretical model (Brown, 2015). More specifically, it is a multivariate technique that combines aspects of factor analysis and multiple regression to compute a series of interrelated relationships simultaneously (Byrne, 2010). In essence, mediation assumes a causal sequence between variables whereby the independent variable affects the mediator and, in turn, produces the dependant variable (MacKinnon, Taborga, & Cheong, 2000). Mediation was, therefore used to examine the relationships between the constructs in the study and to confirm the structural models. This was done through a series of steps as explained by Kenny and Baron (1986) by which the impact was determined of (1) independent variable on dependent variable, (2) independent variable on mediating variable, (3) mediating variable on dependent variable, and (4) independent variable on the mediating variable, and on the dependent variable.

3.8 QUALITY AND RIGOUR OF THE RESEARCH DESIGN

Rigour in quantitative research denotes the accuracy of a study in terms of its theoretical and empirical contribution because of the methodological aspects embedded in the research design, such as planning, data collection, analysis, and reporting (Claydon, 2015; Marquart, 2017). A study's rigour is essentially determined by the extent to which it adds to existing knowledge about a given phenomenon by measuring the validity and reliability (Haele & Twycross, 2015).

3.8.1 Validity

The validity of a study concerns the degree to which the measurement tool measures what it claims to measure and how well it does so (Welman et al., 2005; Foxcroft & Roodt, 2013). Unfortunately, there is no one straightforward indicator of a study's validity (Foxcroft & Roodt, 2013; Pallant, 2020). Therefore, the validation of this study involved the collection of empirical evidence concerning the four constructs.

According to Pallant (2013), to test for construct, content, and criterion validity, the researcher must review existing literature, collect data with suitable measurement items, and critically examine the results. This was applied throughout the course of the research process to ensure that this study yielded valid results, interpretations, and conclusions. Case in point, construct validity refers to the degree to which the items measure what it claims to measure (Westen & Rosenthal, 2003; Welman et al., 2005). In this study, this was assessed by reviewing the correlation statistics to interpret and comment on the Cronbach Alpha. Specifically, the individual survey item responses with high correlations suggest that the survey accurately measured each construct in the study (Westen & Rosenthal, 2003). Content validity is the extent to which the measurement tool represents all facets of a given construct it is meant to measure (Rusticus, 2014). The primary method that was used to determine content validity was expert judgement by considering three aspects of content validity, namely domain definition, domain representation, and domain relevance (Rusticus, 2014). In basic terms, the literature review formed the basis of content validity as it allowed one to understand each construct in terms of its theoretical foundation. Criterion validity denotes the extent to which a measure is related to an outcome (Welman et al., 2005; Foxcroft & Roodt, 2013). In this case, criterion validity was tested by drawing comparisons between each measure and the outcomes. The validity of this study will be addressed in the results chapter.

3.8.2 Reliability

According to Foxcroft and Roodt (2013), research reliability denotes the consistency with which the overall measurement tool produces dependable results over time. A

reliable research study can produce the same results if it were to be replicated by other researchers using the same methodology (Welman et al., 2005).

Similar to determining construct validity, this study used Cronbach Alpha to interpret the level of internal consistency across the measurement instruments. To reiterate, the Cronbach alpha value should be greater than 0.70 to be deemed reliable (Tavakol & Dennick, 2011). According to Tavakol and Dennick (2011), this is one of the best indicators of instrument and data reliability. The reliability of this study is addressed in the results chapter.

3.9 ETHICS

The study was grounded in Nelson Mandela University's policy on research ethics which is utilised by personnel and post-graduate students. The policy recognises numerous underlying principles of ethical research that gives effect to the South African Constitution's framework. Therefore, this study's ethical agenda was conducted under the supervision of a well-established, doctoral-qualified scholar, that is the Primary Responsible Person (PRP). Furthermore, it included the following overarching ethical principles: (1) respecting participants' privacy and confidentiality, (2) ensuring research participants participate freely and that they were provided with informed consent, and (3) the concept of benevolence to refrain from harm to the research participants.

The researcher acknowledged all sources consulted and used the sources to provide background information and evidence on the research topic. In addition, the researcher implemented the recommendations offered by the Department of Health, Education, and Welfare (1979) in the following ways: Prior to data collection, the researcher ensured that all participants were fully aware of the title and purpose of the study, along with the opportunity to give their written consent to participate. Thereafter, the participants also had the option to opt out at any time as their participation was voluntary and confidentiality and anonymity applied throughout the research process.

To eliminate the possibility of unfair discrimination, the researcher administered the questionnaire on separate one-on-one occasions to participants with low literacy levels with the intention of reading each question and asking them to provide a rating of their

choosing. It should be noted that the latter was done in accordance with the national lockdown rules and regulations to ensure participant and researcher safety. That is, all COVID-19 protocols were employed during one-on-one survey administration sessions. Participant names and other forms of individual identification were only used on the informed consent and not included with their survey responses.

After data collection, the results were merely be used for research purposes and feedback was given to the participating organisations. Specifically, the Directors of each entity received a copy of the findings report upon project completion. The report gave reference to the relevant recommendations as informed by the results of the study. The researcher's contact details were provided to the participants, should they wish to request feedback. It should be noted that feedback on individual results was not given as the results are reported as a whole, thereby merely revealing group-based results. Finally, the results were reported in an honest manner, thereby not withholding, or fabricating the data.

3.10 CONCLUSION

The study adopted a quantitative, descriptive survey design to test the research hypotheses. Specifically, a cross-sectional approach was chosen to investigate the relationship between authentic leadership, PsyCap, work engagement, and safety behaviour in a construction environment. Therefore, convenience sampling was employed to recruit full-time employed workers across hierarchical levels working in the South African construction industry.

Four measurement instruments were combined into a composite questionnaire, along with a demographics section. The questionnaire consisted of closed-ended questions whereby participants were required to rate their responses according to the Likert scale method.

The original method of data collection was the application of a paper-and-pencil questionnaire that was administered during group administration to collect the data from a convenient sample. However, due to international pandemic brought on by the COVID-19 pandemic and the associated South African lockdown period, the original data collection method was amended to an online version.

The data processing and data cleaning principles were discussed, and the data analysis background was provided. Finally, this chapter acknowledged the validity and reliability aspects, in conjunction with ethical considerations throughout the study. In essence, the research ethics were adhered to throughout the research project as governed by the Nelson Mandela University REC-H.

The next chapter reviews and reports on the results of the data analyses.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

To reiterate, the main objective of this study was two-fold: (1) to investigate the relationship between authentic leadership, PsyCap, work engagement levels, and employees' safety behaviour in a South African construction environment, and (2) to develop and test a theoretical model comprising of all four constructs as informed by the literature review and data collected. Therefore, this chapter highlights the results of the following analyses: Descriptive statistics, CFA, independent sample t-test and analysis of variance (ANOVA) to report on the differences between the sample in terms of demographics, correlation coefficients to report on the relationships between the constructs in the study, and the mediation effects between the constructs and, thereby also acknowledging the final structural model. Finally, the outcome of the tested hypotheses is summarised.

4.2 DESCRIPTIVE STATISTICS AND RELIABILITY

According to Herbert (2011), descriptive statistics and item analysis are typically conducted to identify and eliminate possible items that do not contribute to the definition of the latent variable. Therefore, this section reflects the descriptive statistics and item analysis results to report on the quality of the items and the survey prior to subsequent analyses.

As noted in Chapter 3, the measurement instruments made use of Likert-scale response options. However, the number of response options differed between the instruments. As such, they were recorded across the scales so that all the scores are the same, that is, responses were calculated go from 1 – 7. The rationale behind this was to allow for consistency in data analysis and improved results interpretation. This is especially true when perusing the results obtained in the independent t-test and ANOVA calculations.

4.2.1 Safety behaviour

The results of the descriptive statistics are presented in Table 4. The factor scores for each factor in the study were recorded to be from 1 to 7. Specifically for safety behaviour, the factor scores were recoded to “Never (1), Rarely (2), Sometimes (4), Often (6), Almost Always (7)”. The numbers and wording that provided the same or similar options were retained to ensure consistency across each factor in the study.

Table 4: Descriptive statistics for the safety behaviour scale

	Cronbach's Alpha	Minimum	Maximum	Mean	Std. Deviation
Safety compliance	0,88	2	7	6,13	1,23
Safety participation	0,86	1	7	5,60	1,51
Safety behaviour	0,89	1,5	7	5,87	1,25

N = 198

An aggregate mean score of 5.87 was obtained for safety behaviour. This demonstrates that the respondents felt that they “often” to “almost always” act safely in the workplace. The lowest mean score was obtained for questions pertaining to safety participation ($M = 5.60$), whereas the highest mean score was obtained for safety compliance ($M = 6.13$). In general, these results show that safety behaviour is observed within construction.

To analyse the survey items, the iterations of the item-total statistics for the subscales are presented in table format in Appendix E.

4.2.1.1 Safety compliance subscale

The Cronbach Alpha ($\alpha = 0.88$) for the safety compliance subscale was well above the acceptable value of 0.70. Based on the item statistics, none of the items had an extreme mean or standard deviation. This indicated the absence of poor items. The item-total statistics for safety compliance revealed that the scale mean if an item is removed from the analysis is more or less constant for all the items comprising the subscale as well as the scale variance if an item is deleted. This supports the assumption that all the items contribute to the internal consistency of the scale. Furthermore, all items yielded acceptable correlations which further indicated that the

items measured the same underlying factor, that is, safety compliance. The Cronbach's Alpha results also did not show an increase in reliability if the item were to be deleted. Therefore, all safety compliance items were retained.

4.2.1.2 Safety participation subscale

The Cronbach Alpha ($\alpha = 0.86$) for the safety participation subscale was exceeded the recommended value of 0.70. Like safety compliance, the item statistics for safety participation, none of the items had an extreme mean or standard deviation, that is, there was an absence of poor items. The item-total statistics for safety participation accentuated that no poor items were present. All the items yielded reasonably high corrected correlations which indicated that the items measured the same underlying factor, namely safety participation. In support of this, there was also no increase in reliability if an item is deleted. Therefore, all safety participation items were retained.

4.2.1.3 Safety behaviour scale

The Cronbach Alpha ($\alpha = 0.89$) for the overall safety behaviour scale was beyond the suggested value of 0.70. Once again, there was no evidence of problematic items that should have been excluded from further analysis.

Table 5: Item-total statistics for the safety behaviour scale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SB1	20,72	17,36	0,65	0,88
SB2	20,66	17,43	0,74	0,87
SB3	20,74	17,37	0,77	0,87
SB4	20,96	16,30	0,71	0,88
SB5	21,04	15,99	0,77	0,87
SB6	21,14	16,34	0,67	0,88

The item-total statistics indicated that the scale mean remained constant for all items if an item was deleted (see Table 5). This verified that all items functioned well in the

overall scale. Consistent with the other results, all items showed high corrected item-total correlations. In other words, the items measured the same underlying factor, specifically safety behaviour. There was also no substantial increase in reliability if an item was deleted. Therefore, all safety behaviour items were retained for subsequent analyses.

4.2.2 UWES

The results of the descriptive statistics are presented in Table 6. The factor scores were recoded to “Never (1), Almost never (2), Rarely (3), Sometimes (4), Often (5), Very often (6), Always (7)”.

Table 6: Descriptive statistics for the UWES scale

	Cronbach's Alpha	Minimum	Maximum	Mean	Std. Deviation
Vigour	0,82	2,5	7	5,72	1,06
Dedication	0,85	1,6	7	5,77	1,18
Absorption	0,76	2,5	7	5,54	1,03
Work engagement	0,92	2,3	7	5,67	1,01

N = 198

A collective mean score of 5.67 was obtained for work engagement. This demonstrates that the respondents felt that they “often” to “very often” engaged in their work. The lowest mean score was obtained for questions pertaining to absorption ($M = 5.54$), whereas the highest mean score was obtained for dedication ($M = 5.77$). In general, these results show high levels of work engagement.

To analyse the survey items, the iterations of the item-total statistics for the subscales are presented in table format in Appendix E.

4.2.2.1 Vigour

The Cronbach Alpha ($\alpha = 0.82$) for the vigour subscale was well above the acceptable value of 0.70. Based on the item statistics, none of the items had an extreme mean or standard deviation. This indicated the absence of poor items. The item-total statistics

for vigour revealed the scale mean if an item is removed from the analysis is constant for all the items comprising the subscale as well as the scale variance if an item is deleted. This supported the assumption that all the items contributed to the internal consistency of the scale. Furthermore, all items yielded acceptable correlations which indicated that the items measured the same underlying factor, namely vigour. The Cronbach's Alpha results did not demonstrate an increase in reliability if the item were to be deleted. Therefore, all items that measure vigour were retained.

4.2.2.2 Dedication

As with the vigour subscale, the Cronbach Alpha ($\alpha = 0.85$) for the dedication subscale exceeded the acceptable value of 0.70. The item statistics for dedication demonstrated that none of the items had an extreme mean or standard deviation. As such, there was an absence of poor items. Furthermore, the item-total statistics for dedication demonstrated that all the items yielded reasonably high corrected correlations which indicated that the items measured the same underlying factor. In support of this, there was no substantial increase in reliability if a certain item was deleted. Therefore, all items that measure dedication were retained.

4.2.2.3 Absorption

The Cronbach Alpha ($\alpha = 0.76$) for the absorption subscale was acceptable. Based on the item statistics, none of the items had an extreme mean or standard deviation. This indicated the absence of poor items. The item-total statistics for absorption revealed a constant the scale mean and scale variance if an item is removed from the analysis. This supported to the assumption that all the items contributed to the internal consistency of the scale. Moreover, all items yielded acceptable correlations which indicated that the items measured the same underlying factor, namely absorption. The Cronbach's Alpha results did not indicate an increase in reliability if any item is deleted. Therefore, all items that measure absorption were retained.

4.2.2.4 UWES

The Cronbach Alpha ($\alpha = 0.92$) for the overall UWES scale was far beyond the suggested value of 0.70. Once again, there was no evidence of problematic items that should be excluded from further analysis.

Table 7: Item-total statistics for work engagement

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WE1	74,96	256,49	0,58	0,92
WE2	74,35	256,82	0,77	0,92
WE3	74,35	258,73	0,68	0,92
WE4	74,56	254,61	0,74	0,92
WE5	74,41	253,74	0,72	0,92
WE6	75,04	257,83	0,49	0,92
WE7	74,62	245,77	0,78	0,91
WE8	74,74	251,37	0,69	0,92
WE9	74,36	258,81	0,67	0,92
WE10	74,20	254,60	0,77	0,91
WE11	74,54	256,53	0,75	0,92
WE12	74,36	261,01	0,62	0,92
WE13	75,37	255,30	0,51	0,92
WE14	75,40	260,14	0,45	0,92
WE15	74,72	257,91	0,58	0,92
WE16	75,22	260,52	0,43	0,92
WE17	74,53	263,17	0,49	0,92
WE1	74,96	256,49	0,58	0,92

The item-total statistics indicated that the scale mean and scale variance remain constant for all items if an item was deleted (see Table 7). This verifies that all items functioned well in the overall scale. Consistent with the other results, all items showed high corrected item-total correlations. This implies that the items measured the same factor, specifically work engagement. There was also no increase in reliability if an

item is deleted. Therefore, all work engagement items were retained for subsequent analyses.

4.2.3 PCQ-24

The results of the descriptive statistics are presented in Table 8. The factor scores were recoded to “Strongly disagree (1), Disagree (2), Somewhat disagree (3), Somewhat agree (5), Agree (6), Strongly Agree (7)”.

Table 8: Descriptive statistics for PsyCap

	Cronbach's Alpha	Minimum	Maximum	Mean	Std. Deviation
Self-efficacy	0,82	2,5	7	5,71	1,06
Hope	0,78	1,6	7	5,77	1,18
Resilience	0,67	2,5	7	5,54	1,03
Optimism	0,78	2,3	7	5,67	1,01
PsyCap	0,90	2,5	7	5,72	1,06

N = 198

An aggregate mean score of 5.72 was obtained for PsyCap. This demonstrates a tendency towards “somewhat agree” to “agree”. The lowest mean score was obtained for questions pertaining to resilience (*M* = 5.54), whereas the highest mean score was obtained for hope (*M* = 5.77). In general, these results show that the respondents draw from high levels of PsyCap.

To analyse the survey items, the iterations of the item-total statistics for the subscales are presented in table format in Appendix E.

4.2.3.1 Self-efficacy

The Cronbach Alpha ($\alpha = 0.82$) for the self-efficacy subscale was acceptable. None of the items had extreme means or standard deviations which suggested the absence of poor items. The item-total statistics for self-efficacy demonstrated a constant scale mean and scale variance if an item is deleted. This supported the notion that all the items successfully contributed to the internal consistency of the scale. Furthermore, all items yielded good correlations which suggested that the items measured the same

underlying factor. The Cronbach's Alpha results also showed little to no substantial increase in reliability if the item were to be deleted. Therefore, all self-efficacy items were retained.

4.2.3.2 Hope

The Cronbach Alpha ($\alpha = 0.78$) for the hope subscale as acceptable. There was no evidence of items that could be problematic. This assumption was drawn from the descriptive statistics which did not indicate extreme standard deviations. The item-total statistics for hope did not show extreme differences if a specific item were to be removed from the analysis as the scale mean and scale were relatively steady. For this reason, it is safe to assume that all the items contributed to the internal consistency of the hope scale. Furthermore, all items yielded acceptable correlations which indicated that the items measured the same underlying factor, namely hope. The Cronbach's Alpha results also did not show a noticeable increase in reliability if items were to be deleted. Therefore, all hope items were retained.

4.2.3.3 Resilience

The initial analysis of the resilience subscale demonstrated a weak Cronbach Alpha ($\alpha = 0.57$) which was attributed to the inclusion of an item that was reverse coded (RPC13). The item-total statistics for resilience validated the removal of item RPC13. Specifically, the removal of this item enhanced the internal consistency to a Cronbach Alpha value of 0.67 which is considered to be moderate.

Earlier studies demonstrate that resilience and optimism yield lower internal consistency scores than the other two subscales in the PCQ-24 (Avey et al., 2011; Luthans et al., 2007). Similarly, the same occurrence was observed in the results of this study. Resilience obtained the lowest Cronbach Alpha value ($\alpha = 0.67$). Even though this value is considered yield moderate internal consistency. It should be noted that the item-total statistics did not suggest the removal of additional items. A total of five resilience items were retained.

4.2.3.4 Optimism

The preliminary analysis of the optimism subscale confirmed a weak Cronbach Alpha ($\alpha = 0.52$). This was attributed to the inclusion of an item that was reverse coded (RPC20). The item-total statistics for optimism justified the removal of item RPC20. Specifically, the exclusion of this item increased the internal consistency to a Cronbach Alpha value of 0.61 which is still considered weak. For this reason, another reverse coded item was deleted, namely RPC23. Based on the item-total statistics, the removal of RPC23 further increased the internal consistency of the optimism subscale which met the suggested requirement of an acceptable Cronbach Alpha value. Specifically, after items the removal of items RPC20 and RPC23, the final Cronbach Alpha increased to 0.78. The Cronbach's Alpha results did not show a noteworthy increase in reliability if more items were to be deleted. A total of four optimism items were retained.

4.2.3.5 PCQ-24

After the removal of three problematic items, the Cronbach Alpha ($\alpha = 0.90$) for the overall PCQ-24 model exceeded the suggested value of 0.70. This indicated an excellent level of reliability. Once more, there was no evidence of further problematic items that should have been excluded from further analysis.

Table 9: Item-total statistics for the PsyCap model

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC1	97,61	171,06	0,60	0,90
PC2	97,49	171,93	0,59	0,90
PC3	97,57	173,08	0,58	0,90
PC4	97,24	173,08	0,63	0,90
PC5	97,74	172,70	0,45	0,90
PC6	97,55	173,44	0,55	0,90
PC7	97,68	175,84	0,42	0,90
PC8	97,36	172,48	0,64	0,90

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC9	97,37	176,45	0,49	0,90
PC10	97,61	175,52	0,47	0,90
PC11	97,38	172,77	0,64	0,90
PC12	97,65	173,90	0,59	0,90
PC14	97,60	174,40	0,60	0,90
PC15	97,35	180,26	0,38	0,90
PC16	97,97	177,40	0,37	0,90
PC17	97,38	174,70	0,55	0,90
PC18	97,61	176,33	0,48	0,90
PC19	97,93	172,54	0,56	0,90
PC21	97,53	170,94	0,67	0,90
PC22	97,68	174,71	0,51	0,90
PC24	97,78	173,74	0,47	0,90

The item-total statistics indicated that the scale mean remains constant for all items if an item was deleted (see Table 9). This confirmed that all remaining items functioned well in the overall PsyCap model. There was also no evidence of a substantial increase in reliability if a specific item were to be deleted. Therefore, a total of 21 PsyCap items were retained for subsequent analyses.

4.2.4 **ALQ**

The results of the descriptive statistics are presented in Table 10. The factor scores were recoded to “Not at all (1), Once in a while (2), Sometimes (4), Fairly Often (6), Frequent, if not always (7)”.

Table 10: Descriptive statistics for authentic leadership

	Cronbach's Alpha	Minimum	Maximum	Mean	Std. Deviation
Self-awareness	0,81	1	7	5,25	1,50
Transparency	0,82	1	7	4,91	1,46

Ethical/moral	0,86	1	7	5,00	1,65
Balanced processing	0,86	1	7	4,85	1,72
Authentic leadership	0,94	1	7	5,25	1,50

N = 198

A total mean score of 5.25 was obtained for authentic leadership. This shows that the respondents perceived their leaders to be authentic “fairly often” to “frequent, if not always”. The lowest mean score was obtained for questions pertaining to balanced processing ($M = 4.85$), whereas the highest mean score was obtained for self-awareness ($M = 5.25$). In general, these results demonstrate that the respondents perceive their immediate leaders as genuine and authentic.

To analyse the survey items, the iterations of the item-total statistics for the subscales are presented in table format in Appendix E.

4.2.4.1 Self-awareness

The Cronbach Alpha ($\alpha = 0.81$) for the self-awareness subscale indicated outstanding internal consistency. There were no extreme means or standard deviations observed which indicated the absence of poor items. The item-total statistics presented in Appendix E demonstrate a steady scale mean and scale variance if an item is deleted. This confirmed that all the items successfully contributed to the internal consistency of the subscale. Furthermore, all items yielded good correlations which indicated that the items measured the same underlying factor. The Cronbach’s Alpha results also showed no increase in reliability if items were to be deleted. Therefore, all self-awareness items were retained.

4.2.4.2 Transparency

The Cronbach Alpha ($\alpha = 0.82$) for the self-efficacy subscale was excellent. There was no evidence of items that could be problematic. This assumption was drawn from the descriptive statistics which did not indicate extreme standard deviations. The item-total statistics for transparency items showed no extreme differences if a specific item were to be removed from the analysis as the scale mean and scale variance were

relatively constant. It was, therefore, safe to assume that all the items contributed to the internal consistency of the transparency subscale. The Cronbach's Alpha results also did not show an increase in reliability if items were to be deleted. Therefore, all transparency items were retained.

4.2.4.3 Ethical/moral

The Cronbach Alpha ($\alpha = 0.86$) for the ethical/moral demonstrated exceptional internal consistency. There were no extreme means or standard deviations observed which indicated the absence of poor items. The item-total statistics revealed steady scale mean and scale variance if an item is deleted. This confirmed that all the items successfully contributed to the internal consistency of the subscale. Furthermore, all items yielded good correlations which indicated that all items measured the ethical/moral factor. The Cronbach's Alpha results did not show an increase in reliability if items were to be deleted. Therefore, all ethical/moral items were retained.

4.2.4.4 Balanced processing

Like the other authentic leadership factors, the Cronbach Alpha ($\alpha = 0.86$) for the balanced processing subscale exceeded the acceptable value of 0.70, suggesting exceptional internal consistency. There were no extreme means or standard deviations observed which showed the absence of poor items. The item-total statistics demonstrated a constant scale mean and scale variance if an item is deleted. This confirmed that all the items successfully contributed to the internal consistency of the subscale. Moreover, all items show good correlations which implied that all items measured balanced processing. The Cronbach's Alpha results also did not show an increase in reliability if items were to be deleted. Therefore, all balanced processing items were retained.

4.2.4.5 ALQ

The Cronbach Alpha ($\alpha = 0.94$) for the overall ALQ indicated an excellent level of reliability. Once more, there was no evidence of problematic items that should be excluded from further analysis.

Table 11: Item-total statistics for the authentic leadership model

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AL1	53,86	177,92	0,68	0,94
AL2	54,04	174,53	0,69	0,94
AL3	54,01	173,67	0,72	0,94
AL4	53,97	177,27	0,59	0,94
AL5	54,41	183,38	0,41	0,94
AL6	54,25	175,01	0,67	0,94
AL7	54,12	175,84	0,65	0,94
AL8	54,15	173,38	0,72	0,94
AL9	54,06	176,90	0,66	0,94
AL10	54,28	178,28	0,63	0,94
AL11	54,05	170,47	0,79	0,94
AL12	54,04	170,72	0,79	0,94
AL13	54,10	171,81	0,75	0,94
AL14	54,37	173,33	0,73	0,94
AL15	54,22	173,78	0,75	0,94
AL16	54,12	172,53	0,76	0,94

Table 11 displays the item-total statistics which indicates that the scale mean remains constant for all items if an item was deleted. This confirmed that all remaining items functioned well in the overall model. There was also no evidence of an increase in reliability if a specific item is deleted. Therefore, all authentic leadership items were retained for subsequent analyses.

4.3 VALIDITY OF THE MEASUREMENT INSTRUMENTS

The validity of the measurement instruments was tested by means of CFA. The CFA process entailed inspecting the parameter estimates of each factor before goodness-of-fit indices are reported. Specifically, the degree of fit between the models and the dataset was determined by acknowledging the goodness of fit statistics criteria (see Table 12).

Table 12: Goodness of fit indices

Index	Good model fit cut-off	Adequate model fit cut-off	Reference
CMIN/df	< 3.00	< 5.00	Tabachnick and Fidell (2013).
CFI	> 0.95	> 0.90	Bentler (2011).
SRMR	< 0.05	< 0.08	Brown (2015).
RMSEA	< 0.08	< 0.10	Hooper, Coughlan, and Mullen (2008). MacCallum, Browne, and Sugawara (1996).

Interestingly, three instruments yielded good fit to the dataset, thereby confirming its successful application to the sample. That is, safety behaviour, UWES, and the ALQ. Therefore, EFA was deemed redundant, and all subsequent analyses were based on the original factor models. In the same vein, the PCQ-24 demonstrated good fit to the data after three problematic items were removed. For this reason, EFA was also regarded unnecessary, and all subsequent analyses were based on the 21-item factor model.

4.3.1 Safety behaviour

The CFA process was repeated a total of three times to confirm the safety behaviour factor structure. More specifically, one CFA was conducted on every factor, that is, safety compliance, safety participation, and finally on the overall safety behaviour model.

4.3.1.1 Safety compliance

Table 13 presents the parameter estimates for the safety compliance subscale.

Table 13: Parameter estimates for the safety compliance subscale

Regression weights		Estimate	S.E.	C.R.	P
SB1	<--- Safety Compliance	1,043	0,082	12,697	***
SB2	<--- Safety Compliance	1,015	0,074	13,673	***
SB3	<--- Safety Compliance	1			
Standardised regression weights					
SB1	<--- Safety Compliance	0,793			
SB2	<--- Safety Compliance	0,863			
SB3	<--- Safety Compliance	0,87			

The unstandardised and standardised parameter estimates indicate statistical significance (p -value < 0.05). In addition, the standard errors did not appear excessively large or small which meant that the parameters were well defined (Byrne, 2010). In line with the descriptive and item-total statistics, the parameter estimates did not demonstrate problematic items that must be excluded from later analyses.

Table 14: Model fit summary for the safety compliance subscale

Fit index	Value	Interpretation
SRMR	0,00	Good
CFI	1,00	Good

Based on the SRMR (0.00) and CFI (1.00) values of the default model, it is clear that the safety compliance model represented an overall good fit to the dataset (see Table 14). Since the subscale merely has three items, the RMSEA value for the default model could not be calculated due to the lack of degrees of freedom.

4.3.1.2 Safety participation

Table 15 shows that the unstandardised and standardised parameter estimates.

Table 15: Parameter estimates for the safety participation subscale

Regression weights	Estimate	S.E.	C.R.	P
---------------------------	-----------------	-------------	-------------	----------

SB4	<--- Safety Participation	0,926	0,085	10,871	***
SB5	<--- Safety Participation	1,116	0,096	11,671	***
SB6	<--- Safety Participation	1			
Standardised regression weights					
SB4	<--- Safety Participation	0,75			
SB5	<--- Safety Participation	0,92			
SB6	<--- Safety Participation	0,783			

It is clear from the table above that the unstandardised and standardised parameter estimates were statistically significant (p -value < 0.05), and no problematic items were identified that should be considered for exclusion.

Table 16: Model fit summary for the safety participation subscale

Fit index	Value	Interpretation
SRMR	0,00	Good
CFI	1,00	Good

The results of the fit indices are presented in Table 16. Based on the SRMR (0.00) and CFI (1.00) values of the default model, the safety participation model represented an overall good fit to the dataset. Since the subscale merely has three items, the RMSEA value for the default model could not be calculated due to the lack of degrees of freedom.

4.3.1.3 Safety behaviour

Table 17 shows that the unstandardised and standardised parameter estimates

Table 17: Parameter estimates for safety behaviour

Regression weights		Estimate	S.E.	C.R.	P
Safety Compliance	<--- Safety Behaviour	1			
Safety Participation	<--- Safety Behaviour	1			
SB4	<--- Safety Participation	0,955	0,084	11,376	***
SB5	<--- Safety Participation	1,081	0,083	12,951	***
SB6	<--- Safety Participation	1			

Regression weights		Estimate	S.E.	C.R.	P
SB1	<--- Safety Compliance	1,011	0,077	13,09	***
SB2	<--- Safety Compliance	0,995	0,066	14,962	***
SB3	<--- Safety Compliance	1			
Standardised regression weights					
Safety Compliance	<--- Safety Behaviour	0,942			
Safety Participation	<--- Safety Behaviour	0,814			
SB4	<--- Safety Participation	0,776			
SB5	<--- Safety Participation	0,896			
SB6	<--- Safety Participation	0,787			
SB1	<--- Safety Compliance	0,781			
SB2	<--- Safety Compliance	0,859			
SB3	<--- Safety Compliance	0,883			

The unstandardised and standardised parameter estimates were statistically significant (p -value < 0.05) across the overall safety behaviour scale. In addition, no problematic items are identified that should be considered for exclusion from subsequent analyses.

Table 18: Model fit summary for the safety behaviour model

Fit index	Value	Interpretation
CMIN/DF	1,10	Good
SRMR	0,03	Good
CFI	0,99	Good
RMSEA	0,02	Good

When compared to the results each factor, it is evident that the results for the overall safety behaviour model provided good model fit to the dataset as noted by the CMIN/DF (1,10), SRMR (0,03), CFI (0,99), and RMSEA (0,02) values (see Table 18). The two-factor safety behaviour model is presented in Figure 7.

In sum, the results indicated statistically significant parameter estimates and acceptable goodness-of-fit statistics. Therefore, none of the factors were excluded from the safety behaviour model.

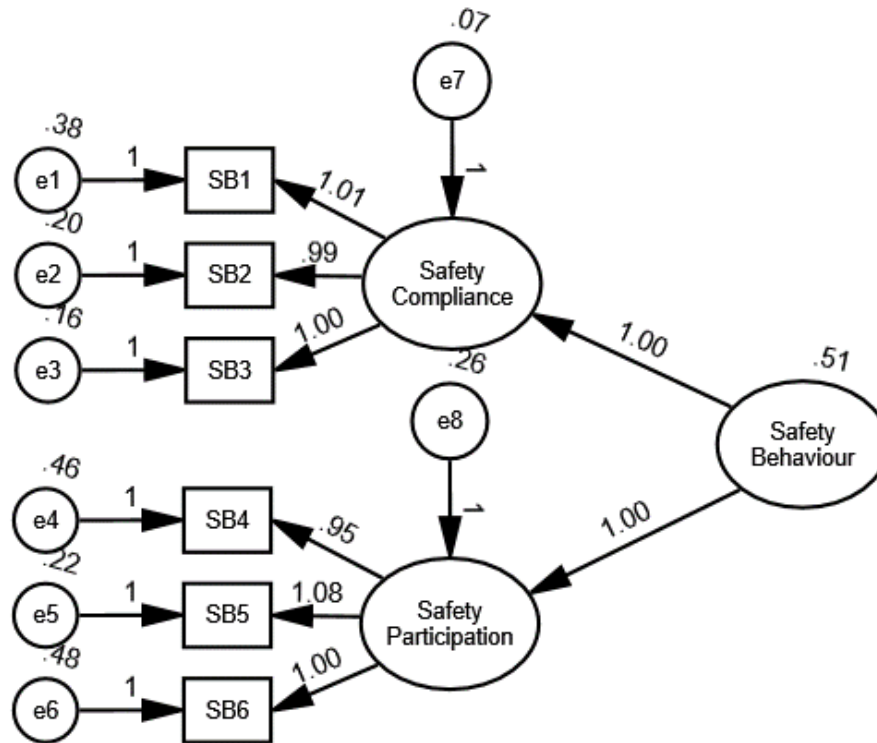


Figure 7: Safety behaviour model

4.3.2 UWES

The CFA process was repeated a total of six times to confirm the overall UWES factor structure. The reason for the CFA repetition is because of the use of Modification Indices (MI) on two factors, namely vigour and the overall work engagement model. MI was required because it offers remedies to discrepancies between the proposed and estimated model, and when the items relate to the same concepts. Proof positive, MI informs how well model fit would change if new parameters were added to the model (Byrne, 2010). Indices of 3.84 or more suggest that the overall fit of the model can be improved ($p < 0.05$) if the additional parameters are included (Brown, 2015).

4.3.2.1 Vigour

The first round of CFA demonstrated that the unstandardised and standardised parameter estimates are statistically significant ($p\text{-value} < 0.05$).

Table 19: Modification index for the vigour default model

			M.I.	Par Change
e4	<-->	e1	4,46	-0,20
e5	<-->	e4	4,21	0,20
e6	<-->	e3	9,50	-0,32
e6	<-->	e5	16,84	0,47

The covariance output indicated that items WE15 and WE17 were highly related (MI = 16.84; Parameter Change = 0.47) which suggested that the inclusion of an additional pathway might improve the fit statistics (see Table 19). The inclusion of the covariance between these two items were necessary from a theoretical point of view as they relate to a similar concept. The CFA process was, therefore repeated to free a new parameter between items WE15 and WE17. Consequently, the parameter estimates, and goodness-of-fit indicators were strengthened (see Table 20).

Table 20: Parameter estimates for the vigour subscale

Regression weight			Estimate	S.E.	C.R.	P
WE17	<---	Vigour	1			
WE15	<---	Vigour	1,117	0,171	6,534	***
WE12	<---	Vigour	1,047	0,184	5,699	***
WE8	<---	Vigour	1,626	0,254	6,395	***
WE4	<---	Vigour	1,569	0,237	6,612	***
WE1	<---	Vigour	1,501	0,244	6,154	***
Standardised regression weight						
WE17	<---	Vigour	0,497			
WE15	<---	Vigour	0,533			
WE12	<---	Vigour	0,588			
WE8	<---	Vigour	0,743			
WE4	<---	Vigour	0,827			
WE1	<---	Vigour	0,681			

Table 21: Model fit summary for the vigour subscale

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	4,12	Adequate
	SRMR	0,06	Adequate
	CFI	0,93	Adequate
	RMSEA	0,19	Poor
CFA 2	CMIN/DF	2,39	Good
	SRMR	0,04	Good
	CFI	0,97	Good
	RMSEA	0,08	Good

The first round of CFA demonstrated an adequate fit to the data set: CMIN/DF (4.12), SRMR (0.06), CFI (0.93), and RMSEA (0.19). The second round of CFA where the additional pathway is included, denotes improved fit statistics to show a good fit to the data: CMIN/DF (2.39), SRMR (0.04), CFI (0.97), and RMSEA (0.08) (see Table 21). The inclusion for the new parameter improved this model's goodness-of-fit statistics.

4.3.2.2 Dedication

Table 22 shows the parameter estimates for the items that measured dedication.

Table 22: Parameter estimates for the dedication subscale

Regression weight			Estimate	S.E.	C.R.	P
WE13	<---	Dedication	0,977	0,138	7,092	***
WE10	<---	Dedication	1,148	0,092	12,47	***
WE7	<---	Dedication	1,438	0,116	12,42	***
WE5	<---	Dedication	1,149	0,101	11,343	***
WE2	<---	Dedication	1			
Standardised regression weight						
WE13	<---	Dedication	0,513			
WE10	<---	Dedication	0,846			
WE7	<---	Dedication	0,842			

WE5	<---	Dedication	0,777
WE2	<---	Dedication	0,782

Specifically, both the unstandardised and standardised parameter estimates indicates statistical significance (p-value < 0.05) and no problematic items were identified. This factor did not yield MI that suggested the inclusion of additional pathways between items.

Table 23: Model fit summary for the dedication subscale

Fit index	Value	Interpretation
CMIN/DF	2,92	Good
SRMR	0,03	Good
CFI	0,98	Good
RMSEA	0,10	Adequate

The results of the fit indices are presented in Table 23. Based on the CMIN/DF (2.92), SRMR (0.03), CFI (0.98), and RMSEA (0.10) values of the default model, it is clear that the dedication model represented an overall good fit to the dataset. Although the dedication subscale fit indices generally, indicate good model fit, the RMSEA value of 0.10 was a cause for concern as it indicates adequate model fit.

4.3.2.3 Absorption

Table 24 shows the parameter estimates for the items that measured absorption.

Table 24: Initial parameter estimates for the absorption subscale

Regression weight			Estimate	S.E.	C.R.	P
WE14	<---	Absorption	1,048	0,174	6,027	***
WE11	<---	Absorption	1,118	0,14	7,988	***
WE9	<---	Absorption	1,012	0,137	7,382	***
WE6	<---	Absorption	1,153	0,178	6,46	***
WE3	<---	Absorption	1			
WE16	<---	Absorption	1,012	0,177	5,712	***
Standardised regression weight						

WE14	<---	Absorption	0,515
WE11	<---	Absorption	0,754
WE9	<---	Absorption	0,662
WE6	<---	Absorption	0,559
WE3	<---	Absorption	0,662
WE16	<---	Absorption	0,484

Both the unstandardised and standardised parameter estimates indicated statistical significance (p-value < 0.05) and no problematic items are identified. Once again, this factor did not yield MI that suggested the inclusion of additional pathways between items.

Table 25: Model fit summary for the absorption subscale

Fit index	Value	Interpretation
CMIN/DF	2,21	Good
SRMR	0,05	Good
CFI	0,96	Good
RMSEA	0,08	Good

The results of the fit indices are presented in Table 25. The absorption model signified a good fit to the data as noted by the CMIN/DF (2.21), SRMR (0.05), CFI (0.96), and RMSEA (0.08) values.

4.3.2.4 Work engagement

The parameter estimates for the overall work engagement model are presented in table format in Appendix F. Like the vigour subscale, the first round of CFA validated that the application of MI as a high relation between items WE14 and WE16 were identified (MI = 11.99; Parameter Change = 0.63). Therefore, the CFA process was repeated to include an additional parameter between said items.

The MI between e16 and e17 of 11.99 and parameter change of 0.63 was included in the model because of the theoretical considerations that these items relate to the same concept and improvement of the model fit (see Appendix F). The unstandardised and

standardised parameter estimates indicated statistical significance (p-value < 0.05) after the additional pathway were included in the analysis.

Table 26: Model fit summary for the UWES model

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	2,64	Good
	SRMR	0,06	Adequate
	CFI	0,90	Adequate
	RMSEA	0,09	Adequate
CFA 2	CMIN/DF	2,55	Good
	SRMR	0,06	Adequate
	CFI	0,90	Adequate
	RMSEA	0,09	Adequate

The first round of CFA demonstrated an adequate fit to the data set: CMIN/DF (2.64), SRMR (0.06), CFI (0.90), and RMSEA (0.09). The second round of CFA included the additional pathway and resulted in a slightly improved and acceptable fit to the dataset: CMIN/DF (2.55), SRMR (0.06), CFI (0.90), and RMSEA (0.09) (see Table 26).

In general, the results indicated statistically significant parameter estimates and acceptable goodness-of-fit statistics for the work engagement model. Therefore, none of the factors are excluded. The original three-factor work engagement model is presented in Figure 8.

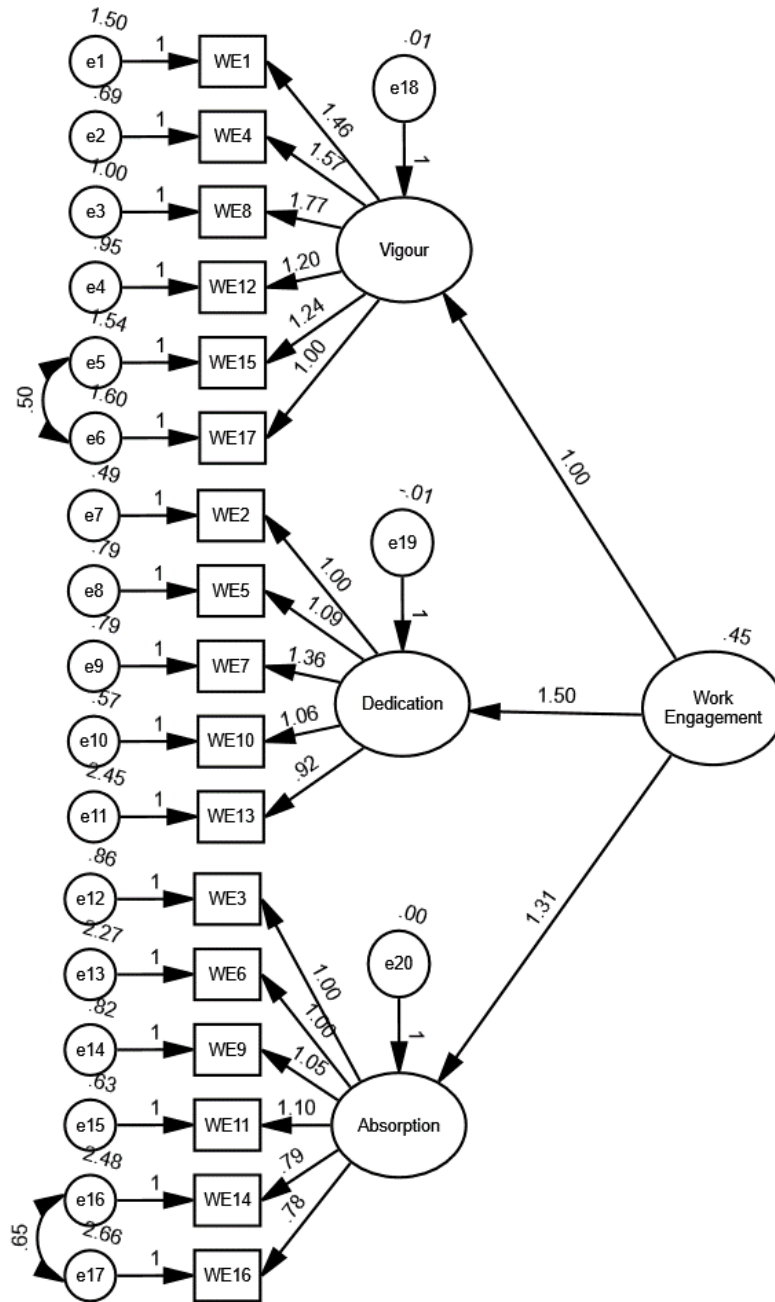


Figure 8: UWES model

4.3.3 PCQ-24

The CFA process was repeated nine times to confirm model fit. Similar to the UWES, the CFA iterations improved the model fit with the inclusion of additional pathways. The parameter estimates of each factor were inspected before goodness-of-fit indices were considered.

4.3.3.1 Self-efficacy

Table 27 presents the parameter estimates for the items that measured self-efficacy.

Table 27: Parameter estimates for the self-efficacy subscale

Regression weight			Estimate	S.E.	C.R.	P
PC6	<---	Efficacy	1			
PC5	<---	Efficacy	1,041	0,173	6,002	***
PC4	<---	Efficacy	1,152	0,143	8,071	***
PC3	<---	Efficacy	1,256	0,154	8,142	***
PC2	<---	Efficacy	1,303	0,16	8,142	***
PC1	<---	Efficacy	1,065	0,154	6,91	***
Standardised regression weight						
PC6	<---	Efficacy	0,606			
PC5	<---	Efficacy	0,51			
PC4	<---	Efficacy	0,764			
PC3	<---	Efficacy	0,775			
PC2	<---	Efficacy	0,775			
PC1	<---	Efficacy	0,61			

Both the unstandardised and standardised parameter estimates indicated statistical significance (p-value < 0.05) and no problematic items were identified. This factor did not yield parameter change estimates that will improve model fit and, therefore additional pathways between items were unnecessary.

Table 28: Model fit summary for the self-efficacy subscale

Fit index	Value	Interpretation
CMIN/DF	2,75	Good
SRMR	0,04	Good
CFI	0,96	Good
RMSEA	0,09	Adequate

The results of the fit indices are presented in Table 28. Based on the CMIN/DF (2.75), SRMR (0.04), CFI (0.96), and RMSEA (0.09) values of the default model, it is clear that the self-efficacy model signified an overall good fit to the dataset.

4.3.3.2 Hope

The first round of CFA demonstrated that the unstandardised and standardised parameter estimates were statistically significant (p -value < 0.05).

Table 29: Modification index for the hope subscale

			M.I.	Par Change
e3	<-->	e1	25,49	0,38
e6	<-->	e3	7,92	-0,15

The covariance output indicated that items PC7 and PC9 were highly related (MI = 25.49; Parameter Change = 0.38) which implied that the inclusion of an additional pathway might improve the fit statistics.

Table 30: Parameter estimates for the hope subscale

Regression weight			Estimate	S.E.	C.R.	P
PC12	<---	Hope	1			
PC11	<---	Hope	1,148	0,133	8,62	***
PC10	<---	Hope	0,987	0,141	7,01	***
PC9	<---	Hope	0,683	0,123	5,567	***
PC8	<---	Hope	1,221	0,138	8,834	***
PC7	<---	Hope	0,687	0,145	4,749	***
Standardised regression weight						
PC12	<---	Hope	0,665			
PC11	<---	Hope	0,768			
PC10	<---	Hope	0,588			
PC9	<---	Hope	0,454			
PC8	<---	Hope	0,809			
PC7	<---	Hope	0,383			

Based on the information above, the CFA process was repeated to include the additional pathway between items PC7 and PC9 which improved the parameter estimates (see Table 30).

Table 31: Model fit summary for the hope subscale

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	4,27	Adequate
	SRMR	0,07	Adequate
	CFI	0,91	Poor
	RMSEA	0,13	Poor
CFA 2	CMIN/DF	1,42	Good
	SRMR	0,03	Good
	CFI	0,99	Good
	RMSEA	0,04	Good

From Table 31 above, it is clear that the first round of CFA demonstrated an adequate fit to the data: CMIN/DF (4.27) and SRMR (0.07) indicated an adequate fit, while the CFI (0.91) and RMSEA (0.13) indicated a poor fit. However, the second round of CFA admitted the additional pathway which resulted in improved statistics to yield good fit: CMIN/DF (1.42), SRMR (0.032), CFI (0.99), and RMSEA (0.04).

4.3.3.3 Resilience

The CFA process was repeated a total of three times to determine the goodness-of-fit for the resilience subscale to the dataset.

Table 32: Parameter estimates for the resilience subscale with problematic items

Regression weight			Estimate	S.E.	C.R.	P
PC18	<---	Resilience	1			
PC17	<---	Resilience	1,901	0,429	4,432	***
PC16	<---	Resilience	1,55	0,374	4,144	***
PC15	<---	Resilience	1,053	0,272	3,864	***
PC14	<---	Resilience	1,302	0,309	4,205	***

RPC13	<---	Resilience	0,424	0,316	1,34	0,18
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In line with the descriptive and item-total statistics, the first round of CFA revealed that one reverse coded item was problematic, namely RPC13. The parameter estimates for item RPC13 ($p = 0.18$) was statistically insignificant (see Table 32).

Table 33: Modification index for the resilience subscale

			M.I.	Par Change
e4	<-->	e3	4,77	-0,15
e6	<-->	e2	7,75	0,17
e6	<-->	e3	5,63	0,15
e6	<-->	e5	8,28	-0,17

Item RPC13 was removed from further analyses with the intention of observing model fit. This led to the second round of CFA which signified that an additional parameter needs to be freed between items PC17 and PC18 since they are highly related (MI = 8.28; Parameter Change = -0.17) (see Table 33).

The CFA process was, therefore repeated a third time to acknowledge the relatedness between items PC17 and PC18 to see if it will yield improved the parameter estimates and goodness-of-fit statistics.

Table 34: Parameter estimates for the resilience subscale

Regression weight			Estimate	S.E.	C.R.	P
PC18	<---	Resilience	1			
PC15	<---	Resilience	0,632	0,156	4,056	***
PC14	<---	Resilience	0,714	0,169	4,233	***
PC16	<---	Resilience	0,819	0,199	4,107	***
PC17	<---	Resilience	1,389	0,255	5,44	***
Standardised regression weight						
PC18	<---	Resilience	0,633			
PC15	<---	Resilience	0,44			
PC14	<---	Resilience	0,49			
PC16	<---	Resilience	0,454			

PC17 <--- Resilience 0,902

Table 34 presents both the unstandardised and standardised parameter estimates which indicate statistical significance (p-value < 0.05) after the additional pathway between said items were included in the analysis.

Table 35: Model fit summary for the resilience subscale

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	3,11	Adequate
	SRMR	0,06	Adequate
	CFI	0,87	Poor
	RMSEA	0,10	Adequate
CFA 2	CMIN/DF	5,20	Poor
	SRMR	0,07	Adequate
	CFI	0,86	Poor
	RMSEA	0,15	Poor
CFA 3	CMIN/DF	1,75	Good
	SRMR	0,04	Good
	CFI	0,98	Good
	RMSEA	0,06	Good

The model fit summary is presented in Table 35. The first round CFA demonstrated an adequate fit to the data: CMIN/DF (3.11), SRMR (0.057), CFI (0.87), and RMSEA (0.10). After the item was removed and the second round CFA was concluded, the results indicated that the model did not fit to the data: CMIN/DF (5.20), SRMR (0.07), CFI (0.86), and RMSEA (0.15). Finally, after the removal of said items and the additional pathway between items PC17 and PC18 were acknowledged, the goodness-of-fit statistics improved to the extent that good model fit is confirmed: CMIN/DF (1.75), SRMR (0.04), CFI (0.98), and RMSEA (0.06).

4.3.3.4 Optimism

Similar to the resilience factor, there were two reverse coded items identified as problematic, namely RPC20 and RPC23.

Table 36: Parameter estimates for the optimism subscale with problematic items

Regression weight			Estimate	S.E.	C.R.	P
PC24	<---	Optimism	1			
RPC23	<---	Optimism	-0,091	0,135	-0,677	0,50
PC22	<---	Optimism	0,725	0,108	6,693	***
PC21	<---	Optimism	1,169	0,131	8,908	***
RPC20	<---	Optimism	-0,194	0,13	-1,495	0,14
PC19	<---	Optimism	0,96	0,116	8,301	***

In line with the descriptive and item-total statistics, the problematic nature of the two items were confirmed with CFA. The parameter estimates for items RPC20 ($p = 0.14$) and RPC23 ($p = 0.50$) were statistically insignificant (see Table 36). For this reason, the items were removed from further analyses with the intention of observing improved parameter estimates and model fit.

Table 37: Parameter estimates for the optimism subscale

Regression weight			Estimate	S.E.	C.R.	P
PC24	<---	Optimism	1			
PC22	<---	Optimism	0,739	0,111	6,689	***
PC21	<---	Optimism	1,216	0,139	8,732	***
PC19	<---	Optimism	0,964	0,118	8,158	***
Standardised regression weight						
PC24	<---	Optimism	0,648			
PC22	<---	Optimism	0,54			
PC21	<---	Optimism	0,92			
PC19	<---	Optimism	0,682			

Table 37 presents the parameter estimates for the items that measured optimism. Specifically, both the unstandardised and standardised parameter estimates indicated statistical significance (p -value < 0.05) and no additional problematic items were identified that should be considered for exclusion. The results did not suggest that the inclusion of additional pathways between items was deemed unnecessary.

Table 38: Model fit summary for the optimism subscale

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	6,76	Poor
	SRMR	0,11	Poor
	CFI	0,82	Poor
	RMSEA	0,17	Poor
CFA 2	CMIN/DF	3,65	Adequate
	SRMR	0,03	Good
	CFI	0,98	Good
	RMSEA	0,12	Poor

Table 38 presents the model fit summary for the optimism subscale. It is evident that the removal of items RPC20 and RPC23 had a positive impact on the goodness-of-fit statistics. Specifically, the first round of CFA demonstrated an almost poor fit to the data set since the CMIN/DF (6.76), SRMR (0.11), CFI (0.82), and RMSEA (0.17). However, the second round of CFA admitted the exclusion of said items which resulted in improved statistics that yield an overall good fit: CMIN/DF (3.65), SRMR (0.03), CFI (0.98), and RMSEA (0.12).

4.3.3.5 PCQ-24

The parameter estimates for the PCQ-24 are presented in table format in Appendix F. The table reflects the parameter estimates after all amendments were made (i.e., the removal of problematic items and the acknowledgement of additional pathways between items). Both the unstandardised and standardised parameter estimates indicated statistical significance (p -value < 0.05).

Table 39: Model fit summary for the overall PCQ-24

Fit index	Value	Interpretation
CMIN/DF	1,80	Good
SRMR	0,07	Adequate
CFI	0,91	Adequate
RMSEA	0,06	Good

Based on the information provided in Table 39, it is clear that the overall PsyCap model suggested good fit to the data set when looking at the CMIN/DF (1.80), SRMR (0.07), CFI (0.91), and RMSEA (0.06) values of the default model.

In general, the results indicate statistically significant parameter estimates and acceptable goodness-of-fit statistics for the PsyCap model. Therefore, none of the factors are excluded. The four-factor PsyCap model is presented in Figure 9.

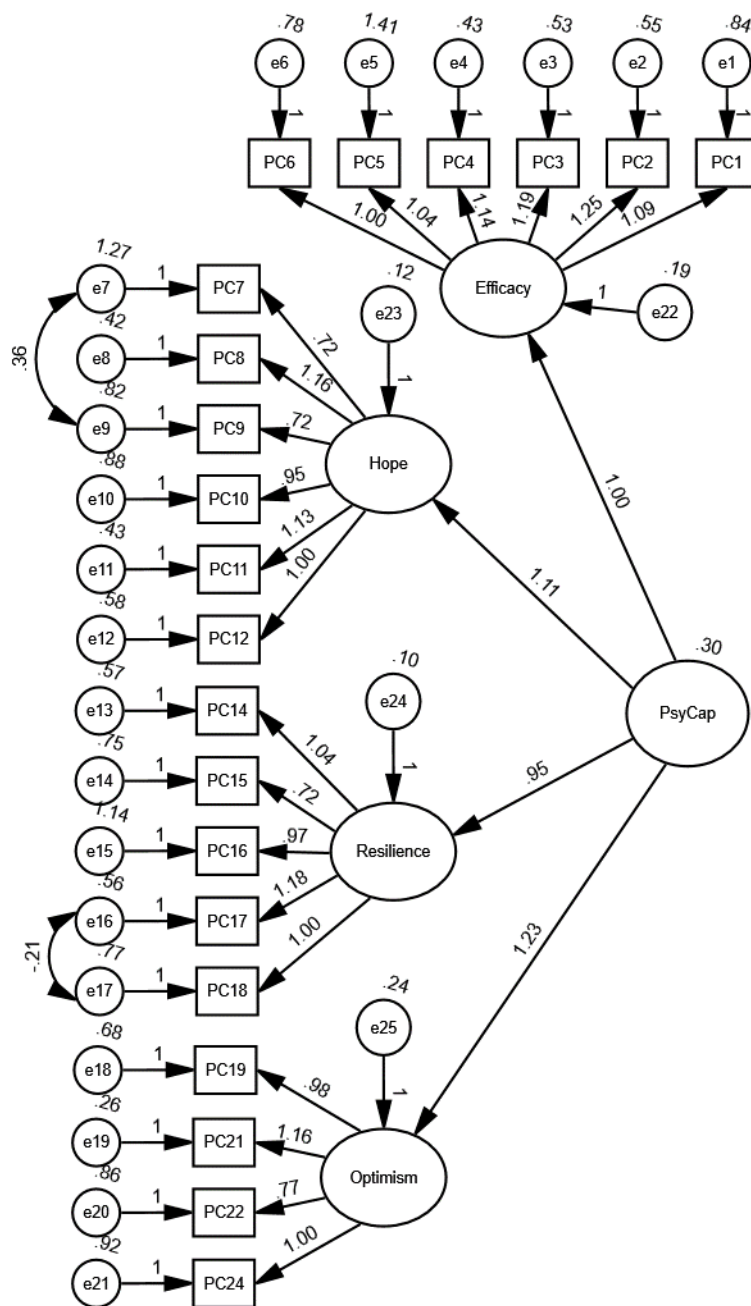


Figure 9: PCQ-24 model

4.3.4 ALQ

The CFA process was repeated a total of six times to confirm the overall work engagement factor structure. Once again, the reason for the CFA iteration was because of the MI on one factor that indicated a new parameter should be freed to improve model fit, namely self-awareness.

4.3.4.1 Self-awareness

The first round of CFA demonstrated that the unstandardised and standardised parameter estimates were statistically significant (p-value < 0.05). However, the covariance output indicated that items AL2 and AL4 were highly related (MI = 5.80, Parameter Change = -0.16). This suggested that the inclusion of an additional pathway might improve the fit statistics (see Table 40).

Table 40: Modification index for the self-awareness subscale

			M.I.	Par Change
e3	<-->	e2	4,35	0,13
e4	<-->	e1	5,49	0,13
e4	<-->	e2	5,80	-0,16

Table 41: Parameter estimates for the self-awareness subscale

Regression weight			Estimate	S.E.	C.R.	P
AL4	<---	SelfAwareness	1			
AL3	<---	SelfAwareness	1,008	0,127	7,922	***
AL2	<---	SelfAwareness	1,078	0,137	7,854	***
AL1	<---	SelfAwareness	0,898	0,112	8,04	***
Standardised regression weight						
AL4	<---	SelfAwareness	0,711			
AL3	<---	SelfAwareness	0,722			
AL2	<---	SelfAwareness	0,777			
AL1	<---	SelfAwareness	0,746			

Based on the information above, the CFA process was repeated to free a parameter between items AL2 and AL4. Consequently, the parameter estimates and goodness-of-fit indicators were strengthened (see Table 41).

Table 42: Model fit summary for the self-awareness subscale

	Fit index	Value	Interpretation
CFA 1	CMIN/DF	6,34	Poor
	SRMR	0,04	Good
	CFI	0,96	Good
	RMSEA	0,17	Poor
CFA 2	CMIN/DF	3,14	Good
	SRMR	0,02	Good
	CFI	0,99	Good
	RMSEA	0,10	Adequate

As demonstrated in Table 42, The first round of CFA demonstrated a marginally acceptable fit when reviewing the CMIN/DF (6.34), SRMR (0.04), CFI (0.96), and RMSEA (0.17). However, the second round of CFA which acknowledged the additional pathway, denotes improved fit statistics to show a good fit to the data: CMIN/DF (3.14), SRMR (0.02), CFI (0.99), and RMSEA (0.10) (Brown, 2015).

4.3.4.2 Transparency

Table 43 presents the parameter estimates for the items that measured transparency.

Table 43: Parameter estimates for the transparency subscale

Regression weight			Estimate	S.E.	C.R.	P
AL8	<---	Transparency	1			
AL7	<---	Transparency	1,029	0,096	10,688	***
AL6	<---	Transparency	0,854	0,096	8,874	***
AL5	<---	Transparency	0,618	0,095	6,502	***
AL9	<---	Transparency	0,836	0,089	9,381	***
Standardised regression weight						

Regression weight			Estimate	S.E.	C.R.	P
AL8	<---	Transparency	0,778			
AL7	<---	Transparency	0,813			
AL6	<---	Transparency	0,663			
AL5	<---	Transparency	0,493			
AL9	<---	Transparency	0,7			

Specifically, both the unstandardised and standardised parameter estimates indicated statistical significance (p -value < 0.05) and no problematic items were identified. The results did not indicate that new pathways should be freed to improve model fit.

Table 44: Model fit summary for the transparency subscale

Fit index	Value	Interpretation
CMIN/DF	2,32	Good
SRMR	0,04	Good
CFI	0,98	Good
RMSEA	0,08	Good

As demonstrated in Table 44, the CMIN/DF (2.32), SRMR (0.04), CFI (0.98), and RMSEA (0.08) values of the default model demonstrate that the transparency model represented an overall good fit to the dataset.

4.3.4.3 Ethical/moral

Table 45 presents the parameter estimates for the items that measured transparency.

Table 45: Parameter estimates for the ethical/moral subscale

Regression weight			Estimate	S.E.	C.R.	P
AL13	<---	EthicalMoral	1			
AL12	<---	EthicalMoral	1,036	0,075	13,859	***
AL11	<---	EthicalMoral	1,025	0,075	13,622	***
AL10	<---	EthicalMoral	0,593	0,074	8,046	***
Standardised regression weight						
AL13	<---	EthicalMoral	0,836			

AL12	<---	EthicalMoral	0,864
AL11	<---	EthicalMoral	0,848
AL10	<---	EthicalMoral	0,559

Based on the information in Table 45, both the unstandardised and standardised parameter estimates revealed statistical significance (p-value < 0.05) and no problematic items were identified that should be considered for exclusion. The results did not indicate that new pathways should be freed to improve model fit.

Table 46: Model fit summary for the ethical/moral subscale

Fit index	Value	Interpretation
CMIN/DF	0,64	Good
SRMR	0,01	Good
CFI	1,00	Good
RMSEA	0,00	Good

The results of the fit indices are presented in Table 46. Based on the CMIN/DF (0.64), SRMR (0.01), CFI (1.00), and RMSEA (0.00) values of the default model, it is clear that the ethical/moral model exemplified an overall good fit to the dataset.

4.3.4.4 Balanced processing

Table 47 presents the parameter estimates for the items that measured transparency.

Table 47: Parameter estimates for the balanced processing subscale

Regression weight			Estimate	S.E.	C.R.	P
AL14	<---	BalancedProcessing	0,933	0,083	11,197	***
AL15	<---	BalancedProcessing	0,975	0,083	11,814	***
AL16	<---	BalancedProcessing	1			
Standardised regression weight						
AL14	<---	BalancedProcessing	0,771			
AL15	<---	BalancedProcessing	0,848			
AL16	<---	BalancedProcessing	0,831			

As noted in the table above, both the unstandardised and standardised parameter estimates demonstrated statistical significance (p -value < 0.05) and no problematic items were identified that should be considered for exclusion. Again, the results did not indicate that new pathways should be freed to improve model fit.

Table 48: Model fit summary for the balanced processing subscale

Fit index	Value	Interpretation
CMIN/DF	-	
SRMR	0,0	Good
CFI	1,0	Good
RMSEA	-	

Based on the SRMR (0.00) and CFI (1.00), values of the default model, the balanced processing model represents an overall good fit to the dataset (see Table 48).

4.3.4.5 ALQ

The parameter estimates for the ALQ are presented in table format in Appendix F. The table reflects the parameter estimates after all amendments were made (i.e., the acknowledgement of additional pathways between items). Both the unstandardised and standardised parameter estimates indicated statistical significance (p -value < 0.05).

Table 49: Model fit summary for the overall authentic leadership model

Fit index	Value	Interpretation
CMIN/DF	2,22	Good
SRMR	0,05	Good
CFI	0,94	Adequate
RMSEA	0,08	Good

The results of the fit indices are presented in Table 49. Based on the CMIN/DF (2.22), SRMR (0.05), CFI (0.94), and RMSEA (0.08) values of the default model, the overall authentic leadership model indicates a good fit to the dataset.

In general, the results indicated statistically significant parameter estimates and acceptable goodness-of-fit statistics for the authentic leadership model. Therefore, none of the factors were excluded. The original four-factor authentic leadership model is presented in Figure 10.

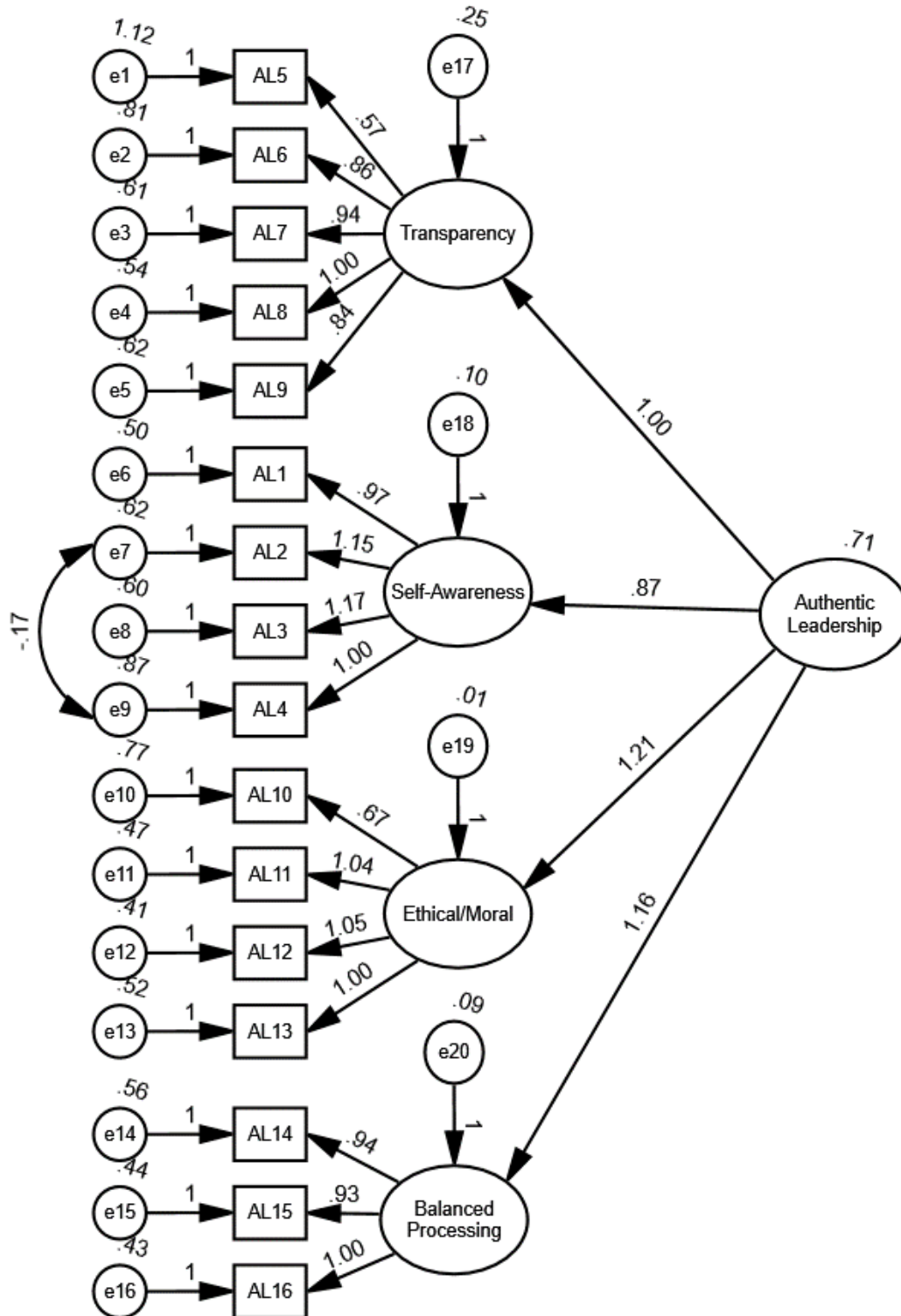


Figure 10: ALQ model

4.4 DIFFERENCES BETWEEN SAMPLE DEMOGRAPHICS

An analysis of the differences in responses between the groups in terms of their demographics provided valuable information to better understand which groups might have higher levels of PsyCap and work engagement, exhibit safety behaviour, and perceive authentic leadership behaviour displayed by their managers. As such, the following four hypotheses were addressed:

Hypothesis 1: There are significant differences in the scores between safety behaviour and demographic variables.

Hypothesis 2: There are significant differences in the scores between work engagement and demographic variables.

Hypothesis 3: There are significant differences in the scores between PsyCap and demographic variables.

Hypothesis 4: There are significant differences in the scores between authentic leadership and demographic variables.

A t-test was conducted to determine the differences between two groups by comparing the mean scores, such as gender (Bevans, 2020). It is important to note that merely the statistically significant differences are reported, and Cohen's *d* was calculated to determine the practical significance of such differences. The Cohen's *d* is interpreted to explain the effect size by using Cohen's (1988) guideline (see Table 50).

Table 50: Cohen's *d* interpretation guidelines (Cohen, 1988)

Value of <i>d</i>	Interpretation
≤ 0.2	Trivial effect size
≥ 0.2	Small effect size
≥ 0.5	Moderate effect size
≥ 0.8	Large effect size

In addition to the t-test, a one-way ANOVA was applied to investigate whether there is a significant difference in the average score for each factor according to the demographic variables where three or more categories are used (Pallant, 2020).

Therefore, the following four demographic variables were considered: Age, population group, title, tenure, and location.

There are four basic steps to conducting an ANOVA. First, the assumption of homogenous variance is tested. If the result is insignificant ($p > 0.05$), the ANOVA test was used to assess if there was an overall difference between groups. Alternatively, if the assumption of homogenous variance yielded a significant result ($p < 0.05$), the Welch Robust test was used to assess overall difference between groups (Pallant, 2020). Second, a significant result retrieved from either the ANOVA or Welch Robust test indicated that there was an overall difference in the factor. Third, the application of the Tukey HSD or Games-Howell test was used to determine where the differences lie. These tests check each combination of categories for any significant differences ($p < 0.05$). Finally, after the differences were determined, the use of descriptive statistics was applied to assist in interpreting the differences.

The results of the test of homogeneity of variances, along with the outcome of the ANOVA and Welch Robust tests are presented in table format in Annexure F.

4.4.1 **Gender**

In this case, the t-test was applied to gender to determine whether there were significant differences between males ($n = 177$) and females ($n = 21$). Specifically, an independent samples t-test was conducted to determine if there were differences in between the employees' perceptions of their leader's leadership style in terms of genuineness and authenticity, self-report levels of PsyCap and work engagement, and the degree to which they engage in safe behaviours at work. Table 51 presents the independent samples test, while Table 52 presents the group statistics on t-test results for the differences in gender.

Table 51: Independent samples test results for gender differences

		t	df	Sig.
Self-Awareness	Equal variances not assumed	1,14	25,13	0,27
Transparency	Equal variances not assumed	1,89	26,79	0,07
Ethical/Moral	Equal variances not assumed	1,47	26,63	0,15

		t	df	Sig.
Balanced Processing	Equal variances not assumed	1,12	25,73	0,27
Authentic Leadership	Equal variances not assumed	1,48	25,38	0,15
Self-Efficacy	Equal variances not assumed	1,68	27,86	0,10
Hope	Equal variances not assumed	1,56	31,32	0,13
Resilience	Equal variances assumed	2,01	196,00	0,05
Optimism	Equal variances not assumed	0,10	23,29	0,92
PsyCap	Equal variances not assumed	1,48	27,31	0,15
Vigour	Equal variances not assumed	0,59	29,02	0,56
Dedication	Equal variances not assumed	4,54	58,02	0,00
Absorption	Equal variances not assumed	3,61	38,19	0,00
Work Engagement	Equal variances not assumed	3,15	43,00	0,00
Safety Compliance	Equal variances not assumed	0,13	25,17	0,90
Safety Participation	Equal variances not assumed	1,39	25,11	0,18
Safety Behaviour	Equal variances not assumed	0,91	25,20	0,37

Table 52: Group statistics on t-test results for gender differences

	Gender	M	Std. Deviation	Std. Error Mean	Cohen's d
Self-Awareness	Male	5,20	1,50	0,11	
	Female	5,60	1,48	0,32	
Transparency	Male	4,85	1,47	0,11	
	Female	5,42	1,27	0,28	
Ethical/Moral	Male	4,95	1,66	0,13	
	Female	5,45	1,45	0,32	
Balanced Processing	Male	4,80	1,73	0,13	
	Female	5,22	1,62	0,35	
Authentic Leadership	Male	4,95	1,42	0,11	
	Female	5,42	1,37	0,30	
Self-Efficacy	Male	5,76	1,05	0,08	
	Female	6,10	0,85	0,19	
Hope	Male	5,83	0,94	0,07	
	Female	6,07	0,64	0,14	

	Gender	M	Std. Deviation	Std. Error Mean	Cohen's d
Resilience	Male	5,73	0,86	0,06	0,52
	Female	6,11	0,62	0,13	
Optimism	Male	5,58	1,11	0,08	
	Female	5,55	1,36	0,30	
PsyCap	Male	5,72	0,81	0,06	
	Female	5,96	0,68	0,15	
Vigour	Male	5,70	1,08	0,08	
	Female	5,82	0,82	0,18	
Dedication	Male	5,70	1,22	0,09	0,68
	Female	6,33	0,48	0,11	
Absorption	Male	5,48	1,06	0,08	0,63
	Female	6,02	0,58	0,13	
Work Engagement	Male	5,63	1,04	0,08	0,52
	Female	6,06	0,51	0,11	
Safety Compliance	Male	6,13	1,24	0,09	
	Female	6,10	1,22	0,27	
Safety Participation	Male	5,65	1,51	0,11	
	Female	5,17	1,49	0,33	
Safety Behaviour	Male	5,89	1,25	0,09	
	Female	5,63	1,23	0,27	

The t-test results for significant differences in gender indicated that there are four significant differences at the 0.05 significance level. The difference is evident in their levels pertaining to resilience ($t = -2.01$, $df = 196$, $p = 0.05$), dedication ($t = -4.54$, $df = 58.02$, $p = 0.00$), absorption ($t = -3.61$, $df = 38.19$, $p = 0.00$), and work engagement ($t = -3.15$, $df = 43$, $p = 0.00$) where the mean scores of females are higher when compared to the mean scores of the male respondents.

The resilience results were rated higher by females ($M = 6.114$, $SD = 0.615$) than males ($M = 5.725$, $SD = 0.861$). This means that the female respondents considered themselves to be more resilient than males when faced with challenging circumstances. Second, females rated themselves higher on questions pertaining to

dedication ($M = 6.333$, $SD = 0.483$) and absorption ($M = 6.024$, $SD = 0.583$), when compared to the male responses to dedication ($M = 5.699$, $SD = 1.221$) and absorption ($M = 5.482$, $SD = 1.062$). In basic terms, females rated themselves higher on dedication and absorption items which are components of work engagement. Interestingly, the same holds true when looking at the work engagement results whereby females believe that they are more engaged in their work ($M = 6.058$, $SD = 0.514$) than males ($M = 5.628$, $SD = 1.039$).

In addition to the abovementioned, the Cohen's d effect size values were also calculated as resilience ($d = 0.520$), dedication ($d = 0.683$), absorption ($d = 0.632$), and work engagement ($d = 0.525$). This suggests moderate effect sizes and practical significance between male and female responses (Cohen, 1988).

4.4.2 Age

The demographic section of the questionnaire categorised age in five groups, namely 24 or under, 25-34, 35-49, 50-64, and 65 or over. To assist with the analysis, the categories were recoded to realise a total of three age categories, that is, 24 or under ($n = 26$), 25-34 years ($n = 126$), and 35 or more years ($n = 46$).

The test of homogeneity of variances demonstrated significance across six factors ($p < 0.05$), namely self-awareness, transparency, ethical/moral, authentic leadership perceptions, self-efficacy, and hope. As such, the Welch robust of equality of means test was used to assess the overall difference between the age groups. However, the results of this test did not indicate significant differences ($p > 0.05$). Therefore, there were no significant difference in the scores according to the different age groups.

4.4.3 Population group

The population group categories that were included in the analysis are White ($n = 76$), African ($n = 61$), Foreign National ($n = 12$), Coloured ($n = 39$), and Indian ($n = 10$). There were no responses selected to reflect the "Other" racial category.

The test of homogeneity of variances demonstrated significant results for 15 factors ($p < 0.05$). To determine and confirm the overall differences between groups, ANOVA

was used on the factors which demonstrated insignificant results ($p > 0.05$), while the Welch robust of equality of means test was applied on the factors which yielded significant results ($p < 0.05$). The results presented verify that merely nine factors were statistically significant ($p < 0.05$), thereby demonstrating that there were overall differences between the responses according to population group. It should be noted that the ANOVA table did not present significant results and, therefore only the Games-Howell test is used to determine where the differences lie for each factor as this test acknowledges each combination of categories for any significant differences ($p < 0.05$) (Pallant, 2020).

Table 53 presents the results of the Games-Howell test analysis between population group groups. Specifically, the table merely displays the dependent variables that were found to be significant ($p < 0.05$) during the Welch robust test of equality of means. Table 54 offers the descriptive statistics on the population group category.

Table 53: Results of the Games-Howell analysis between population group groups

Dependent Variable	(I)Title	(J)Title	Mean Difference (I-J)	Std. Error	Sig.
Self-Awareness	African	White	-1.46586*	0,24	0,00
		Foreign National	-0,68955	0,53	0,69
		Coloured	-1.13346*	0,31	0,00
		Indian	-0,90205	0,46	0,32
Transparency	African	White	-1.30656*	0,23	0,00
		Foreign National	-0,27322	0,47	0,98
		Coloured	-.90399*	0,31	0,03
		Indian	-0,44656	0,57	0,93
Ethical/Moral	White	African	1.33811*	0,28	0,00
		Foreign National	1.68750*	0,53	0,05
		Coloured	0,45192	0,28	0,51
		Indian	0,35	0,43	0,92
Balanced Processing	White	African	1.22649*	0,29	0,00
		Foreign National	1,46784	0,64	0,21
		Coloured	0,39519	0,30	0,69

Dependent Variable	(I)Title	(J)Title	Mean Difference (I-J)	Std. Error	Sig.
Authentic Leadership	African	Indian	0,44561	0,42	0,83
		White	-1.33426*	0,23	0,00
		Foreign National	-0,09301	0,49	1,00
		Coloured	-.93874*	0,29	0,02
Self-Efficacy	White	Indian	-0,7794	0,44	0,42
		African	.75395*	0,18	0,00
		Foreign National	0,49781	0,35	0,62
		Coloured	0,27665	0,17	0,47
Dedication	White	Indian	0,10614	0,40	1,00
		African	.63689*	0,20	0,02
		Foreign National	1.20000*	0,34	0,03
		Coloured	0,0859	0,23	1,00
Absorption	White	Indian	-0,05	0,28	1,00
		African	.56636*	0,17	0,01
		Foreign National	0,67178	0,31	0,26
		Coloured	-0,01091	0,21	1,00
Work Engagement	White	Indian	-0,22544	0,27	0,91
		African	.51642*	0,17	0,02
		Foreign National	0,91413	0,33	0,11
		Coloured	0,0417	0,19	1,00
		Indian	-0,17939	0,24	0,94

Table 54: Descriptive statistics on the population group category

Dependent Variable	Population group	N	Mean	Std.Dev	Std. Error
Self-Awareness	White	76	5,84	1,06	0,12
	African	61	4,37	1,65	0,21
	Foreign National	12	5,06	1,67	0,48
	Coloured	39	5,51	1,41	0,23
	Indian	10	5,28	1,28	0,40
	Total	198	5,25	1,50	0,11

Dependent Variable	Population group	N	Mean	Std.Dev	Std. Error
Transparency	White	76	5,50	1,05	0,12
	African	61	4,19	1,56	0,20
	Foreign National	12	4,47	1,48	0,43
	Coloured	39	5,10	1,45	0,23
	Indian	10	4,64	1,70	0,54
	Total	198	4,91	1,46	0,10
Ethical/Moral	White	76	5,63	1,27	0,15
	African	61	4,29	1,82	0,23
	Foreign National	12	3,94	1,77	0,51
	Coloured	39	5,17	1,53	0,24
	Indian	10	5,28	1,28	0,40
	Total	198	5,00	1,65	0,12
Balanced Processing	White	76	5,41	1,37	0,16
	African	61	4,19	1,88	0,24
	Foreign National	12	3,94	2,16	0,62
	Coloured	39	5,02	1,63	0,26
	Indian	10	4,97	1,24	0,39
	Total	198	4,85	1,72	0,12
Authentic Leadership	White	76	5,59	1,05	0,12
	African	61	4,26	1,52	0,20
	Foreign National	12	4,35	1,55	0,45
	Coloured	39	5,20	1,35	0,22
	Indian	10	5,04	1,23	0,39
	Total	198	5,00	1,42	0,10
Self-Efficacy	White	76	6,12	0,69	0,08
	African	61	5,37	1,25	0,16
	Foreign National	12	5,63	1,17	0,34
	Coloured	39	5,85	0,92	0,15
	Indian	10	6,02	1,25	0,39
	Total	198	5,80	1,04	0,07
Dedication	White	76,00	6,05	0,72	0,08

Dependent Variable	Population group	N	Mean	Std.Dev	Std. Error
Absorption	African	61,00	5,41	1,43	0,18
	Foreign National	12,00	4,85	1,14	0,33
	Coloured	39,00	5,96	1,32	0,21
	Indian	10,00	6,10	0,86	0,27
	Total	198,00	5,77	1,18	0,08
	White	76,00	5,74	0,74	0,08
	African	61,00	5,17	1,17	0,15
	Foreign National	12,00	5,07	1,04	0,30
	Coloured	39,00	5,75	1,18	0,19
	Indian	10,00	5,97	0,81	0,26
	Total	198,00	5,54	1,03	0,07
Work Engagement	White	76,00	5,89	0,61	0,07
	African	61,00	5,37	1,20	0,15
	Foreign National	12,00	4,97	1,13	0,33
	Coloured	39,00	5,85	1,13	0,18
	Indian	10,00	6,07	0,72	0,23
	Total	198,00	5,67	1,00	0,07

The results of the one-way ANOVA indicated that there is an overall significant difference across the nine factors ($df = 4$, $sig = 0.00$). The Games-Howel test was used to determine where the differences lie on each factor which was identified to be significant.

It was determined that the differences in responses the overall authentic leadership factor lie between African and White ($p = 0.00$) and African and Coloured ($p = 0.02$). Specifically, when considering the components of authentic leadership, it is noted that the differences for self-awareness lie between African and White ($p = 0.00$) and African and Coloured ($p = 0.00$), transparency is between African and White ($p = 0.00$) and African and Coloured ($p = 0.03$), ethical/moral is between White and African ($p = 0.00$) and White and Foreign National ($p = 0.05$), and balanced processing is between White and African ($p = 0.00$). After these differences in authentic leadership responses were determined, the White group had higher scores for authentic leadership in general (M

= 5.59, SD = 1.05), self-awareness (M = 5.84, SD = 1.06), transparency (M = 5.50, SD = 1.05), ethical/moral (M = 5.63, SD = 1.27), and balanced processing (M = 5.41, SD = 1.37) when compared to the African group and Coloured group.

Like the above, differences in responses to questions about self-efficacy items are also noted between the White and African group ($p = 0.00$). This is a component of PsyCap. The White group had a higher score for self-efficacy (M = 6.12, SD = 0.69) when compared to the African group (M = 5.37, SD = 1.25).

Finally, differences in responses to work engagement is evident between the White and African group ($p = 0.02$). More specifically, when considering the components of work engagement, it is noted that the differences for dedication lie between African and White ($p = 0.02$) and White and Foreign National ($p = 0.03$). It is evident that the White group had higher scores for work engagement in general (M = 5.89, SD = 0.61), dedication (M = 6.05, SD = 0.72), and absorption (M = 5.74, SD = 0.74) when compared to the African group on work engagement in general (M = 5.37, SD = 1.20), dedication (M = 5.41, SD = 1.43), and absorption (M = 5.17, SD = 1.17).

4.4.4 Title

The title categories that were included in the analysis are Technician/Installer, Paving Installer, Maintenance Technician, Supervisor, Manager, and Other. To reiterate, "Other" includes administrative positions. To assist with the analysis, the categories were recoded to realise a total of four title categories, that is, Technician (Installer, Paving Installer, and Maintenance Technician) ($n = 139$), Supervisor ($n = 14$), Manager ($n = 27$), and Other ($n = 18$).

The test of homogeneity of variances showed significant results for 13 factors ($p < 0.05$). To determine and confirm the overall differences between groups, ANOVA was used on the factors which demonstrated insignificant results ($p > 0.05$), while the Welch robust of equality of means test was applied on the factors which yielded significant results ($p < 0.05$). The results confirm that 12 factors are statistically significant ($p < 0.05$), thereby demonstrating that there are overall differences between the responses according to title. Since the ANOVA table shows significance for three

factors, the Tukey HSD test was applied, while the remaining nine factors as identified from the Welch robust test were verified by the Games-Howell test. Regardless of the test, both are used to determine where the differences lie for each factor as these tests acknowledge each combination of categories for any significant differences ($p < 0.05$) (Pallant, 2020).

Table 55 presents the results of the Tukey HSD and Games-Howell test analyses between the title groups. Specifically, the table merely displays the dependent variables that were found to be significant ($p < 0.05$) during the ANOVA and Welch robust test of equality of means. Table 56 presents the descriptive statistics on this category.

Table 55: Results of the Tukey HSD and Games-Howell analysis between title groups

Dependent Variable	(I)Title	(J)Title	Mean Difference (I-J)	Std. Error	Sig.
Self-Awareness	Technician	Supervisor	-0,72842	0,41	0,29
		Manager	-0,61731	0,31	0,19
		Other	-.97842*	0,37	0,04
Transparency	Technician	Supervisor	-1.02713*	0,34	0,04
		Manager	-.96152*	0,28	0,01
		Other	-1.17634*	0,23	0,00
Ethical/Moral	Technician	Supervisor	-0,84854	0,45	0,27
		Manager	-.88756*	0,32	0,04
		Other	-1.29496*	0,28	0,00
Balanced Processing	Technician	Supervisor	-1,14851	0,47	0,07
		Manager	-0,79137	0,35	0,11
		Other	-1.25433*	0,42	0,02
Authentic Leadership	Technician	Supervisor	-0,93815	0,38	0,07
		Manager	-.81444*	0,29	0,03
		Other	-1.17601*	0,34	0,00
Self-Efficacy	Technician	Supervisor	-.53126*	0,17	0,03
		Manager	-.69131*	0,18	0,00
		Other	-.49687*	0,18	0,05

Dependent Variable	(I)Title	(J)Title	Mean Difference (I-J)	Std. Error	Sig.
Resilience	Technician	Supervisor	-.41531*	0,13	0,02
		Manager	-0,3587	0,16	0,14
		Other	-.35500*	0,13	0,04
PsyCap	Technician	Supervisor	-0,32777	0,14	0,10
		Manager	-0,33125	0,16	0,17
		Other	-.38048*	0,12	0,01
Vigour	Technician	Supervisor	-0,39448	0,20	0,22
		Manager	-.45621*	0,17	0,04
		Other	-0,2093	0,19	0,70
Dedication	Technician	Supervisor	-0,49291	0,22	0,14
		Manager	-.64423*	0,17	0,00
		Other	-.56275*	0,18	0,02
Absorption	Technician	Supervisor	-0,47234	0,20	0,11
		Manager	-.73821*	0,15	0,00
		Other	-0,35858	0,19	0,25
Work Engagement	Technician	Supervisor	-0,45324	0,18	0,07
		Manager	-.61288*	0,15	0,00
		Other	-0,37688	0,16	0,10

Table 56: Descriptive statistics on the title category

Dependent Variable	Title	N	Mean	Std.Dev	Std. Error
Self-Awareness	Technician	139	5,02	1,54	0,13
	Supervisor	14	5,75	1,19	0,32
	Manager	27	5,64	1,43	0,27
	Other	18	6,00	1,08	0,26
	Total	198	5,25	1,50	0,11
Transparency	Technician	139	4,60	1,47	0,12
	Supervisor	14	5,63	1,19	0,32
	Manager	27	5,56	1,33	0,26
	Other	18	5,78	0,84	0,20

Dependent Variable	Title	N	Mean	Std.Dev	Std. Error
Ethical/Moral	Total	198	4,91	1,46	0,10
	Technician	139	4,71	1,66	0,14
	Supervisor	14	5,55	1,60	0,43
	Manager	27	5,59	1,49	0,29
	Other	18	6,00	1,01	0,24
Balanced Processing	Total	198	5,00	1,65	0,12
	Technician	139	4,54	1,74	0,15
	Supervisor	14	5,69	1,39	0,37
	Manager	27	5,33	1,63	0,31
	Other	18	5,80	1,19	0,28
Authentic Leadership	Total	198	4,85	1,72	0,12
	Technician	139	4,72	1,42	0,12
	Supervisor	14	5,66	1,20	0,32
	Manager	27	5,53	1,38	0,27
	Other	18	5,89	0,88	0,21
Self-Efficacy	Total	198	5,00	1,42	0,10
	Technician	139	5,62	1,10	0,09
	Supervisor	14	6,15	0,55	0,15
	Manager	27	6,31	0,82	0,16
	Other	18	6,12	0,66	0,16
Resilience	Total	198	5,80	1,04	0,07
	Technician	139	5,66	0,92	0,08
	Supervisor	14	6,07	0,41	0,11
	Manager	27	6,01	0,74	0,14
	Other	18	6,01	0,42	0,10
PsyCap	Total	198	5,77	0,85	0,06
	Technician	139	5,65	0,86	0,07
	Supervisor	14	5,97	0,43	0,12
	Manager	27	5,98	0,73	0,14
	Other	18	6,03	0,38	0,09
Total	198	5,75	0,80	0,06	

Dependent Variable	Title	N	Mean	Std.Dev	Std. Error
Vigour	Technician	139	5,61	1,16	0,10
	Supervisor	14	6,00	0,64	0,17
	Manager	27	6,06	0,71	0,14
	Other	18	5,81	0,70	0,17
	Total	198	5,71	1,06	0,08
Dedication	Technician	139	5,59	1,30	0,11
	Supervisor	14	6,09	0,70	0,19
	Manager	27	6,24	0,70	0,14
	Other	18	6,16	0,62	0,15
	Total	198	5,77	1,18	0,08
Absorption	Technician	139	5,37	1,12	0,09
	Supervisor	14	5,85	0,66	0,18
	Manager	27	6,11	0,61	0,12
	Other	18	5,73	0,69	0,16
	Total	198	5,54	1,03	0,07
Work Engagement	Technician	139	5,52	1,11	0,09
	Supervisor	14	5,98	0,56	0,15
	Manager	27	6,14	0,59	0,11
	Other	18	5,90	0,54	0,13
	Total	198	5,67	1,00	0,07

The results of the one-way ANOVA indicated that there is an overall significant difference across the nine factors ($df = 4$, $sig = 0.00$). It was determined that the differences in responses the overall authentic leadership factor lie between Technician and Manager ($p = 0.03$) and Technician and Other ($p = 0.00$). When looking at the components of authentic leadership, it is noted that the differences for self-awareness lie between Technician and Other ($p = 0.04$), transparency is between Technician and Supervisor ($p = 0.04$), Technician and Manager ($p = 0.01$) and Technician and Other ($p = 0.00$), ethical/moral is between Technician and Manager ($p = 0.04$) and Technician and Other ($p = 0.00$), and balanced processing is between Technician and Other ($p = 0.02$). After these differences in authentic leadership responses were determined, it is observed that the Other title category had higher scores for authentic

leadership in general ($M = 5.89$, $SD = 0.88$), self-awareness ($M = 6.00$, $SD = 1.08$), transparency ($M = 5.78$, $SD = 0.84$), ethical/moral ($M = 6.00$, $SD = 1.01$), and balanced processing ($M = 5.80$, $SD = 1.19$) when compared to Technicians, Supervisors, and Managers.

The differences in responses to the overall PsyCap are between Technicians and the Other occupational category ($p = 0.01$). In addition, there are noteworthy differences in the responses to two PsyCap components, that is self-efficacy and resilience. For self-efficacy, the differences are between Technicians and Supervisors ($p = 0.03$), Technicians and Managers ($p = 0.00$), and technicians and Other occupational categories ($p = 0.05$). The differences for items that measured resilience lie between Technicians and Supervisors ($p = 0.02$) and Technicians and Other occupational categories ($p = 0.04$). The other occupational category scored higher for PsyCap ($M = 6.03$, $SD = 0.38$) when compared to Technicians, Supervisors, and Managers. However, Managers scored the highest on self-efficacy ($M = 6.31$, $SD = 0.82$), while Supervisors scored the highest on resilience ($M = 6.07$, $SD = 0.41$).

Finally, differences in responses to work engagement is evident between Technicians and Managers ($p = 0.00$). More specifically, when considering all three components of work engagement, it is noted that the differences for vigour are between Technicians and Managers ($p = 0.04$), dedication differences are between Technicians and Managers ($p = 0.00$) and Technicians and the other occupational category ($p = 0.02$), and finally, the differences in responses to absorption items are between Technicians and Managers ($p = 0.00$). It is evident that Managers had higher scores for work engagement in general ($M = 6.14$, $SD = 0.59$), vigour ($M = 6.06$, $SD = 0.71$), dedication ($M = 6.24$, $SD = 0.70$), and absorption ($M = 6.11$, $SD = 0.61$) when compared to Technicians on work engagement ($M = 5.52$, $SD = 1.11$), vigour ($M = 5.61$, $SD = 1.16$), dedication ($M = 5.59$, $SD = 1.30$), and absorption ($M = 5.37$, $SD = 1.12$).

4.4.5 Tenure

The tenure categories that were included in the analysis include: Less than 6 months, 6 months to 1 year, 1 to 2 years, 2 to 5 years, 6 to 10 years, and 10. It should be noted

that categories were recoded to merely incorporate four tenure categories with the intention of aiding data analysis: Less than 6 months ($n = 38$), 6 months to 1 year ($n = 28$), 1 to 2 years ($n = 36$), and 2 to 5 or more years ($n = 96$).

It is evident that the test of homogeneity of variances yielded three significant factors, namely self-awareness, self-efficacy, and resilience ($p < 0.05$). Again, ANOVA was conducted to confirm if there were overall differences in each factor that demonstrated insignificant results ($p > 0.50$), while the Welch robust test was applied to the three factors that were identified to be significant ($p < 0.05$). The results confirm that four factors were statistically significant ($p < 0.05$), thereby demonstrating that there are overall differences between the responses according to title. Specifically, the ANOVA table demonstrated significance for three factors, while the remaining nine factors were identified from the Welch robust test.

Table 57 presents the results of the Tukey HSD and Games-Howell test analyses between the employment tenure groups. Specifically, the table merely displays the dependent variables that were found to be significant ($p < 0.05$) during the ANOVA and Welch robust test of equality of means. Table 58 presents the descriptive statistics.

Table 57: Results of the Tukey HSD and Games-Howell analysis between tenure groups

Dependent Variable	(I)Tenure	(J)Tenure	Mean Difference (I-J)	Std. Error	Sig.
Self-Awareness	1 to 2 years	Less than 6 months	-0,60892	0,34	0,30
		6 months to 1 year	-.98909*	0,32	0,02
		2 to 5 + years	0,13628	0,32	0,97
	2 to 5 + years	Less than 6 months	-.74520*	0,26	0,03
		6 months to 1 year	-1.12537*	0,22	0,00
		1 to 2 years	-0,13628	0,32	0,97
Authentic Leadership	6 months to 1 year	Less than 6 months	0,22576	0,35	0,92

Dependent Variable	(I)Tenure	(J)Tenure	Mean Difference (I-J)	Std. Error	Sig.
Efficacy	6 months to 1 year	1 to 2 years	0,68092	0,35	0,22
		2 to 5 + years	.81079*	0,30	0,04
		Less than 6 months	0,5354	0,21	0,07
		1 to 2 years	0,48545	0,20	0,08
		2 to 5 + years	.56994*	0,17	0,01

Table 58: Descriptive statistics on the tenure category

Dependent Variable	Tenure	N	Mean	Std.Dev	Std. Error
Self Awareness	Less than 6 months	38	5,66	1,27	0,21
	6 months to 1 year	28	6,04	0,83	0,16
	1 to 2 years	36	5,06	1,66	0,28
	2 to 5 + years	96	4,92	1,57	0,16
	Total	198	5,25	1,50	0,11
Ethical/Moral	Less than 6 months	38	5,45	1,35	0,22
	6 months to 1 year	28	5,55	1,43	0,27
	1 to 2 years	36	4,97	1,69	0,28
	2 to 5 + years	96	4,68	1,73	0,18
	Total	198	5,00	1,65	0,12
Authentic Leadership	Less than 6 months	38	5,34	1,22	0,20
	6 months to 1 year	28	5,56	1,13	0,21
	1 to 2 years	36	4,88	1,51	0,25
	2 to 5 + years	96	4,75	1,48	0,15
	Total	198	5,00	1,42	0,10
Self-Efficacy	Less than 6 months	38	5,73	1,07	0,17
	6 months to 1 year	28	6,27	0,66	0,12
	1 to 2 years	36	5,78	0,92	0,15
	2 to 5 + years	96	5,70	1,13	0,12
	Total	198	5,80	1,04	0,07

The results of the one-way ANOVA indicated that there is an overall significant difference across the four factors ($df = 4$, $sig = 0.00$). It was ascertained that the differences in responses the overall authentic leadership factor lie between those who were employed between 6 months to 1 year and 2 to more than 5 years ($p = 0.04$). When looking at one authentic leadership component that demonstrated significant results, it is noted that the differences for self-awareness lie between people employed for less than 6 months and those employed for 2 to more than 5 years ($p = 0.03$), between 6 months to 1 year and those employed between 1 year to 2 years ($p = 0.02$), and 6 months to 1 year and those with an employment tenure of 2 to more than 5 years ($p = 0.00$). Once these differences were identified, it is noticed that those who enjoy an employment tenure of 6 months to 1 year had higher scores for authentic leadership ($M = 5.56$, $SD = 1.13$) and self-awareness ($M = 6.04$, $SD = 0.83$) when compared to the other tenure categories.

In addition to the abovementioned, the differences in responses to questions about self-efficacy items are also noted between the tenure category of 6 months to 1 year and 2 to 5 or more years ($p = 0.01$). This is a component of PsyCap. The 6 months to 1 year category had a higher score for self-efficacy ($M = 6.27$, $SD = 0.66$) when compared to the 2 to 5 or more years category ($M = 5.70$, $SD = 1.13$).

4.4.6 Location

The location categories that were included in the analysis are Cape Town ($n = 106$), Johannesburg ($n = 69$), and Durban ($n = 23$).

The test of homogeneity of variances produced eight significant factors ($p < 0.05$). More specifically, the results from the ANOVA and Welch robust test confirm that 10 factors were statistically significant ($p < 0.05$), thereby demonstrating that there are overall differences between the responses according to location.

Table 59 presents the results of the Tukey HSD and Games-Howell test analyses between the location groups. Specifically, the table merely displays the dependent variables that were found to be significant ($p < 0.05$) during the ANOVA and Welch robust test of equality of means. Table 60 shows the descriptive statistics.

Table 59: Results of the Tukey HSD and Games-Howell analysis between location groups

Dependent Variable	(I)Location	(J)Location	Mean Difference (I-J)	Std. Error	Sig.
Self-Awareness	Cape Town	Johannesburg	1.08309*	0,23	0
		Durban	0,74251	0,32	0,07
Transparency	Cape Town	Johannesburg	.78603*	0,22	0,00
		Durban	0,62371	0,33	0,14
Ethical/Moral	Cape Town	Johannesburg	.78141*	0,25	0,01
		Durban	0,2017	0,37	0,85
Balanced Processing	Cape Town	Johannesburg	.66056*	0,26	0,03
		Durban	0,38037	0,39	0,60
Authentic Leadership	Cape Town	Johannesburg	.82777*	0,21	0
		Durban	0,48707	0,32	0,28
Self-Efficacy	Cape Town	Johannesburg	.47842*	0,16	0,01
		Durban	0,51224	0,28	0,19
Dedication	Cape Town	Johannesburg	.53227*	0,19	0,02
		Durban	0,10328	0,24	0,91
Absorption	Cape Town	Johannesburg	.42708*	0,16	0,02
		Durban	-0,02461	0,23	0,99
Work Engagement	Cape Town	Johannesburg	.41144*	0,16	0,03
		Durban	0,0422	0,23	0,98
Safety Compliance	Cape Town	Johannesburg	0,41286	0,19	0,08
		Durban	.88146*	0,33	0,03

Table 60: Descriptive statistics on the location category

Dependent Variable	Location	N	Mean	Std.Dev	Std. Error
Self-Awareness	Cape Town	106	5,71	1,29	0,125
	Johannesburg	69	4,63	1,60	0,192
	Durban	23	4,97	1,43	0,298
	Total	198	5,25	1,50	0,107
Transparency	Cape Town	106	5,26	1,30	0,126
	Johannesburg	69	4,47	1,58	0,190
	Durban	23	4,63	1,46	0,304
	Total	198	4,91	1,46	0,104

Dependent Variable	Location	N	Mean	Std.Dev	Std. Error
Ethical/Moral	Cape Town	106	5,30	1,53	0,148
	Johannesburg	69	4,52	1,78	0,214
	Durban	23	5,10	1,49	0,310
	Total	198	5,00	1,65	0,117
Balanced Processing	Cape Town	106	5,12	1,62	0,158
	Johannesburg	69	4,46	1,83	0,220
	Durban	23	4,74	1,62	0,337
	Total	198	4,85	1,72	0,122
Authentic Leadership	Cape Town	106	5,35	1,28	0,125
	Johannesburg	69	4,52	1,52	0,183
	Durban	23	4,86	1,31	0,272
	Total	198	5,00	1,42	0,101
Self-Efficacy	Cape Town	106	6,03	0,79	0,08
	Johannesburg	69	5,55	1,19	0,14
	Durban	23	5,51	1,31	0,27
	Total	198	5,80	1,04	0,07
Dedication	Cape Town	106	5,96	1,03	0,10
	Johannesburg	69	5,43	1,37	0,16
	Durban	23	5,86	1,06	0,22
	Total	198	5,77	1,18	0,08
Absorption	Cape Town	106	5,69	0,93	0,09
	Johannesburg	69	5,26	1,15	0,14
	Durban	23	5,71	0,98	0,20
	Total	198	5,54	1,03	0,07
Work Engagement	Cape Town	106	5,82	0,89	0,09
	Johannesburg	69	5,41	1,12	0,13
	Durban	23	5,78	1,03	0,21
	Total	198	5,67	1,00	0,07
Safety Compliance	Cape Town	106	6,37	0,98	0,10
	Johannesburg	69	5,96	1,38	0,17
	Durban	23	5,49	1,52	0,32

Dependent Variable	Location	N	Mean	Std.Dev	Std. Error
	Total	198	6,13	1,23	0,09

The results of the one-way ANOVA indicated that there is an overall significant difference across the ten factors ($df = 4$, $sig = 0.00$). It was determined that the differences in responses to the overall authentic leadership factor lie between Cape Town and Johannesburg ($p = 0.00$). When looking at the components of authentic leadership, it is noted that the differences for self-awareness lie between Cape Town and Johannesburg ($p = 0.00$), transparency is between Cape Town and Johannesburg ($p = 0.00$), ethical/moral is between Cape Town and Johannesburg ($p = 0.01$), and balanced processing is between Cape Town and Johannesburg ($p = 0.03$). After these differences in authentic leadership responses were determined, it can be seen that the Cape Town group had higher scores for authentic leadership in general ($M = 5.35$, $SD = 1.28$), self-awareness ($M = 5.71$, $SD = 1.29$), transparency ($M = 5.26$, $SD = 1.30$), ethical/moral ($M = 5.30$, $SD = 1.53$), and balanced processing ($M = 5.12$, $SD = 1.62$) when compared to the Johannesburg group with score for authentic leadership ($M = 4.52$, $SD = 1.83$), self-awareness ($M = 4.63$, $SD = 1.60$), transparency ($M = 4.47$, $SD = 1.158$), ethical/moral ($M = 4.52$, $SD = 1.78$), and balanced processing ($M = 4.46$, $SD = 1.83$).

The differences in responses to questions about self-efficacy items are also noted between Cape Town and Johannesburg ($p = 0.01$). The Cape Town group had a higher score for self-efficacy ($M = 6.03$, $SD = 0.79$) when compared to the Johannesburg group ($M = 5.55$, $SD = 1.19$).

The differences in responses to work engagement is evident between Cape Town and Johannesburg ($p = 0.03$). More specifically, when looking at two significant work engagement components, it is noted that the differences for dedication lie between Cape Town and Johannesburg ($p = 0.02$) and absorption differences are between Cape Town and Johannesburg ($p = 0.02$). It is evident that the Cape Town group had higher scores for work engagement ($M = 5.82$, $SD = 0.89$), dedication ($M = 5.96$, $SD = 1.03$), and absorption ($M = 5.69$, $SD = 0.93$) when compared to the Johannesburg group on work engagement in general ($M = 5.41$, $SD = 1.12$), dedication ($M = 5.43$, $SD = 1.37$), and absorption ($M = 5.26$, $SD = 1.15$).

Finally, the safety compliance component revealed a significant difference between Cape Town and Durban ($p = 0.3$). It is also observed that Cape Town had higher scores on safety compliance ($M = 6.37$, $SD = 0.98$) than Durban ($M = 5.49$, $SD = 1.52$).

4.5 RELATIONSHIP BETWEEN CONSTRUCTS IN THE STUDY

To determine if any statistical association between constructs exist, it was necessary to consider and report on the significance, direction, and strength of such relationships (Hayes, 2020). The strength of the relationships was assessed by using the guidelines as advocated by Cohen in 1992 (see Table 61).

Table 61: Correlation interpretation guidelines (Cohen, 1992)

Absolute value of r	Interpretation
< 0.3	Small / weak relationship; low correlation
0.3 – 0.5	Medium / moderate relationship; moderate correlation
> 0.5	Large / strong relationship; high correlation

The relationships between the constructs in the study are presented in Table 62. The results presented in this table were used to report against the study hypotheses that are listed in Section 2.8. For ease of reference, the hypotheses are presented below.

- Hypothesis 5: There is a positive relationship between PsyCap and work engagement.
- Hypothesis 6: There is a positive relationship between PsyCap and safety behaviour.
- Hypothesis 7: There is a positive relationship between PsyCap and authentic leadership.
- Hypothesis 8: There is a positive relationship between work engagement and safety behaviour.
- Hypothesis 9: There is a positive relationship between work engagement and authentic leadership.
- Hypothesis 10: There is a positive relationship between authentic leadership, PsyCap, work engagement, and safety behaviour.

Table 62: Correlation coefficients between the constructs in the study

	SA	TRA	EM	BP	AL	SE	HOP	RES	OPT	PC	VIG	DED	ABS	WE	SC	SP	SB
SA	(.808)	.714**	.791**	.720**	.894**	.415**	.329**	.191**	.278**	.379**	.349**	.373**	.280**	.365**	.366**	.177*	.288**
TRA		(.819)	.723**	.658**	.854**	.400**	.304**	.296**	.269**	.391**	.360**	.337**	.311**	.365**	.344**	.226**	.306**
EM			(.859)	.835**	.937**	.455**	.330**	.223**	.337**	.421**	.415**	.453**	.404**	.461**	.314**	.249**	.306**
BP				(.856)	.903**	.508**	.371**	.211**	.340**	.449**	.436**	.447**	.374**	.456**	.354**	.301**	.357**
AL					(.942)	.498**	.373**	.255**	.343**	.458**	.437**	.451**	.384**	.461**	.383**	.268**	.351**
SE						(.824)	.617**	.524**	.451**	.801**	.513**	.486**	.438**	.520**	.462**	.430**	.489**
HOP							(.783)	.562**	.529**	.825**	.612**	.523**	.442**	.571**	.429**	.445**	.482**
RES								(.673)	.597**	.809**	.487**	.430**	.413**	.481**	.346**	.307**	.357**
OPT									(.783)	.812**	.522**	.438**	.362**	.478**	.402**	.391**	.436**
PC										(.904)	.657**	.578**	.507**	.630**	.508**	.488**	.547**
VIG											(.818)	.806**	.736**	.918**	.508**	.520**	.566**
DED												(.849)	.775**	.940**	.479**	.463**	.517**
ABS													(.761)	.904**	.359**	.407**	.424**
WE														(.922)	.488**	.503**	.546**
SC															(.877)	.650**	.888**
SP																(.856)	.927**
SB																	(.893)

Note: SA (self-awareness), TRA (transparency), EM (ethical/moral), BP (balanced processing), AL (authentic leadership), SE (self-efficacy), HOP (hope), RES (resilience), OPT (optimism), PC (PsyCap), VIG (vigour), DED (dedication), ABS (absorption), WE (work engagement), SC (safety compliance), SP (safety participation), SB (safety behaviour). N=198

Internal consistency reliability coefficients appear in parentheses along the main diagonal.

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

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

The results presented in Table 62 indicate that there is a strong positive relationship between PsyCap and work engagement ($r = .630, p < .01$), a strong positive relationship exist between PsyCap and safety behaviour ($r = .547, p < .01$), and a moderate positive relationship between PsyCap and authentic leadership ($r = .458, p < .01$). This suggests that employees with higher levels of PsyCap should demonstrate higher levels of work engagement, comply with, and participate in safety-related practices at work, and benefit from higher PsyCap levels when they perceive their leaders to be authentic. Therefore, hypotheses 5, 6, and 7 are supported.

In the same vein, the results presented in Table 62 indicate that there is a strong positive relationship between work engagement and safety behaviour ($r = .546, p < .01$). This implies that as an employee becomes more engaged in his/her work, the more likely they are to act safely while at work. Similarly, a positive relationship exists between work engagement and authentic leadership ($r = .461, p < .01$). In the work context, employees who perceive their leaders to be authentic are likely to be more engaged in their work than others. Consequently, hypotheses 8 and 9 are supported.

Finally, Table 62 demonstrates that there is a positive relationship between all the constructs in the study. Specifically, there are moderate positive relationships between authentic leadership and PsyCap ($r = .458; p < 0.01$), authentic leadership and work engagement ($r = .461; p < 0.01$), and authentic leadership and safety behaviour ($r = .351; p < 0.01$). These results denote that as employees' perceptions of their superior reflect that they are genuine and authentic, their levels of PsyCap and work engagement should be high, as should their safety behaviour. Thus, hypothesis 10 is supported.

4.6 MEDIATION EFFECTS AND TESTING THE STRUCTURAL MODELS

To discover and explain the processes that trigger the relationships between the dependent and independent variable, mediation effects must be studied (MacKinnon et al., 2000; Pallant, 2020). Therefore, regression weights and goodness-of-fit indices were used to evaluate the structural models and the associated mediation effects between variables. By adding mediating variables, each model was checked to see if

the relationship between the dependent and independent variable became insignificant. For this reason, the mediation effects were checked separately to ensure that there was meaningfulness between each pair.

The mediation analyses sought to address the core of this study, specifically the relationship between the constructs as denoted in the following two hypotheses:

Hypothesis 10: PsyCap mediates the relationship between authentic leadership and safety behaviour.

Hypothesis 11: Work engagement mediates the relationship between authentic leadership and safety behaviour.

4.6.1 PsyCap as mediator between authentic leadership and safety behaviour

The independent variable for the analyses was authentic leadership, the dependent variable was safety behaviour, and PsyCap was used as the mediating variable.

As a first step, the regression weights for authentic leadership on safety behaviour was considered (see Table 63).

Table 63: Regression weights for authentic leadership on safety behaviour

Regression weights			Estimate	S.E.	C.R.	P
SafetyBehaviour	<---	ALQ	0,263	0,083	3,165	0,002
SafetyCompliance	<---	SafetyBehaviour	1,279	0,304	4,206	***
SafetyParticipation	<---	SafetyBehaviour	1			
Transparency	<---	ALQ	1			
SelfAwareness	<---	ALQ	0,872	0,106	8,218	***
EthicalMoral	<---	ALQ	1,208	0,112	10,774	***
BalancedProcessing	<---	ALQ	1,158	0,108	10,763	***

The results presented in Table 63 demonstrated that that authentic leadership was positively associated with safety behaviour, but it was statistically significant ($p = 0.002$). As such, the fit indices were scrutinised (see Table 64).

Table 64: Model fit summary for authentic leadership on safety behaviour

Fit index	Value	Interpretation
CMIN/DF	1,789	Good
SRMR	0,052	Good
CFI	0,942	Adequate
RMSEA	0,063	Good

The results of the fit indices show good model fit: CMIN/DF (1.789), SRMR (0.052), CFI (0.942), and RMSEA (0.063).

Table 65: Regression weights for authentic leadership on PsyCap

Regression weights			Estimate	S.E.	C.R.	P
PsyCap	<---	ALQ	0,349	0,067	5,215	***
Transparency	<---	ALQ	1			
SelfAwareness	<---	ALQ	0,867	0,106	8,211	***
EthicalMoral	<---	ALQ	1,203	0,112	10,773	***
BalancedProcessing	<---	ALQ	1,156	0,107	10,785	***
Hope	<---	PsyCap	1,067	0,164	6,501	***
Efficacy	<---	PsyCap	1			
Optimism	<---	PsyCap	1,142	0,187	6,122	***
Resilience	<---	PsyCap	0,873	0,156	5,591	***

Second, it was found that authentic leadership was positively related to PsyCap and represented statistical significance ($p < 0.001$) (see Table 65).

Table 66: Model fit summary for authentic leadership on PsyCap

Fit index	Value	Interpretation
CMIN/DF	1,631	Good
SRMR	0,068	Adequate
CFI	0,893	Adequate
RMSEA	0,057	Good

Based on the information given in Table 66, the fit indices showed good model fit: CMIN/DF (1.631), SRMR (0.068), CFI (0.893), and RMSEA (0.057).

Third, the regression weights for PsyCap on safety behaviour was considered (see Table 67).

Table 67: Regression weights for PsyCap on safety behaviour

Regression weights			Estimate	S.E.	C.R.	P
SafetyBehaviour	<---	PsyCap	0,931	0,166	5,61	***
Hope	<---	PsyCap	1,107	0,174	6,376	***
Efficacy	<---	PsyCap	1			
SafetyParticipation	<---	SafetyBehaviour	1			
SafetyCompliance	<---	SafetyBehaviour	0,89	0,115	7,73	***
Optimism	<---	PsyCap	1,208	0,199	6,069	***
Resilience	<---	PsyCap	0,926	0,166	5,573	***

PsyCap on safety behaviour demonstrated a positive relationship and statistical significance ($p < 0.001$).

Table 68: Model fit summary for PsyCap on safety behaviour

Fit index	Value	Interpretation
CMIN/DF	1,658	Good
SRMR	0,065	Adequate
CFI	0,913	Adequate
RMSEA	0,058	Good

Based on the results in Table 68, the fit indices showed good model fit: CMIN/DF (1.658), SRMR (0.065), CFI (0.913), and RMSEA (0.058).

Finally, the results indicated that PsyCap mediates the relationship between authentic leadership and safety behaviour. Specifically, Table 69 presents the regression weights.

Table 69: Regression weights for PsyCap as a mediator

Regression weights			Estimate	S.E.	C.R.	P
PsyCap	<---	ALQ	0,352	0,067	5,245	***
SafetyBehaviour	<---	ALQ	0,02	0,074	0,265	0,791
SafetyBehaviour	<---	PsyCap	0,871	0,169	5,163	***

It clearly shows statistical significance when authentic leadership is loaded to PsyCap ($p < 0.001$) and when PsyCap was loaded to safety behaviour ($p < 0.001$). However, no statistical significance was evident between authentic leadership and safety behaviour. This means that authentic leadership does not necessarily have a direct impact on employees' safety behaviour at work, but rather an indirect impact when mediated by PsyCap.

Table 70: Model fit summary with PsyCap as a mediator

Fit index	Value	Interpretation
CMIN/DF	1,584	Good
SRMR	0,0663	Adequate
CFI	0,891	Adequate
RMSEA	0,054	Good

Based on Table 70, the model demonstrated a good fit to the dataset when PsyCap acts as a mediator between authentic leadership and safety behaviour: CMIN/DF (2.224), SRMR (0.0499), CFI (0.938), and RMSEA (0.079). The mediation model is depicted in Figure 11. Hypothesis 10 is accepted.

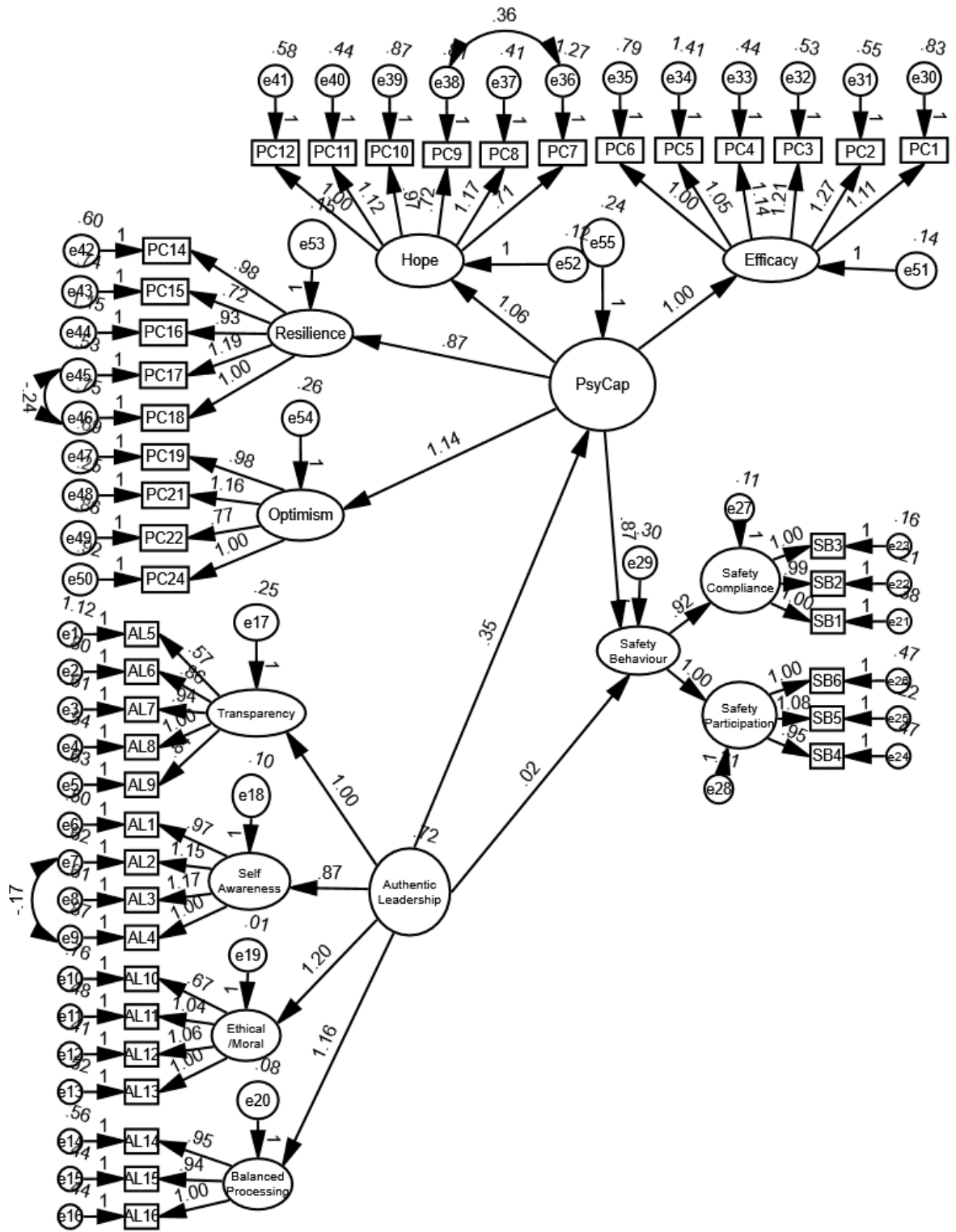


Figure 11: Mediation model with PsyCap as the mediator

4.6.2 Work engagement as a mediator between authentic leadership and safety behaviour

The independent variable for the analyses was authentic leadership, the dependent variable was safety behaviour, and work engagement was used as the mediating variable.

The first step was not repeated as the effect of authentic leadership on safety behaviour was established in the previous section. Therefore, the researcher proceeded to the second step, namely determining the relationship between authentic leadership and work engagement.

Table 71: Regression weights for authentic leadership on work engagement

Regression weights			Estimate	S.E.	C.R.	P
WorkEngagement	<---	ALQ	0,403	0,082	4,918	***
Transparency	<---	ALQ	1			
SelfAwareness	<---	ALQ	0,864	0,106	8,156	***
EthicalMoral	<---	ALQ	1,217	0,112	10,823	***
BalancedProcessing	<---	ALQ	1,162	0,108	10,788	***
Absorption	<---	WorkEngagement	1,306	0,207	6,306	***
Vigour	<---	WorkEngagement	1			
Dedication	<---	WorkEngagement	1,5	0,222	6,764	***

The results indicated that authentic leadership was positively related to work engagement and represented statistical significance ($p < 0.001$) (see Table 71).

Table 72: Model fit summary for authentic leadership on work engagement

Fit index	Value	Interpretation
CMIN/DF	1,846	Good
SRMR	0,057	Adequate
CFI	0,895	Adequate
RMSEA	0,066	Good

The results of the fit indices showed good model fit: CMIN/DF (1.846), SRMR (0.057), CFI (0.895), and RMSEA (0.066) (see Table 72).

Third, the relationship between work engagement and safety behaviour was acknowledged by reviewing the regression weights on these two constructs as presented in Table 73.

Table 73: Regression weights on work engagement on safety behaviour

Regression weights			Estimate	S.E.	C.R.	P
SafetyBehaviour	<---	WorkEngagement	0,715	0,135	5,29	***
Absorption	<---	WorkEngagement	1,279	0,2	6,406	***
Vigour	<---	WorkEngagement	1			
Dedication	<---	WorkEngagement	1,478	0,214	6,908	***
SafetyParticipation	<---	SafetyBehaviour	1			
SafetyCompliance	<---	SafetyBehaviour	0,907	0,115	7,863	***

Work engagement on safety behaviour demonstrated a positive relationship and statistical significance ($p < 0.001$) (see Table 73). Thereafter, the fit statistics were considered (see Table 74).

Table 74: Model fit summary for work engagement on safety behaviour

Fit index	Value	Interpretation
CMIN/DF	2,233	Good
SRMR	0,058	Adequate
CFI	0,898	Adequate
RMSEA	0,079	Good

The results of the fit indices showed good model fit: CMIN/DF (2.233), SRMR (0.058), CFI (0.898), and RMSEA (0.079).

Finally, the results indicated that work engagement mediates the relationship between authentic leadership and safety behaviour. Specifically, Table 75 presents the regression weights.

Table 75: Regression weights for work engagement as a mediator

Regression weights			Estimate	S.E.	C.R.	P
WorkEngagement	<---	ALQ	0,409	0,082	4,96	***
SafetyBehaviour	<---	WorkEngagement	0,679	0,139	4,888	***

SafetyBehaviour	<--- ALQ	0,048	0,07	0,682	0,495
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It clearly shows statistical significance when authentic leadership is loaded to work engagement ($p < 0.001$) and with work engagement on safety behaviour. However, once again, no statistical significance is evident between authentic leadership and safety behaviour. To echo, authentic leadership does not necessarily have a direct impact on employees' safety behaviour at work, but rather an indirect impact when mediated by work engagement.

Table 76: Model fit summary with work engagement as a mediator

Fit index	Value	Interpretation
CMIN/DF	1,833	Good
SRMR	0,059	Adequate
CFI	0,882	Adequate
RMSEA	0,065	Good

Based on the results presented in Table 76, the default model demonstrates a good fit to the dataset when work engagement acts as a mediator between authentic leadership and safety behaviour: CMIN/DF (1.833), SRMR (0.059), CFI (0.882), and RMSEA (0.065). The mediation model is depicted in Figure 12. Hypothesis 11 is accepted.

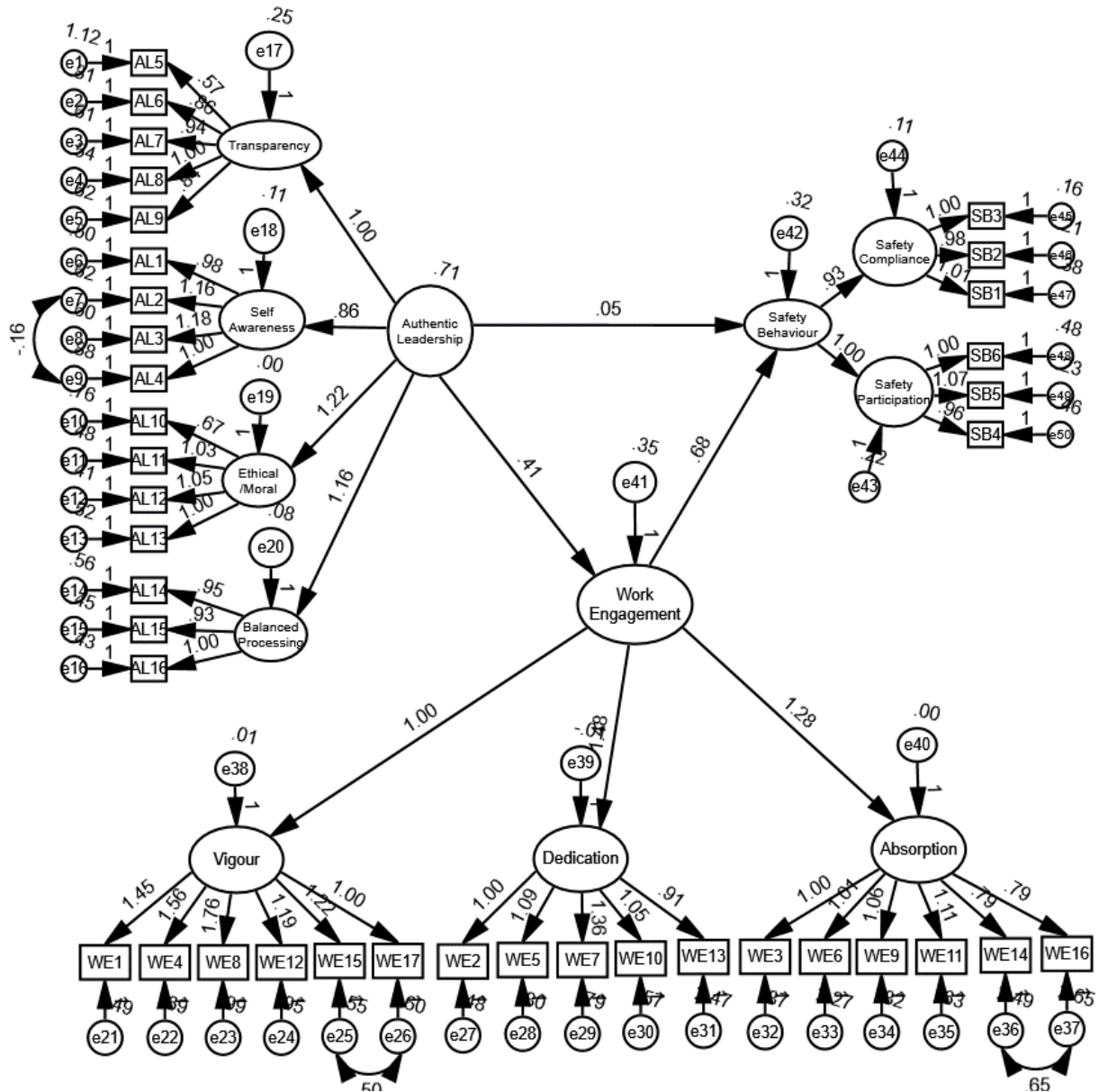


Figure 12: Mediation model with work engagement as the mediator

4.6.3 Full mediation and structural model

In order to evaluate the full mediation model, both PsyCap and work engagement were used as mediator variables. The results confirmed statistical significance when both mediator variables are present (see Table 77).

Table 77: Regression weights for the full mediation and structural model

Regression weights			Estimate	S.E.	C.R.	P
WorkEngagement	<---	ALQ	0,419	0,083	5,034	***
PsyCap	<---	ALQ	0,367	0,068	5,378	***
SafetyBehaviour	<---	WorkEngagement	0,47	0,114	4,127	***
SafetyBehaviour	<---	ALQ	-0,069	0,082	-0,847	0,397
SafetyBehaviour	<---	PsyCap	0,576	0,137	4,192	***

Specifically, Table 77 offers the regression weights which clearly shows statistical significance when authentic leadership is loaded to work engagement and PsyCap ($p < 0.001$), work engagement on safety behaviour ($p < 0.001$), and PsyCap on safety behaviour ($p < 0.001$). Once more, no statistical significance is evident between authentic leadership and safety behaviour which indicates that both PsyCap and work engagement mediates the relationship between authentic leadership and safety behaviour. In other words, even though authentic leadership may have an impact on safety behaviour, the impact will be much greater when mediated by work engagement and/or PsyCap.

Table 78: Model fit summary of the full mediation and structural model

Fit index	Value	Interpretation
CMIN/DF	1,733	Good
SRMR	0,100	Poor
CFI	0,823	Adequate
RMSEA	0,061	Good

Based on the CMIN/DF (1.733), SRMR (0.100), CFI (0.823), and RMSEA (0.061) presented in Table 78, the full mediation model demonstrates an acceptable fit to the dataset when both PsyCap and work engagement act as mediators between authentic leadership and safety behaviour. The full mediation model is depicted in Figure 13. In summary, the hypothesised theoretical model is accepted.

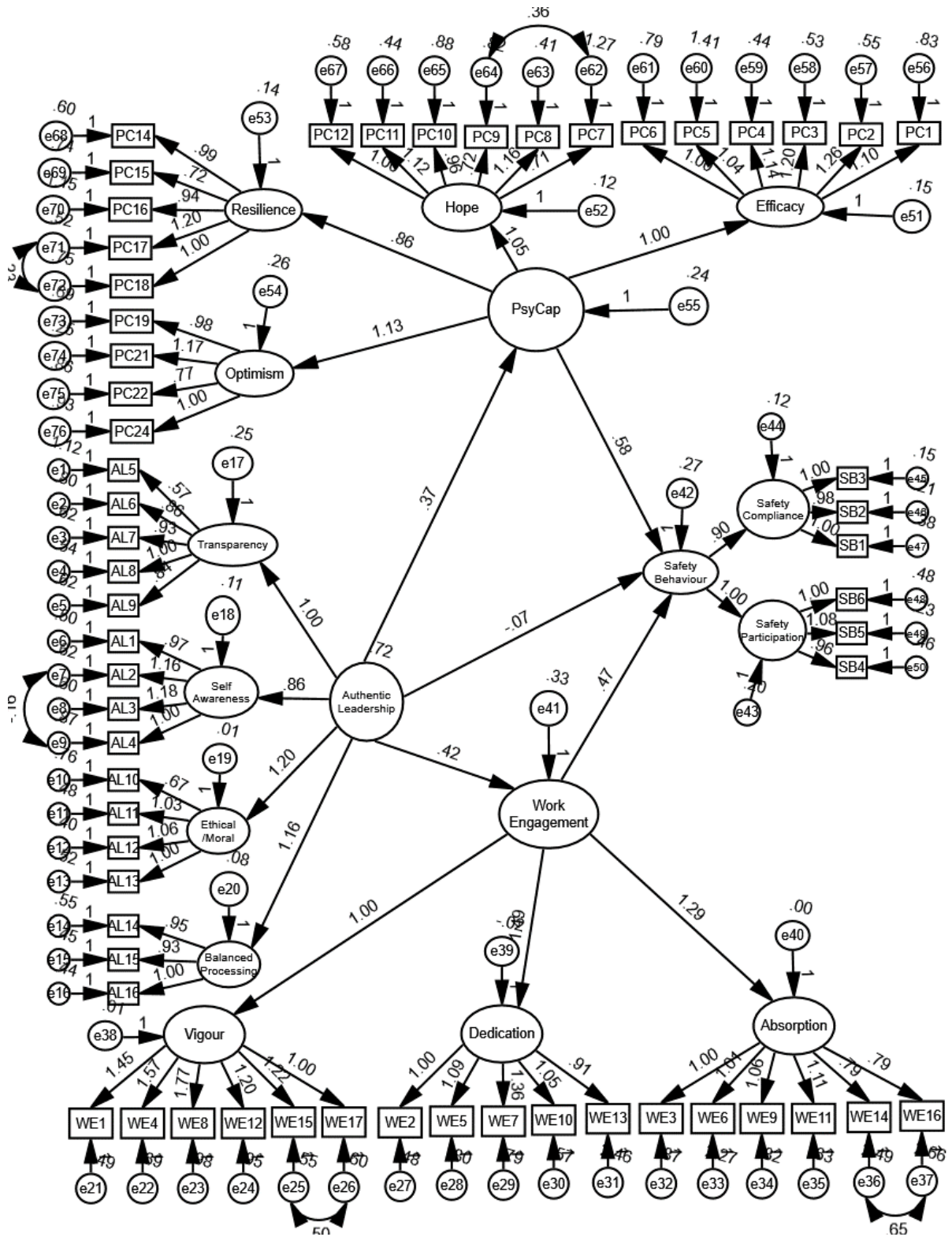


Figure 13: Full mediation and structural model

4.7 SUMMARY OF HYPOTHESES TESTING

A total of 12 hypotheses were tested and reported in this chapter. The hypotheses, as formulated in Chapter 2, are echoed in Table 79 for ease of reference.

Table 79: Summary of hypotheses testing

Number	Hypothesis	Outcome
Hypothesis 1	There are significant differences in the scores between safety behaviour and demographic variables.	Accepted
Hypothesis 2	There are significant differences in the scores between work engagement and demographic variables.	Accepted
Hypothesis 3	There are significant differences in the scores between PsyCap and demographic variables.	Accepted
Hypothesis 4	There are significant differences in the scores between authentic leadership and demographic variables.	Accepted
Hypothesis 5	There is a positive relationship between PsyCap and work engagement.	Accepted
Hypothesis 6	There is a positive relationship between PsyCap and safety behaviour.	Accepted
Hypothesis 7	There is a positive relationship between PsyCap and authentic leadership	Accepted
Hypothesis 8	There is a positive relationship between work engagement and safety behaviour.	Accepted
Hypothesis 9	There is a positive relationship between work engagement and authentic leadership.	Accepted
Hypothesis 10	There is a positive relationship between authentic leadership, PsyCap, work engagement, and safety behaviour.	Accepted
Hypothesis 11	PsyCap mediates the relationship between authentic leadership and safety behaviour.	Accepted

Number	Hypothesis	Outcome
Hypothesis 12	Work engagement mediates the relationship between authentic leadership and safety behaviour.	Accepted

The outcome column indicates the result of the hypothesis test and is indicated by one of the following indicators: Rejected (the results contradict the hypothesis), accepted (the results support the hypothesis), or judgement withheld (ambiguous results). As can be seen in Table 79, all the hypotheses were accepted.

4.8 CONCLUSION

This chapter reports on the results of the study, in conjunction with the connection between the results and the hypotheses which were formulated in Chapter 2. All hypotheses were supported and the theoretically established relationships between the constructs in the study were validated by the results. More specifically, the relationships were tested and supported in a South African construction environment, thereby revealing the prevalence that authentic leadership, PsyCap, and levels of work engagement affect the safety behaviour of employees.

The next chapter provides a detailed discussion of the results and makes inferences about the theoretical and practical implications thereof. In addition, limitations are acknowledged and recommendations for future research are discussed.

CHAPTER 5: DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

The preceding chapters dealt with the research problem, study objectives, a review of the relevant literature pertaining to constructs in the study, background of the research design and research methodology employed. The statistical analyses were presented in Chapter 4 to explore and comment on the research hypotheses.

In general, the study aimed to establish whether authentic leadership is related to PsyCap, work engagement, and safety behaviour, and to construct a theoretical model of the relationships between the constructs. Therefore, this chapter provides a discussion of the research findings whereby the relevant literature is consulted to make inferences and draw comparisons. Reference is also given to the theoretical and practical implications. This chapter concludes with limitations and recommendations for future research based on the findings of the study. Ultimately, the research objectives of this study were achieved.

5.2 QUESTIONNAIRE RESULTS

The descriptive results provide insight into the mean levels of safety behaviour, work engagement, PsyCap, and authentic leadership. These results are considered in relation to the sample. Interestingly, the results demonstrated consistency in that the respondents assigned high ratings to safety behaviour, work engagement, PsyCap, and authentic leadership perceptions. This was the first indication that a theoretical relationship between the constructs exists.

5.2.1 Safety behaviour

The respondents tended to score highly on their self-reported safety behaviour. They scored themselves higher on safety compliance ($M = 6.13$) and the lowest on safety participation ($M = 5.60$). This indicates that the respondents are more inclined to obey safety rules and protocols, than surreptitiously participate in safety-related activities, such as helping other to create a safe work environment. Nevertheless, the

respondents appear to embrace the needed behaviours that prevent the likelihood of physical harm and will adapt their behaviour to improve their overall safety at work (Beus et al., 2015).

5.2.2 Work engagement

The results indicated a collective mean score of 5.67 was obtained for work engagement. The lowest mean score was obtained for questions pertaining to absorption (M = 5.54), whereas the highest mean score was obtained for dedication (M = 5.77). It appears that the respondents experienced high energy levels and mental resilience, while reporting to be fully immersed in and dedicated to their work. In essence, the results support the notion that high work engagement contributes to enhanced performance. The latter is typically evident in employees' workplace behaviours, and one such behaviour could translate to safety behaviour.

In terms of the literature, the above is supported by the notion that high work engagement translates to employees' willingness to invest the necessary efforts into their work and ability to persevere when confronted with increased job demands (Schaufeli & Bakker, 2004; Bakker et al., 2014).

5.2.3 PsyCap

Overall, a mean score of 5.72 was obtained for PsyCap. The lowest mean score was obtained for questions pertaining to resilience (M = 5.54), whereas the highest mean score was obtained for hope (M = 5.77). The results show that the respondents draw from high levels of PsyCap.

Employees with high PsyCap have a propensity to perform better than their counterparts because of a combination of self-efficacy, hope, optimism, and resilience (Luthans et al., 2007). Case in point, an employee with high self-efficacy openly accepts challenging tasks. Should the same employee also have high levels of optimism, he or she will expend the needed effort to achieve the tasks while being confident about a positive outcome. In principle, the employee will persist until the task has been successfully completed which in turn, explains high resilience. Therefore,

the respondents who scored high on all PsyCap dimensions also reported high levels of safety behaviour and work engagement.

5.2.4 Authentic leadership

The results indicated that the respondents obtained an aggregate mean score of 5.25 for authentic leadership. The lowest mean score was obtained for questions pertaining to balanced processing ($M = 4.85$), whereas the highest mean score was obtained for self-awareness ($M = 5.25$). Overall, these results demonstrate that the respondents perceive their immediate leaders as genuine and authentic in relation to their self-awareness, followed by ethical/moral perspective, transparency, and balanced processing. This means that the respondents perceived their leaders in terms of their ability to understand and apply the essence of their own values, motives, strengths, and weaknesses, while being actively aware of their interactions with others (Riggio, 2014; Wang et al., 2014).

Authentic leadership has proven to contribute to employee PsyCap (Caza et al., 2010), work engagement (Adil & Kamal, 2016), and employee behaviour (Avolio et al., 2004).

5.3 DIFFERENCES BETWEEN SAMPLE DEMOGRAPHICS

The analyses of significant differences between the sample and demographic variables indicated several mean differences. By exploring these differences in relation to the study hypotheses and according to the research objectives, a better understanding of the variables can be achieved and may assist human resource management decisions that are typically informed by demographics. It is important to note that while this was not the main aim of the study, it provided valuable input as significant differences were noted across all constructs and demographic variables, except age. The largest part of the sample belonged to 25 – 34-year age group, which may have contributed to this result.

5.3.1 Gender

Gender was positively related to resilience, dedication, absorption, and work engagement. This means that gender differences contribute toward different perceptions about PsyCap and work engagement. In general, this finding is consistent with the literature since it supports the fact that there is a positive association between gender and work engagement, including its components, and gender and resilience (Ugwu & Amazue, 2014).

Specifically, the results pertaining to resilience indicate that gender is an important characteristic (Mukherjee & Srivastava, 2017). Resilience refers to a person's capacity to adapt to negative environmental experiences, such as adversity, conflict, and difficulty (Luthans, 2002a). To reiterate, the results of this study indicated that female respondents considered themselves to be more resilient than males when faced with challenging circumstances. The latter is in line with a study conducted by Baker (2006) which revealed a notable relationship between gender and resiliency whereby males were less resilient than females. According to Sull, Harland, and Moore (2014), women are often more resilient than men when they function in male-dominated organisations. This may be particularly true when acknowledging that more males participated in this study than females, which further signifies that the sample is representative of the population in that the South African construction industry is well-known for being male dominated (Ness, 2012). In the same vein, the results showed that the female respondents rated themselves higher on dedication and absorption items which are components of work engagement. This is further supported by the work engagement results which revealed that females believe that they are more engaged in their work. Based on the literature, women tend to be more persuaded to invest extra effort and resources to become and remain successful in industries that are stereotypically male (Banihani, Lewis, & Syed, 2013).

In essence, the results support the notion that gender plays a role when it comes to the differences in levels of work engagement and resilience between men and women. However, it is important to reiterate that the literature provides conflicting results on studies that have examined variation in work engagement in relation to employees' demographic characteristics as noted in Chapter 2. For example, Bonanno (2004)

recorded that males present higher levels of resilience, while Caza, et al. (2010) found no statistical noteworthy difference in resilience between males and females.

5.3.2 Population group

The study revealed significant differences between population group and the following constructs: Authentic leadership and all four authentic leadership components, one PsyCap component (self-efficacy), and two work engagement components (dedication and absorption). More specifically, the significant differences lie between the African, Coloured, and White population group groups whereby the White population group scored higher on items that measured authentic leadership, followed by the Coloured group and the African group. Furthermore, differences in responses to questions about self-efficacy items were noted between the White and African group whereby the White group scored higher on items that measured self-efficacy. Finally, differences in responses to work engagement and absorption were found between the White and African groups, where differences were noted between the White and Foreign National groups for items pertaining to dedication. In both cases, the White population group recorded higher ratings for work engagement, dedication, and absorption, when compared to the other two population group groups.

Unfortunately, extraordinarily little has been reported on the relationship between racial groups in terms of authentic leadership perceptions, PsyCap, work engagement, and safety behaviour. Interestingly, scholars seem to focus on ethnic groups in this regard, instead of population group. This may be attributed to the well-documented fact that ethnicity affects behaviour through learned experiences of cultural values, religion, social norms and so on, whereas population group is merely a representation to devise social groupings related to physical appearance (Suyemoto, Curley, & Mukkamala, 2020). However, despite the limited literature available on how population group may lead to differences in self-report questionnaires that measure the constructs, the significant differences in population group may be assigned to two opposing yet supporting notions. Perceivers are more likely to accept leaders from their own racial group or tend to rate them more favourably (Ospina & Foldy, 2009). Bass (1990) has shown that followers tend to give higher ratings to the leaders of the

same racial group as them. Alternatively, some studies argue that interaction with organisational context influence how population group influences followers' evaluations of their leaders (Slay, 2003). In basic terms, leaders who emphasise their racial identity in predominantly white work environments are less likely to be highly rated by employees from other racial groups (Slay, 2003). In this case, most of the sample represents the White racial category which may explain the noteworthy differences in authentic leadership perceptions, its associated factors, and work engagement.

5.3.3 Job Title

The study revealed significant differences between title, authentic leadership and all its components between the "Other" title category (administrative personnel), Technicians, Supervisors and Managers. In addition, the Other occupational category scored higher for PsyCap when compared to Technicians, Supervisors, and Managers. However, Managers scored the highest on self-efficacy, while Supervisors scored the highest on resilience. Finally, differences in responses to work engagement was evident between Technicians and Managers, whereby Managers scored higher for items that measured work engagement and all three of its components.

The significant differences in title might be because job descriptions play a role in the way employees perceive their leaders and the degree to which they utilise and develop psychological resources to cope with adversity at work, while being engaged in their work activities. For example, supervisory and management positions are characterised by greater levels of autonomy, skill variety, and significance in terms of task importance to others, when compared to Technicians. In this way, one may deduce that job characteristics play a role when it comes employees' perception of leadership authenticity, levels of PsyCap, and the degree to which employees are engaged. Job characteristics refer to the objective descriptions of the work that influence performance outcomes (Wegman, Hoffman, Carter, Twenge, & Guenole, 2018). For example, if employees have high PsyCap and perceive their leaders to be authentic, tend to feel more confident and encouraged to devote themselves to their work, thereby being more engaged in their work activities (Cai, Lysova, Bossink,

Khapova, & Wang, 2019). Alternatively, because managerial employees have more decision-making control and can influence action delivery, they have higher engagement when compared to other occupational levels (Robertson-Smith & Markwick, 2009).

5.3.4 Tenure

Respondents with an employment tenure of six months to one year reported greater authentic leadership perceptions, self-awareness, and self-efficacy.

Interestingly, a meaningful relationship between leadership perceptions and tenure has also been established by Sürücü et al. (2018). Specifically, the differences noted in the tenure category may be ascribed to the notion that perceptions of leadership tend to strengthen as service duration increases. This means that true leadership authenticity is observed over time as followers get to know their leaders better. Similarly, the differences noted in tenure as it relates to self-efficacy may be because employees with more work experience and a longer period of service are more equipped with knowledge and skills. In basic terms, employees with more years of service have an increased belief in their ability to succeed (Jiang, Hu, & Wang, 2018).

5.3.5 Location

The results indicated noteworthy differences in authentic leadership responses and all four authentic leadership components whereby respondents from Cape Town had higher scores when compared to those who were from Johannesburg. The same holds true for responses about self-efficacy (PsyCap component), work engagement and two work engagement components, namely dedication and absorption. Interestingly, Cape Town respondents scored higher on safety compliance when compared to Durban respondents. The difference noted in location might be since the participating entities have different leaders, thereby resulting in different perceptions of the degree to which their leaders are genuine and authentic. Moreover, there might be different emphasis placed on authenticity between the participating entities. For example, the executive board in Cape Town value transparency, while the opposite

may be perceived by employees working in Johannesburg. The same line of thought applies when considering the fact that engagement levels are affected by the availability of resources to deal with job demands.

Remarkably, location is the only demographic variable that had an influence on safety compliance. Based on the information received from the participating organisations, the meaningful difference between Cape Town and Durban may be because of the increased presence of leadership in Cape Town versus the lack thereof in Durban. In other words, a noticeable presence of organisational leaders who consider occupational health and safety to be a priority can influence the degree to which employees comply with safety rules and regulations (Neal & Griffin, 2002).

In KwaZulu-Natal in 2020, struck by (27.39%), slip or over-exertion (16.09%), and motor vehicle accidents (13.48%) were the most reported cause of workplace injuries, with a total of 920 number of accidents, 12 fatal accidents, and 6851 days lost (FEMA, 2020). The Western Cape statistics for 2020 were as follows: Struck by (32.30%), slip or over-exertion (17.37), and striking against (15.49%) were the most reported causes of, with a total of 904 accidents, zero fatal accidents, and 4651 days lost (FEMA, 2020). When compared to the Western Cape, it is clear that KwaZulu-Natal's statistics are more alarming which further supports the results of this study.

5.4 RELATIONSHIP BETWEEN CONSTRUCTS IN THE STUDY

The purpose of this study was to address the paucity of the literature which explores safety from more recently acknowledged leadership theories, and to establish a link between a contemporary leadership theory, psychological constructs, and associated outcomes distinctively to a given industry within the South African construction environment.

The relationships between the constructs in the study were mainly assessed by means of correlation statistics. Moreover, it should be noted that this section discusses the relationships that are based on the hypotheses that were formulated in Chapter 2. Ultimately, the primary objective of the study was achieved whereby a theoretical model comprising of all four constructs was established. In addition, the investigation into the relationship between the constructs revealed that authentic leadership acted

as the independent variable, while PsyCap, work engagement, and safety behaviour were situated as the dependent variables.

The explanations offered in sections 5.4.1 to 5.4.6 provide links between the results of the study and supportive literature. However, these explanations boil down to the belief that the South African construction industry will observe improved health and safety statistics when they consider the impact of each construct on occupational health and safety standards. In other words, the potential consequences of facilitating the development of the constructs in this study may be remarkable. For example, the South African construction environment may be better able to eliminate work-related injuries and fatalities when they encourage and incentivise organisations to devote resources to increase work engagement levels, PsyCap and/or authentic leadership. It is incredible to note that the relationship between the constructs in the study are not mutually exclusive, making it easier for organisations to focus their efforts to improve one aspect at a time.

5.4.1 PsyCap and work engagement

It was predicted that a strong relationship would be found between PsyCap and work engagement, along with the distinctive components of work engagement. The results of the current study confirmed that there was a strong positive relationship between PsyCap and work engagement ($r = .630, p < .01$). This implies that employees in the South African construction industry who have higher levels of PsyCap will experience greater work engagement. This relationship is further supported by the results which demonstrated that there is a strong positive relationship between PsyCap and all three components of work engagement, namely vigour ($r = .657, p < .01$), dedication ($r = .578, p < .01$), and absorption ($r = .507, p < .01$). The same holds true when acknowledging the correlation between the PsyCap components and work engagement as a whole: Self-efficacy ($r = .488, p < .01$), hope ($r = .523, p < .01$), resilience ($r = .430, p < .01$), and optimism ($r = .438, p < .01$). This means that PsyCap components are significant to predict work engagement, and vice versa.

These findings are in line with the results of several studies that were conducted in diverse contexts which tested and confirmed the encouraging effects of PsyCap on

work-related outcomes, such as work engagement and workplace behaviours (Youssef & Luthans, 2007). For example, research by Simons and Buitendach (2013) yield comparable findings to the results presented in this study whereby they confirm a significant positive relationship between PsyCap and work engagement in a South African sample of 106 employees working in a call centre environment ($r = .730, p < .01$). Likewise, Joo, Lim, and Kim (2016) corroborated this finding after examining the influence of PsyCap on work engagement on 599 Korean conglomerates. In addition, Nordin, Rashid, Panatik, and Rashid (2019) replicated these results in a sample of 220 employees located in Johor Bahru where a significant moderate relationship was found between PsyCap and work engagement ($r = .543, p < .01$).

In general, employees with high levels of PsyCap are likely to exhibit higher energy levels and resilience (vigour), self-discipline and perseverance (dedication), and are immersed in their work (absorption) (Bakker & Demerouti, 2008; Ho et al., 2011; Liu et al., 2013). Therefore, they are more engaged in their work because of their improved ability to harness energy and exercise discretionary efforts towards goal achievement at work (Schneider et al., 2009). A study conducted by Sweetman and Luthans (2010) confirmed that PsyCap enables employees to benefit from being immersed in their work (absorption), invested efforts to achieve desired results (vigour), and identifying with what they are busy with (dedication).

5.4.2 PsyCap and safety behaviour

Based on the results of the present study, a significant relationship between PsyCap and safety behaviour was established ($r = .547, p < .01$). This implies that employees who have higher levels of PsyCap are more likely to exhibit safe workplace behaviour.

Regrettably, there is limited empirical evidence available in the literature on the relationship between PsyCap and employees' safety behaviour. However, this relationship has been proven by Wang, Wang, and Xia (2018) who reported a positive relationship between PsyCap and safety behaviour ($r = .671, p < .01$) in a sample of 359 Chinese construction workers. The present research concurs with Wang, Wang, and Xia's (2018) findings.

Case in point, PsyCap has been proven to affect workplace attitudes, behaviours, and performance, thereby establishing a direct influence on safety behaviour (Avey et al., 2009; Griffin & Neal, 2000). This is because PsyCap enables employees to draw on their psychological strengths with the intention of fulfilling challenging tasks (Luthans et al., 2007). In basic terms, PsyCap can be used to predict employees' safety behaviour since their belief in their capabilities to perform (self-efficacy), confidence and motivation to achieve goals (confidence), positive expectations about the future (optimism), and ability to bounce back from adversity (resilience) will inevitably influence the degree to which they comply with safety rules and their level of participation in safety practices (Wang et al., 2018; Youssef & Luthans, 2007). In essence, all the possible relationships between PsyCap, safety behaviour, and their components were significant.

5.4.3 PsyCap and authentic leadership

Both PsyCap and authentic leadership are grounded in the POB framework since both constructs support positive psychological capacities that are open to development (Luthans, 2002a; Walumbwa et al., 2008). The current study revealed that PsyCap is positively related to authentic leadership ($r = .458, p < .01$).

This finding is consistent with previous empirical studies on PsyCap and authentic leadership (Munyaka, Boshoff, Pietersen, & Snelgar, 2017; Novitasari, Siswanto, Purwanto, & Fahmi, 2020). Proof positive, Adil and Kamal (2016) found a statistically significant relationship between PsyCap and authentic leadership ($r = .350, p < .001$).

PsyCap has a direct bearing on the advancement of authentic leadership and researchers argue that this is due to the fact that PsyCap is an important self-developmental factor that supports growth of self-identity (Luthans & Avolio, 2003). In turn, this provides the steppingstone for authentic leadership development as authentic leadership incorporates both positive psychological attributes and behaviours (Adil & Kamal, 2016). Therefore, leaders with high PysCap are more inclined to foster an understanding of and develop authentic leadership behaviours (Gardner et al., 2005).

5.4.4 Work engagement and safety behaviour

The results of this study produced a significant relationship between work engagement and safety behaviour ($r = .546, p < .01$), reinforcing previous research in this domain (Nahrgang et al., 2011).

This study's finding is supported by Nahrgang et al. (2011) who maintain that employees are more motivated to engage in safety activities when they have access to appropriate resources to effectively deal with job demands, which is potential causes of work engagement as noted in Section 2.4.2. The authors report a statistically significant negative relationship between work engagement and unsafe work behaviour ($r = -.28, p < .01$) in a meta-analysis of 203 independent samples. This means that employees who are engaged in their work are less likely to behave unsafely.

The results of this study propose that as employees in the construction industry with higher levels of engagement (sense of drive, innovation, and passion towards their work) tend to show higher levels of safety behaviour, when compared to their lower engagement counterparts. In the work context, work engagement (vigour, dedication, and absorption) has been proven to contribute to positive outcomes, including performance outcomes and positive workplace behaviours (Cesário & Chambel, 2017; Xiong & Wen, 2020).

5.4.5 Work engagement and authentic leadership

In addition to the positive relationship between work engagement and authentic leadership demonstrated in this study ($r = .461, p < .01$), the association is supported by an abundance of empirical studies. For example, Adil and Kamal (2016) found a statistically significant relationship between work engagement and authentic leadership ($r = .290, p < .001$).

Because it is anticipated that authentic leaders facilitate employee engagement, it is expected that leadership authenticity will persist at the individual and organisational level (Gardner et al., 2005). Employees benefit from a more successful future within an organisation when they perceive their leaders to be authentic, genuine, transparent, and capable of managing the organisation (Spreitzer & Mishra, 2002). Furthermore,

employees are more likely to identify with their authentic leaders, thereby making them feel empowered as they identify with the 'boss' which, in turn, may result in increased work engagement levels (Avolio, Schaubroeck, Wang, Wang, & Walumbwa, 2010).

5.4.6 Authentic leadership, PsyCap, work engagement and safety behaviour

This study yielded several noteworthy relationships between authentic leadership, PsyCap, work engagement, and safety behaviour in a construction environment. This supports the core of this study in that a theoretical relationship between the constructs was tested and established. Specifically, the results of the present study confirmed that authentic leadership is positively related to PsyCap ($r = .458, p < .01$), work engagement ($r = .461, p < .01$), and safety behaviour ($r = .351, p < .01$) (see Table 62).

Wang et al. (2014) corroborated a positive relationship between authentic leadership and PsyCap ($r = .480, p < .01$) in a sample of 801 followers and their superiors from a logistics company situated in Beijing. In addition, a study conducted by Stander, De Beer, and Stander (2015) revealed a positive statistically significant relationship between authentic leadership and work engagement ($r = .420, p < .01$) in a sample of 633 South African public health employees. Authentic leaders can, therefore, promote the development of PsyCap among their followers and increase their work engagement (Banks et al., 2016).

As noted in Chapter 2, this is based on social learning theory which is the basis for clarifying the transfer of behaviours between leaders and followers. By reason of a leader's role and power status, employees' behaviour and associated performance outcomes are influenced by the leader since employees seek to learn from them and mimic their behaviours (Turner, 2017). This means, employees of the same leader are likely to model the leader's behaviours to reciprocate norms and, in that way, they interpret information and appraise the work environment like the leader (Turner, 2017). According to Gardner et al. (2005), authentic leaders draw from PsyCap to model and promote the development thereof in others. In the same vein, authentic leaders' credibility, and positive approaches to solving problems encourage employees' hope and optimism toward goal achievement (Avolio et al., 2004). In other words,

employees who see their leaders as authentic, also experience emotional and motivational states corresponding to the PsyCap components, namely self-efficacy, optimism, hope and resilience (Eid et al., 2012). Through the same process, authentic leaders who serve as role models and instil shared beliefs and common goals, influences employees' behaviour whereby they engage in behaviours and actions that are beneficial to themselves and the organisation (Eid et al., 2012). In essence, through the process of social learning and behaviour modelling, authentic leaders can promote the development of PsyCap and stimulate work engagement because of consistency in values and observed objectivity in their decision making (Banks et al., 2016).

Due to the lack of studies that explores the direct association between authentic leadership and safety behaviour, the researcher provided an example of the relationship between authentic leadership and safety performance. The reasoning behind this is because the literature indicates that safety performance is driven by safety behaviours among employees (Neal & Griffin, 2006). For example, Cavazotte, Duarte, and Gobbo (2013) linked authentic leadership to safety performance by reinforcing the positive relationship between constructs, that is, safety performance ($r = .47, p < .01$). In addition, scholars have demonstrated that leadership influences organisational safety outcomes. For example, management's involvement is a driving force behind positive safety performance and associated outputs because of their rank and ability to influence company policies and procedures (Guo & Yiu, 2015; Unnikrishnan et al., 2015). However, since leadership can be fulfilled from a distance, an immediate relationship between authentic leadership and safety behaviour may not be directly observed, alternatively it may not be a strong relationship (Wu et al., 2017). Proof positive, the results of the present study indicate that authentic leadership is moderately related to safety behaviour at work ($r = .351, p < .01$) (see Table 62). Interestingly, this relationship was mediated by two constructs (see Section 5.4).

In essence, the results of this study validate the findings in the literature as the respondents perceived their leaders to be authentic and, consequently reported high levels of PsyCap and work engagement, and believe they comply with safety rules while participating in the necessary safety practices at work. Authentic leaders influence employees' psychological capacities and experience through positive

emotional contagion which, in turn, may result in higher levels of engagement as the work environment developed and maintained by the authentic leader is conducive to positive experiences (Adil & Kamal, 2016; Ilies et al., 2005). Interestingly, engaged employees are more likely to be intrinsically motivated, thereby resulting in higher satisfaction and work performance (Luthans, Youssef, & Avolio, 2007). This means that authentic leaders who transfer or develop PsyCap and work engagement among their employees, equip them to be more successful and happier in both their work and personal lives (Adil & Kamal, 2016). Moreover, employees are more motivated to invest their best efforts in their work (Adil & Kamal, 2016) which should have a positive influence on their safety behaviour. Consequently, the relationship between the four constructs in the study is justified.

5.5 MEDIATION EFFECTS

Hypotheses 10 and 11 predicted that PsyCap and work engagement mediates the relationship between authentic leadership and safety behaviour. Both PsyCap and work engagement explained the process that underlies this relationship.

It was claimed that authentic leaders influence the degree to which employees engage in safe workplace behaviours through the presence of PsyCap. This argument was based on the findings by Eid et al. (2012) who described authentic leadership as a behavioural pattern that draws upon and encourages PsyCap among employees. This means that authentic leaders foster greater self-awareness, transparency, ethical perspectives, and balanced processing through the provision of comprehensive information, both verbal and non-verbal, which results in PsyCap development in employees (Walumbwa et al., 2008). The current study demonstrated that authentic leadership leads to the development of PsyCap which, in turn, enhances employee's safety behaviour. Employees high on PsyCap exhibit greater safety behaviour than their counterparts. This means that PsyCap components (self-efficacy, hope, resilience, and optimism) serve as facilitating mechanisms in the authentic leadership and safety behaviour relationship, by fostering positive psychological states that encourage safety compliance and safety participation to prevent accidents and injuries (Gardner et al., 2005).

In addition to PsyCap as a mediation, another outcome was that work engagement mediates the relationship between authentic leadership and safety behaviour. It was reasoned that authentic leaders influence employees' safety behaviour through the occurrence of work engagement. This line of reasoning is grounded in the work of Shah, Hamid, Malaysia, Shaikh, and Malaysia (2016) who claimed that work engagement mediates the relationship between a given leadership style and employee outcomes. They argued that positive leadership styles adopted by management, such as authentic leadership, leads to enhanced work engagement which, in turn, results in desired employee outcomes (Shah et al., 2016). This is because work engagement enables employees to exert greater effort to their work since they are emotionally connected thereto, fully involved, and enthusiastic about their work, their organisations, and goal achievement (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2004). This means that work engagement mediates the relationship between authentic leadership and safety behaviour in two ways. First, employees must be able to utilise their full mental and physical capabilities in order to avoid and prevent injuries, accidents, and other safety-related issues in the workplace (Nahrgang et al., 2011). Second, employees must be motivated to perform safely through positive modelling behaviours, and this motivation typically comes from the authentic leader and access to both physical and mental resources required to perform safely (Nahrgang et al., 2011).

Since the construction industry is characterised by complex and hazardous conditions, the need for strict health and safety practices are called for. By promoting employees' PsyCap and by improving their level of work engagement, employers in the construction industry can observe less injuries-on-duty, employee absence, and in turn, improved performance outputs (Maseko, 2016; Jinnett et al., 2017). Consequently, this allows organisations to improve their compliance to the Occupational Health and Safety Act.

5.6 IMPLICATIONS FOR THEORY AND PRACTICE

This study extends the growing, but still limited, body of research on the relationship between authentic leadership, PsyCap, work engagement and safety behaviour in South Africa and in the construction environment. Although scholarly interest in this

line of research has increased over the years, extant leadership and positive psychology research on employees' work engagement levels and safety behaviour leave much room for exploration. Therefore, the primary contribution of this study lies in acknowledging the existence of such as relationship to lay the necessary theoretical and empirical groundwork that may advance knowledge about how workplace safety is influenced by authentic leadership, PsyCap, and work engagement in the South African construction industry.

5.6.1 Implications for theory

This study contributes to the literature in two ways. First, the study aimed to explore contemporary leadership theories, in conjunction with positive psychological constructs and its prevalence in the South African construction industry. The research findings align with the principles of social learning theory whereby employees are expected to learn from leaders through observation or instruction, and incorporate similar actions in their behaviour (Bandura, 1978; Gardner et al., 2005). This means that the positive impact of authentic leadership is subject to a trickle-down effect as aspects thereof is transferred to employees. Second, a theoretical framework was established to understand how authentic leadership and PsyCap can affect employees' engagement at work, along with their safety compliance. The framework provides structure and allows for an improved understanding of approaching safety behaviour in organisations from a psychological standpoint.

5.6.2 Implications for practice

In addition to the theoretical implications, the findings have implications for practitioners. Studies have shown that employees who perceive their leaders to be authentic demonstrated higher PsyCap and work engagement which, in turn, results in greater performance and behaviour (Gupta, Shaheen, & Reddy, 2017; Du Plessis & Boshoff, 2018). Therefore, the tested theoretical model may become a promising tool to aid and support selection, training and development initiatives pertaining to leadership development, increasing levels of PsyCap and work engagement, in conjunction with improved levels of safety performance and associated safety

behaviours. In basic terms, Human Resource Practitioners and Development Practitioners can help employees enhance their PsyCap and improve their engagement level in general, but also safety behaviour by developing authentic leadership.

By understanding this relationship, greater insight into appropriate workplace interventions can be provided. For example, initiatives aimed at facilitating positive modelling processes by training supervisors and managers to be self-aware of their actions and decisions, consistent and transparent in communication with others, and to establish relationship with their employees and colleagues (Lyuboynikoya et al., 2017). In turn, this may allow employees to enhance their PsyCap and the degree to which they engaged in their work. For example, authentic leaders motivate others, both directly and indirectly, to set realistic goals (hope), help them focus on past successes and to copy other people to achieve future success (self-efficacy), face reality in situations of despair and hopelessness and to improvise to deal with the situation (resilience), and change focus to appreciate the moment and to view the future as a source of opportunity (optimism) (Ohlin, 2020). Moreover, authentic leaders are more equipped to provide an environment conducive to development, clarify goals, and encourage and provide constructive feedback to improve performance and facilitate growth which increases work engagement and, in turn, workplace behaviour (Clarke, 2021). Keeping in mind that leaders are modelled by employees, it is important that leaders recognise the importance of adopting a leadership style that is genuine and one that is observed as such by their employees to ultimately contribute towards the health and safety of the organisation.

5.7 LIMITATIONS OF THE STUDY

This study presented several limitations that must be acknowledged, even though the limitations revolved primarily around the research design.

First, the participants completed the questionnaire at one point in time which limits the researcher to make causal inferences about the relationships between the study variables over time. In essence, the relationship may remain explanatory in nature and

would, therefore benefit from repeated measures or a longitudinal research design (Maree, 2010; Welman et al., 2005).

Second, although the use of convenience sampling has been documented as a successful data collection method (Maree, 2010; Welman et al., 2005), a concern was that the sample would over represent certain groups within the sample which as this method is commonly associated with sampling bias, in turn, would undermine generalisability to the population (Saunders, Lewis, & Thornhill, 2012). However, this limitation was reduced by approaching all occupational categories at the participating organisations and not singling out a specific category. The ratio between participant responses and people employed at the participating organisations was in line when considering the different occupational categories. Finally, based on national statistics, the construction industry is predominantly driven by males which is also evident in this study. Specifically, the South African construction industry employed approximately 1 339 000 people in 2019, of which 89% were male (Statistics South Africa, 2019).

Third, the results should be considered with caution as responses to demographic details were measured with categorical response options, instead of continuous variable (Altman & Royston, 2006). This means that the participants were not asked to indicate their actual age.

Fourth, the data was initially collected through the group administration of paper-and-pencil questionnaires. The problem with self-report questionnaires, especially with the group administration of paper-based questionnaires, is the increased possibility of participants responding in a socially desirable manner which could have had an influence on the results of this study (Krumpal, 2013). Despite attempts to mitigate social desirability, for example making participants aware and reassuring them that their personal details and individual results will not be disclosed to others (Sheperis, 2020), the results of this study should be interpreted bearing in mind that social desirability may still have had an influence on the results of this study. Nevertheless, the group administration of paper-and-pencil questionnaires was converted to online questionnaires because of the COVID-19 pandemic and associated health and safety concerns. This resulted in a six-month delay to complete data collection efforts which, in turn, may have caused participants to view their leaders and themselves differently

because of the all-round negative impact of COVID-19 on companies and its employees.

Finally, the questionnaire was developed in the English language since this is the universal language that is assumed to be understood across different regions and cultures. Moreover, researchers are prohibited from translating the ALQ and PCQ-24. In general, the item wording used may not have completely understood by the participants. According to Harzing (2006), central tendency in responses become more apparent when participants do not fully understand the language or the items in a survey.

5.8 RECOMMENDATIONS FOR FUTURE RESEARCH

The limitations of the study create alternative avenues for future research in this sphere. The correlation coefficients, along with the mediation analyses indicated significant relationships between the constructs in the study which led to the acceptance of the hypotheses. For this reason, it is possible that these relationships may be observed in future studies that make use of larger samples, in different occupations, and different South African industries. It would also be beneficial for future studies to consider how this relationship can be influenced by different ethnic and cultural groups. A diverse sample in terms of ethnicity would allow researchers and practitioners to understand how differences in ethnicity manifests in the constructs. Furthermore, an ethnic diverse sample would yield results that are more representative of the current South African demographic as this study's sample was dominated by a large pool of White males. In the same vein, it future studies ought to consider the use of continuous variables to measure the sample's demographics as it streamlines the statistical analysis, realises easy interpretation and presentation of results, and does not discard useful variance (Altman & Royston, 2006).

Another logical extension of the study would be to adopt a longitudinal research design investigate the long-term effects of these constructs in the South African workplace as no such studies currently exist. This can also be considered in relation to possible interventions to improve leadership authenticity and increase PsyCap with the intention of realising high work engagement, and ultimately, mitigate adverse safety

events observed in the construction industry. More specifically, future research should consider what impact different interventions would have on occupational health and safety specific to the construction industry. Examples of interventions include workshops and training programmes that guide employees through a transformational process that will produce authentic leaders and enhance PsyCap.

A final avenue for future research would be to investigate authentic leadership perceptions, PsyCap, work engagement, and safety behaviour as a group-level phenomenon. This may involve an investigation using an alternative theoretical framework, such as social information processing theory which stems from the premise that people are adaptive beings who can alter their behaviour and attitudes to the social context in which they function (Salancik & Pfeffer, 1978), such as the workplace. It is a pervasive theoretical base that can be used to argue that employees' behaviour is shaped by the behaviour of their leaders (Mawritz et al., 2012).

5.9 CONCLUSION

The overarching aim of this study was to establish a relationship between authentic leadership, PsyCap, work engagement, and safety behaviour in the South African construction environment.

There is a clear indication that authentic leaders can influence PsyCap in employees, encourage work engagement which leads to desired behavioural outcomes. Organisations that function within the construction industry are challenged with the increased pressure to prevent occupational injuries and accidents. The leaders of such organisations act as the focal point in facilitating the dissemination of favourable safety behaviour, that is, complying with safety rules and participating in safety practices, to prompt the development of PsyCap and work engagement that will eventually lead to similar employee outcomes in terms of safety behaviour.

The results of this study provide evidence that employees' safety behaviour is influenced by authentic leadership perceptions, PsyCap, and work engagement. Employees who perceive their leaders as authentic and genuine, are more likely to demonstrate higher PsyCap and enhanced work engagement which, in turn, positively impacts on their safety behaviour. This is an important discovery that sheds

light on the frustrating issues revolving around occupational health and safety faced by organisations that function in the South African construction industry (Skeepers & Mbohwa, 2015).

Employees who comply with and participate in safety-related activities at work improve the overall safety statistics of the organisation, and by virtue the South African construction industry as a whole. This is especially true when acknowledging the fact that the South African construction industry is constantly faced with increased on-duty accidents and injuries that goes against the South African Health and Safety accord which aims for zero harm to employees (South African Government News Service, 2012). For this reason, researchers and practitioners are required to explore new ways of achieving acceptable occupational health and safety standards.

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APPENDIX A: PERMISSION TO USE INSTRUMENTS

SAFETY BEHAVIOUR



Mark Griffin
to me

Tue, 13 Aug, 15:29

Dear Gillian,
apologies for delay, please find survey attached,
all the best with your research,
Mark Griffin

Professor Mark Griffin

Director, Future of Work Institute | Faculty of Business and Law
Associate Editor, *Journal of Applied Psychology*

Curtin University

Tel | +61 8 9266 2279

Email | Mark.Griffin@curtin.edu.au


Web | <http://curtin.edu.au/fowi>

See latest research on LEAD safety model



UWES

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Wilmar Schaufeli
Professor at Utrecht and Leuven University

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Notice for potential users of the UWES and the DUWAS

You are welcomed to use both tests provided that you agree to the following two conditions:

1. The use is for non-commercial educational or research purposes only. This means that no one is charging anyone a fee.
2. You agree to share some of your data, detailed below, with the authors. We will add these data to our international database and use them only for the purpose of further validating the UWES (e.g., updating norms, assessing cross-national equivalence).

Data to be shared:
For each sample, the raw test-scores, age, gender, and (if available) occupation. Please adhere to the original answering format and sequential order of the items.
For each sample a brief narrative description of its size, occupation(s) covered, language, and country.

Please send data to: w.schaufeli@uu.nl. Preferably the raw data file should be in SPSS or EXCEL format.

✓ Accept and continue to the test forms



To whom it may concern,

This letter is to grant permission for Gillian Turner to use the following copyright material:

Instrument: *Psychological Capital (PsyCap) Questionnaire (PCQ)*

Authors: *Fred Luthans, Bruce J. Avolio & James B. Avey.*

Copyright: "*Copyright © 2007 Psychological Capital (PsyCap) Questionnaire (PCQ) Fred L. Luthans, Bruce J. Avolio & James B. Avey. All rights reserved in all medium.*"

for his/her thesis/dissertation research.

Three sample items from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any other published material.

Sincerely,

A handwritten signature in black ink, appearing to read "Fred Luthans", with a stylized flourish at the end.

Mind Garden, Inc.
www.mindgarden.com



To whom it may concern,

This letter is to grant permission for Gillian Turner to use the following copyright material for his/her research:

Instrument: ***Authentic Leadership Questionnaire (ALQ)***

Authors: ***Bruce J. Avolio, William L. Gardner, and Fred O. Walumbwa***

Copyright: ***2007 by Bruce J. Avolio, William L. Gardner, and Fred O. Walumbwa***

Three sample items from this instrument may be reproduced for inclusion in a proposal, thesis, or dissertation.

The entire instrument may not be included or reproduced at any time in any published material.

Sincerely,

A handwritten signature in black ink, appearing to read "K. H. W.", written over a light blue rectangular background.

Mind Garden, Inc.
www.mindgarden.com

APPENDIX B: ETHICAL CLEARANCE

NELSON MANDELA UNIVERSITY

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031, South Africa mandela.ac.za

Chairperson: Faculty Research Ethics Committee (Human)
Tel: +27 (0)41 504 2906

Ref: [H20-BES-HRM-007] / Approval]

14 February 2020

Dr C Harris
Department: IOP and LR

Dear Dr Harris,

TITLE OF STUDY: AUTHENTIC LEADERSHIP, PSYCHOLOGY CAPITAL, WORK ENGAGEMENT AND SAFETY BEHAVIOUR IN A CONSTRUCTION ENVIRONMENT COMMUNITIES (PHD)

PRP: Dr C Harris
PI: G Turner

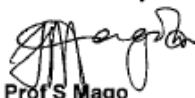
Your above-entitled application served at the *Faculty Ethics Committee of the Faculty of Business and Economic Science, (17 January 2020)* for approval. The study is classified as a negligible/low risk study. The ethics clearance reference number is **H20-BES-HRM-007** and approval is subject to the following conditions:

1. The immediate completion and return of the attached acknowledgement to Lindie@mandela.ac.za, the date of receipt of such returned acknowledgement determining the final date of approval for the study where after data collection may commence.
2. Approval for data collection is for 1 calendar year from date of receipt of above mentioned acknowledgement.
3. The submission of an annual progress report by the PRP on the data collection activities of the study (form RECH-004 to be made available shortly on Research Ethics Committee (Human) portal) by 15 December this year for studies approved/extended in the period October of the previous year up to and including September of this year, or 15 December next year for studies approved/extended after September this year.
4. In the event of a requirement to extend the period of data collection (i.e. for a period in excess of 1 calendar year from date of approval), completion of an extension request is required (form RECH-005 to be made available shortly on Research Ethics Committee (Human) portal)
5. In the event of any changes made to the study (excluding extension of the study), completion of an amendments form is required (form RECH-006 to be made available shortly on Research Ethics Committee (Human) portal).
6. Immediate submission (and possible discontinuation of the study in the case of serious events) of the relevant report to RECH (form RECH-007 to be made available shortly on Research Ethics Committee (Human) portal) in the event of any unanticipated problems, serious incidents or adverse events observed during the course of the study.
7. Immediate submission of a Study Termination Report to RECH (form RECH-008 to be made available shortly on Research Ethics Committee (Human) portal) upon unexpected closure/termination of study.
8. Immediate submission of a Study Exception Report of RECH (form RECH-009 to be made available shortly on Research Ethics Committee (Human) portal) in the event of any study deviations, violations and/or exceptions.
9. Acknowledgement that the study could be subjected to passive and/or active monitoring without prior notice at the discretion of Research Ethics Committee (Human).

Please quote the ethics clearance reference number in all correspondence and enquiries related to the study. For speedy processing of email queries (to be directed to Lindie@mandela.ac.za), it is recommended that the ethics clearance reference number together with an indication of the query appear in the subject line of the email.

We wish you well with the study.

Yours sincerely



Prof S Mago

Cc: Department of Research Capacity Development
Faculty Research Co-ordinator: Lindie van Rensburg

APPENDIX C: PERMISSION TO USE INSTRUMENTS (ONLINE)

PCQ-24

**Approval for Remote Online Use
of a Mind Garden Instrument**

Effective date is August 6, 2020 for:

Gillian Turner

You submitted your Application for Remote Online Use at 6:49 pm EDT on August 06, 2020.



[v2]

Remote online use of the Mind Garden instrument stated below is approved for the person on the title page of this document.

Your name:

Gillian Turner

Email address:

gilliandraaier@gmail.com

Company/institution:

Nelson Mandela University

Mind Garden Sales Order or Invoice number for your license purchase:

CFKVDJIXV

The name of the Mind Garden instrument you will be using:

Psychological Capital

Please specify the name of and web address for the remote online survey website you will be using and describe how you will be putting this instrument online:

The online version will be powered by Survey Monkey (<https://www.surveymonkey.com>) which is a popular and free online survey tool used by scholars and business practitioners. Access to the data will be password protected and restricted to the researcher only. The email addresses of the potential participants will be used to create a distribution list for sending the unique hyperlink to the online questionnaire. The email invitation will provide the potential participants with a deadline date for responding to the questionnaire, which will be two weeks after the initial email was sent. A reminder will be sent to encourage participants to complete the questionnaire. At midnight of the deadline date for completion, the questionnaire will be closed, and the hyperlink will be deactivated.

Please include any other comments or explanations you would like to provide about your remote online use of a Mind Garden instrument:

Mind Garden has granted me permission to utilise said instrument in 2019 in order to aid data collection for my PhD studies. The permission was for administration of paper-and-pencil questionnaires. Unfortunately, the initiation of the lockdown period on 26 March 2020 demanded for data collection to be suspended due to the health and safety concerns that may arise during group administration as COVID-19 is primarily transmitted through close contact with symptomatic people and contact with contaminated objects and surfaces (World Health Organization, 2020). In addition, due to the fact that there is no confirmed end date for the lockdown period, the conversion from group administration of paper-and pencil questionnaires to an online survey will be the most efficient way to resume and conclude data collection, while also safeguarding participants from the potential risk of contracting COVID-19.

ALQ

Approval for Remote Online Use of a Mind Garden Instrument

Effective date is August 6, 2020 for:

Gillian Turner

You submitted your Application for Remote Online Use at 1:04 am EDT on August 06, 2020.



[v2]

Remote online use of the Mind Garden instrument stated below is approved for the person on the title page of this document.

Your name:

Gillian Turner

Email address:

gilliandraaier@gmail.com

Company/institution:

Nelson Mandela University

Mind Garden Sales Order or Invoice number for your license purchase:

ZASGMNXDY

The name of the Mind Garden instrument you will be using:

Authentic Leadership Questionnaire

Please specify the name of and web address for the remote online survey website you will be using and describe how you will be putting this instrument online:

The online version will be powered by Survey Monkey (<https://www.surveymonkey.com>) which is a popular and free online survey tool used by scholars and business practitioners. Access to the data will be password protected and restricted to the researcher only. The email addresses of the potential participants will be used to create a distribution list for sending the unique hyperlink to the online questionnaire. The email invitation will provide the potential participants with a deadline date for responding to the questionnaire, which will be two weeks after the initial email was sent. A reminder will be sent to encourage participants to complete the questionnaire. At midnight of the deadline date for completion, the questionnaire will be closed, and the hyperlink will be deactivated.

Please include any other comments or explanations you would like to provide about your remote online use of a Mind Garden instrument:

Mind Garden has granted me permission to utilise said instrument in 2019 in order to aid data collection for my PhD studies. The permission was for administration of paper-and-pencil questionnaires. Unfortunately, the initiation of the lockdown period on 26 March 2020 demanded for data collection to be suspended due to the health and safety concerns that may arise during group administration as COVID-19 is primarily transmitted through close contact with symptomatic people and contact with contaminated objects and surfaces (World Health Organization, 2020). In addition, due to the fact that there is no confirmed end date for the lockdown period, the conversion from group administration of paper-and pencil questionnaires to an online survey will be the most efficient way to resume and conclude data collection, while also safeguarding participants from the potential risk of contracting COVID-19.

APPENDIX D: ETHICAL CLEARANCE FOR AMENDED DATA COLLECTION METHOD

NELSON MANDELA UNIVERSITY

PO Box 77000, Nelson Mandela University, Port Elizabeth, 6031, South Africa mandela.ac.za

Chairperson: Research Ethics Committee (Human)
Tel: +27 (0)41 504 2347
sharlene.govender@mandela.ac.za

NHREC registration nr: REC-042508-025

Ref: [H20-BES-HRM-007] / Amendment]

14 September 2020

Dr C Harris
Faculty: BES

Dear Dr Harris

THE RELATIONSHIP BETWEEN AUTHENTIC LEADERSHIP, PSYCHOLOGICAL CAPITAL, WORK ENGAGEMENT AND SAFETY BEHAVIOUR IN A CONSTRUCTION ENVIRONMENT

PRP: Dr C Harris
PI: Ms G Turner

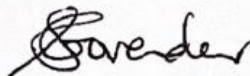
The request for an amendment to the above-entitled application served at the Research Ethics Committee (Human) for approval. The study is classified as a medium risk study. The ethics clearance reference number remains H20-BES-HRM-007 and approval is subject to the following conditions:

1. The immediate completion and return of the attached acknowledgement to Imtiaz.Khan@mandela.ac.za, the date of receipt of such returned acknowledgement determining the final date of approval for the study where after data collection may commence.
2. Approval for data collection is for 1 calendar year from date of receipt of above mentioned acknowledgement.
3. The submission of an annual progress report by the PRP on the data collection activities of the study (form RECH-004 available on Research Ethics Committee (Human) portal) by 15 November this year for studies approved/extended in the period October of the previous year up to and including September of this year, or 15 November next year for studies approved/extended after September this year.
4. In the event of a requirement to extend the period of data collection (i.e. for a period in excess of 1 calendar year from date of approval), completion of an extension request is required (form RECH-005 available on Research Ethics Committee (Human) portal)
5. In the event of any changes made to the study (excluding extension of the study), completion of an amendments form is required (form RECH-006 available on Research Ethics Committee (Human) portal).
6. Immediate submission (and possible discontinuation of the study in the case of serious events) of the relevant report to RECH (form RECH-007 available on Research Ethics Committee (Human) portal) in the event of any unanticipated problems, serious incidents or adverse events observed during the course of the study.
7. Immediate submission of a Study Termination Report to RECH (form RECH-008 available on Research Ethics Committee (Human) portal) upon expected or unexpected closure/termination of study.
8. Immediate submission of a Study Exception Report of RECH (form RECH-009 available on Research Ethics Committee (Human) portal) in the event of any study deviations, violations and/or exceptions.
9. Acknowledgement that the study could be subjected to passive and/or active monitoring without prior notice at the discretion of Research Ethics Committee (Human).

Please quote the ethics clearance reference number in all correspondence and enquiries related to the study. For speedy processing of email queries (to be directed to Imtiaz.Khan@mandela.ac.za), it is recommended that the ethics clearance reference number together with an indication of the query appear in the subject line of the email.

We wish you well with the study.

Yours sincerely



Dr S Govender
Chairperson: Research Ethics Committee (Human)

Cc: Department of Research Capacity Development
Faculty Manager: BES

Appendix 1: Acknowledgement of conditions for ethical approval

APPENDIX E: ITEM ANALYSES

SAFETY BEHAVIOUR

Table 80: Item-total statistics for the safety compliance subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SB1	8,71	2,665	0,735	0,858
SB2	8,64	2,891	0,778	0,812
SB3	8,72	2,943	0,783	0,81

Table 81: Item-total statistics for the safety participation subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SB4	7,93	4,107	0,687	0,837
SB5	8	3,858	0,792	0,739
SB6	8,1	3,898	0,71	0,816

UWES

Table 82: Item-total statistics for the vigour subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WE1	23,89	27,947	0,579	0,79
WE4	23,49	28,079	0,707	0,764
WE8	23,67	27,563	0,613	0,782
WE12	23,29	30,716	0,549	0,797
WE15	23,65	29,001	0,546	0,797
WE17	23,45	29,924	0,514	0,803

Table 83: Item-total statistics for the dedication subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WE2	18,83	24,671	0,713	0,81
WE5	18,89	23,612	0,671	0,815
WE7	19,1	20,859	0,757	0,789
WE10	18,67	23,338	0,781	0,791
WE13	19,85	23,226	0,472	0,882

Table 84: Item-total statistics for the absorption subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
WE3	22,23	29,042	0,568	0,714
WE6	22,92	26,653	0,487	0,733
WE9	22,24	29,647	0,509	0,727
WE11	22,42	28,59	0,621	0,703
WE14	23,28	27,024	0,474	0,736
WE16	23,1	27,204	0,441	0,747

PCQ-24

Table 85: Item-total statistics for the self-efficacy subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC1	24,68	19,183	0,548	0,806
PC2	24,57	18,328	0,68	0,778
PC3	24,64	18,679	0,671	0,781
PC4	24,31	19,12	0,683	0,781
PC5	24,81	18,62	0,48	0,827
PC6	24,62	19,639	0,543	0,806

Table 86: Item-total statistics for the hope subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC7	24,9	15,123	0,412	0,785
PC8	24,58	14,214	0,677	0,716
PC9	24,59	15,603	0,48	0,763
PC10	24,83	15,006	0,476	0,765
PC11	24,61	14,463	0,649	0,723
PC12	24,87	15,167	0,541	0,749

Table 87: Item-total statistics for the resilience subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
RPC13	24,35	12,28	0,073	0,673
PC14	23,31	11,585	0,437	0,482
PC15	23,06	12,276	0,335	0,522
PC16	23,68	11,304	0,328	0,521
PC17	23,09	10,763	0,533	0,437
PC18	23,32	11,913	0,331	0,521

Table 88: Item-total statistics for the resilience subscale (excluding one reverse item)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC14	19,5	8,607	0,464	0,607
PC15	19,25	9,162	0,368	0,647
PC16	19,87	8,091	0,386	0,647
PC17	19,28	7,92	0,556	0,563
PC18	19,51	8,728	0,38	0,643

Table 89: Item-total statistics for the optimism subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC19	21,46	13,056	0,326	0,451
RPC20	22,71	14,852	0,025	0,605
PC21	21,06	11,696	0,573	0,34
PC22	21,21	12,676	0,4	0,419
RPC23	22,17	13,763	0,111	0,568
PC24	21,3	12,356	0,355	0,433

Table 90: Item-total statistics for the optimism subscale (excluding one reverse item)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC19	18,19	10,004	0,467	0,497
PC21	17,79	9,201	0,668	0,4
PC22	17,94	10,225	0,458	0,505
RPC23	18,9	13,178	-0,053	0,783
PC24	18,04	9,43	0,48	0,484

Table 91: Item-total statistics for the optimism subscale (excluding two reverse items)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PC19	14,37	8,053	0,57	0,74
PC21	13,97	7,517	0,749	0,652
PC22	14,13	8,822	0,46	0,792
PC24	14,22	7,402	0,6	0,726

ALQ

Table 92: Item-total statistics for the self-awareness subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AL1	11,19	8,856	0,681	0,738
AL2	11,36	8,436	0,614	0,764
AL3	11,34	8,164	0,656	0,744
AL4	11,3	8,669	0,559	0,792

Table 93: Item-total statistics for the transparency subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AL5	14,36	15,228	0,464	0,825
AL6	14,21	13,82	0,619	0,781
AL7	14,08	13,38	0,697	0,757
AL8	14,11	13,435	0,673	0,764
AL9	14,02	14,431	0,608	0,785

Table 94: Item-total statistics for the ethical/moral subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AL10	11,03	11,7	0,528	0,886
AL11	10,79	9,414	0,762	0,796
AL12	10,79	9,407	0,771	0,792
AL13	10,85	9,459	0,766	0,794

Table 95: Item-total statistics for the balanced processing subscale

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Cronbach's Alpha if Item Deleted
AL14	7,13	4,846	0,701	0,826
AL15	6,98	4,903	0,75	0,781
AL16	6,88	4,726	0,739	0,79

APPENDIX F: VALIDITY OF MEASUREMENT INSTRUMENTS

UWES

Table 96: Modification index for the work engagement default model

			M.I.	Par Change
e2	<-->	e1	4,87	0,17
e3	<-->	e19	4,52	0,07
e4	<-->	e20	13,50	0,13
e4	<-->	e1	4,07	-0,18
e5	<-->	e20	4,24	0,09
e7	<-->	e1	4,30	0,14
e7	<-->	e5	10,71	-0,21
e8	<-->	e1	4,77	0,18
e8	<-->	e2	5,37	0,13
e8	<-->	e4	10,22	-0,21
e9	<-->	e1	8,00	-0,24
e9	<-->	e3	13,50	0,26
e10	<-->	e1	4,97	-0,16
e10	<-->	e5	5,96	0,16
e11	<-->	e20	4,83	0,12
e11	<-->	e1	8,90	-0,42
e11	<-->	e2	4,17	-0,20
e11	<-->	e8	6,77	-0,27
e11	<-->	e10	5,11	0,20
e17	<-->	e20	4,78	0,12
e17	<-->	e6	7,70	0,39
e12	<-->	e1	4,19	0,17
e12	<-->	e2	7,05	0,16
e12	<-->	e3	8,77	-0,21
e12	<-->	e5	6,19	0,20
e13	<-->	e8	9,21	0,30
e13	<-->	e12	4,83	0,23

			M.I.	Par Change
e14	<-->	e2	8,44	-0,17
e14	<-->	e4	9,48	0,20
e15	<-->	e4	8,53	0,17
e15	<-->	e11	6,86	0,24
e15	<-->	e12	6,27	-0,14
e16	<-->	e20	6,68	0,14
e16	<-->	e5	6,95	0,35
e16	<-->	e11	22,18	0,84
e16	<-->	e17	11,99	0,63
e16	<-->	e13	4,26	0,35
e16	<-->	e15	4,26	0,19

Table 97: Parameter estimates for the overall work engagement model

Regression weight			Estimate	S.E.	C.R.	P
Vigour	<---	WorkEngagement	1			
Dedication	<---	WorkEngagement	1,498	0,221	6,777	***
Absorption	<---	WorkEngagement	1,308	0,207	6,327	***
WE14	<---	Absorption	0,794	0,145	5,477	***
WE11	<---	Absorption	1,105	0,108	10,201	***
WE9	<---	Absorption	1,052	0,111	9,474	***
WE6	<---	Absorption	1,003	0,148	6,795	***
WE3	<---	Absorption	1			
WE16	<---	Absorption	0,784	0,149	5,272	***
WE13	<---	Dedication	0,925	0,124	7,455	***
WE10	<---	Dedication	1,055	0,078	13,609	***
WE7	<---	Dedication	1,365	0,096	14,194	***
WE5	<---	Dedication	1,094	0,086	12,681	***
WE2	<---	Dedication	1			
WE17	<---	Vigour	1			
WE15	<---	Vigour	1,239	0,18	6,886	***
WE12	<---	Vigour	1,204	0,196	6,148	***

WE8	<---	Vigour	1,769	0,266	6,661	***
WE4	<---	Vigour	1,573	0,234	6,73	***
WE1	<---	Vigour	1,457	0,24	6,082	***

Standardised regression weight

Vigour	<---	WorkEngagement	0,988
Dedication	<---	WorkEngagement	1,007
Absorption	<---	WorkEngagement	1,003
WE14	<---	Absorption	0,404
WE11	<---	Absorption	0,773
WE9	<---	Absorption	0,714
WE6	<---	Absorption	0,504
WE3	<---	Absorption	0,687
WE16	<---	Absorption	0,389
WE13	<---	Dedication	0,509
WE10	<---	Dedication	0,815
WE7	<---	Dedication	0,838
WE5	<---	Dedication	0,776
WE2	<---	Dedication	0,82
WE17	<---	Vigour	0,474
WE15	<---	Vigour	0,562
WE12	<---	Vigour	0,644
WE8	<---	Vigour	0,77
WE4	<---	Vigour	0,79
WE1	<---	Vigour	0,63

PCQ-24

Table 98: Parameter estimates for the overall PsyCap model

Regression weight			Estimate	S.E.	C.R.	P
Efficacy	<---	PsyCap	1			
Hope	<---	PsyCap	1,113	0,177	6,29	***
Resilience	<---	PsyCap	0,954	0,172	5,544	***
Optimism	<---	PsyCap	1,235	0,205	6,03	***
PC24	<---	Optimism	1			
PC22	<---	Optimism	0,767	0,11	6,977	***
PC21	<---	Optimism	1,156	0,12	9,637	***
PC19	<---	Optimism	0,984	0,117	8,387	***
PC18	<---	Resilience	1			
PC15	<---	Resilience	0,722	0,144	5,017	***
PC14	<---	Resilience	1,035	0,164	6,3	***
PC16	<---	Resilience	0,967	0,184	5,257	***
PC17	<---	Resilience	1,185	0,2	5,935	***
PC12	<---	Hope	1			
PC11	<---	Hope	1,132	0,123	9,235	***
PC10	<---	Hope	0,954	0,132	7,218	***
PC9	<---	Hope	0,717	0,117	6,129	***
PC8	<---	Hope	1,157	0,124	9,318	***
PC7	<---	Hope	0,718	0,138	5,192	***
PC6	<---	Efficacy	1			
PC5	<---	Efficacy	1,039	0,166	6,26	***
PC4	<---	Efficacy	1,137	0,134	8,458	***
PC3	<---	Efficacy	1,188	0,143	8,299	***
PC2	<---	Efficacy	1,249	0,149	8,38	***
PC1	<---	Efficacy	1,086	0,148	7,36	***
Standardised regression weight						
Efficacy	<---	PsyCap	0,784			
Hope	<---	PsyCap	0,868			
Resilience	<---	PsyCap	0,852			

Optimism	<---	PsyCap	0,811
PC24	<---	Optimism	0,655
PC22	<---	Optimism	0,567
PC21	<---	Optimism	0,885
PC19	<---	Optimism	0,704
PC18	<---	Resilience	0,573
PC15	<---	Resilience	0,455
PC14	<---	Resilience	0,642
PC16	<---	Resilience	0,485
PC17	<---	Resilience	0,696
PC12	<---	Hope	0,678
PC11	<---	Hope	0,772
PC10	<---	Hope	0,58
PC9	<---	Hope	0,486
PC8	<---	Hope	0,782
PC7	<---	Hope	0,408
PC6	<---	Efficacy	0,62
PC5	<---	Efficacy	0,521
PC4	<---	Efficacy	0,771
PC3	<---	Efficacy	0,749
PC2	<---	Efficacy	0,76
PC1	<---	Efficacy	0,636

ALQ

Table 99: Parameter estimates for the overall authentic leadership model

Regression weight			Estimate	S.E.	C.R.	P
Transparency	<---	ALQ	1			
SelfAwareness	<---	ALQ	0,87	0,106	8,198	***
EthicalMoral	<---	ALQ	1,213	0,112	10,787	***
BalancedProcessing	<---	ALQ	1,157	0,108	10,745	***
AL14	<---	BalancedProcessing	0,944	0,072	13,046	***
AL15	<---	BalancedProcessing	0,934	0,067	13,844	***
AL16	<---	BalancedProcessing	1			
AL13	<---	EthicalMoral	1			
AL12	<---	EthicalMoral	1,054	0,072	14,614	***
AL11	<---	EthicalMoral	1,037	0,073	14,112	***
AL10	<---	EthicalMoral	0,668	0,072	9,306	***
AL4	<---	SelfAwareness	1			
AL3	<---	SelfAwareness	1,174	0,13	9,038	***
AL2	<---	SelfAwareness	1,154	0,141	8,201	***
AL1	<---	SelfAwareness	0,973	0,111	8,762	***
AL8	<---	Transparency	1			
AL7	<---	Transparency	0,937	0,084	11,206	***
AL6	<---	Transparency	0,856	0,087	9,854	***
AL5	<---	Transparency	0,572	0,089	6,448	***
AL9	<---	Transparency	0,837	0,08	10,484	***
Standardised regression weight						
Transparency	<---	ALQ	0,86			
SelfAwareness	<---	ALQ	0,916			
EthicalMoral	<---	ALQ	0,997			
BalancedProcessing	<---	ALQ	0,956			
AL14	<---	BalancedProcessing	0,789			
AL15	<---	BalancedProcessing	0,821			
AL16	<---	BalancedProcessing	0,84			
AL13	<---	EthicalMoral	0,819			

Regression weight			Estimate	S.E.	C.R.	P
AL12	<---	EthicalMoral	0,86			
AL11	<---	EthicalMoral	0,841			
AL10	<---	EthicalMoral	0,617			
AL4	<---	SelfAwareness	0,652			
AL3	<---	SelfAwareness	0,771			
AL2	<---	SelfAwareness	0,763			
AL1	<---	SelfAwareness	0,74			
AL8	<---	Transparency	0,8			
AL7	<---	Transparency	0,762			
AL6	<---	Transparency	0,684			
AL5	<---	Transparency	0,469			
AL9	<---	Transparency	0,721			

APPENDIX G: ANOVA

AGE

Table 100: Test of homogeneity of variances based on the mean for the age category

	Levene Statistic	df1	df2	Sig.
Self-Awareness	3,894	2	195	0,022
Transparency	3,598	2	195	0,029
Ethical/Moral	2,554	2	195	0,08
Balanced Processing	1,505	2	195	0,225
Authentic Leadership	4,07	2	195	0,019
Self-Efficacy	6,445	2	195	0,002
Hope	3,412	2	195	0,035
Resilience	0,403	2	195	0,669
Optimism	0,361	2	195	0,697
PsyCap	1,456	2	195	0,236
Vigour	0,823	2	195	0,441
Dedication	0,836	2	195	0,435
Absorption	1,072	2	195	0,344
WorkEngagement	0,321	2	195	0,726
Safety Compliance	0,009	2	195	0,991
Safety Participation	1,828	2	195	0,163
Safety Behaviour	1,235	2	195	0,293

Table 101: Welch robust tests of equality of means for the age category

		Statistica	df1	df2	Sig.
Self-Awareness	Welch	0,288	2	62,801	0,751
Transparency	Welch	0,228	2	66,664	0,796
Ethical/Moral	Welch	0,638	2	61,323	0,532
Authentic Leadership	Welch	0,173	2	63,877	0,841
Self-Efficacy	Welch	0,186	2	62,088	0,831
Hope	Welch	1,675	2	67,117	0,195

POPULATION GROUP

Table 102: Test of homogeneity of variances based on the mean for the population group category

	Levene Statistic	df1	df2	Sig.
Self-Awareness	5,019	4	193	0,001
Transparency	2,824	4	193	0,026
Ethical/Moral	4,653	4	193	0,001
Balanced Processing	4,105	4	193	0,003
Authentic Leadership	3,285	4	193	0,012
Self-Efficacy	6,169	4	193	0
Hope	4,265	4	193	0,002
Resilience	3,934	4	193	0,004
Optimism	1,047	4	193	0,384
PsyCap	2,875	4	193	0,024
Vigour	9,712	4	193	0
Dedication	8,621	4	193	0
Absorption	4,709	4	193	0,001
Work Engagement	9,888	4	193	0
Safety Compliance	8,722	4	193	0
Safety Participation	1,216	4	193	0,305
Safety Behaviour	4,742	4	193	0,001

Table 103: ANOVA table for the population group category

		Sum of Squares	df	Mean Square	F	Sig.
Optimism	Between Groups	8,488	4	2,122	1,66	0,16
	Within Groups	246,226	193	1,276		
	Total	254,714	197			
Safety Participation	Between Groups	1,229	4	0,307	0,13	0,97
	Within Groups	448,849	193	2,326		
	Total	450,079	197			

Table 104: Welch robust tests of equality of means for the population group category

		Statistica	df1	df2	Sig.
Self-Awareness	Welch	8,822	4	36,923	0
Transparency	Welch	8,174	4	36,441	0
Ethical/Moral	Welch	7,117	4	37,745	0
Balanced Processing	Welch	5,033	4	37,945	0,002
Authentic Leadership	Welch	8,947	4	37,085	0
Self-Efficacy	Welch	4,57	4	35,993	0,004
Hope	Welch	2,376	4	39,024	0,069
Resilience	Welch	1,895	4	36,597	0,132
PsyCap	Welch	2,196	4	36,46	0,089
Vigour	Welch	2,276	4	37,143	0,079
Dedication	Welch	5,011	4	36,903	0,003
Absorption	Welch	3,942	4	37,404	0,009
Work Engagement	Welch	4,087	4	36,662	0,008
Safety Compliance	Welch	1,924	4	37,429	0,127
Safety Behaviour	Welch	0,357	4	37,122	0,837

TITLE

Table 105: Test of homogeneity of variances based on the mean for the title category

	Levene Statistic	df1	df2	Sig.
Self-Awareness	1,907	3	194	0,13
Transparency	2,983	3	194	0,032
Ethical/Moral	3,738	3	194	0,012
Balanced Processing	1,835	3	194	0,142
Authentic Leadership	2,208	3	194	0,088
Self-Efficacy	5,122	3	194	0,002
Hope	3,487	3	194	0,017
Resilience	4,071	3	194	0,008
Optimism	4,009	3	194	0,008
PsyCap	4,252	3	194	0,006
Vigour	8,357	3	194	0
Dedication	8,825	3	194	0
Absorption	6,759	3	194	0
Work Engagement	10,04	3	194	0
Safety Compliance	2,274	3	194	0,081
Safety Participation	3,67	3	194	0,013
Safety Behaviour	3,891	3	194	0,01

Table 106: ANOVA for the title category

		Sum of Squares	df	Mean Square	F	Sig.
Self-Awareness	Between Groups	24,958	3	8,319	3,85	0,01
	Within Groups	419,227	194	2,161		
	Total	444,185	197			
Balanced Processing	Between Groups	45,5	3	15,167	5,492	0,001
	Within Groups	535,75	194	2,762		
	Total	581,25	197			
	Between Groups	39,121	3	13,04	7,049	0

Authentic leadership	Within Groups	358,883	194	1,85		
	Total	398,004	197			
Safety Compliance	Between Groups	2,971	3	0,99	0,649	0,584
	Within Groups	296,01	194	1,526		
	Total	298,981	197			

Table 107: Welch robust tests of equality of means for the title category

		Statistica	df1	df2	Sig.
Transparency	Welch	10,859	3	38,436	0
Ethical/Moral	Welch	8,38	3	37,332	0
Self-Efficacy	Welch	6,63	3	41,846	0,001
Hope	Welch	1,845	3	39,201	0,155
Resilience	Welch	4,523	3	44,211	0,008
Optimism	Welch	2,603	3	40,693	0,065
PsyCap	Welch	4,412	3	43,272	0,009
Vigour	Welch	2,885	3	41,085	0,047
Dedication	Welch	5,628	3	42,584	0,002
Absorption	Welch	8,052	3	40,636	0
Work Engagement	Welch	6,179	3	42,993	0,001
Safety Participation	Welch	2,079	3	39,64	0,118
Safety Behaviour	Welch	2,418	3	40,851	0,08

TENURE

Table 108: Test of homogeneity of variances based on the mean for the tenure category

	Levene Statistic	df1	df2	Sig.
Self-Awareness	6,76	3	194	0
Transparency	1,133	3	194	0,337
Ethical/Moral	2,471	3	194	0,063
Balanced Processing	0,798	3	194	0,496
Authentic Leadership	2,324	3	194	0,076
Self-Efficacy	3,097	3	194	0,028
Hope	1,077	3	194	0,36
Resilience	4,267	3	194	0,006
Optimism	1,321	3	194	0,269
PsyCap	2,439	3	194	0,066
Vigour	0,486	3	194	0,692
Dedication	0,306	3	194	0,821
Absorption	0,217	3	194	0,885
Work Engagement	0,076	3	194	0,973
Safety Compliance	1,379	3	194	0,251
Safety Participation	0,429	3	194	0,732
Safety Behaviour	0,748	3	194	0,525

Table 109: ANOVA table for the tenure category

		Sum of Squares	df	Mean Square	F	Sig.
Transparency	Between Groups	12,877	3	4,292	2,04	0,11
	Within Groups	408,434	194	2,105		
	Total	421,311	197			
Ethical/Moral	Between Groups	25,916	3	8,639	3,30	0,02
	Within Groups	508,018	194	2,619		
	Total	533,935	197			
	Between Groups	13,395	3	4,465	1,53	0,21

Balanced	Within Groups	567,855	194	2,927		
Processing	Total	581,25	197			
Authentic	Between Groups	19,591	3	6,53	3,35	0,02
Leadership	Within Groups	378,414	194	1,951		
	Total	398,004	197			
Hope	Between Groups	2,799	3	0,933	1,11	0,35
	Within Groups	163,299	194	0,842		
	Total	166,099	197			
Optimism	Between Groups	2,545	3	0,848	0,65	0,58
	Within Groups	252,169	194	1,3		
	Total	254,714	197			
PsyCap	Between Groups	3,459	3	1,153	1,83	0,14
	Within Groups	122,185	194	0,63		
	Total	125,644	197			
Vigour	Between Groups	1,831	3	0,61	0,54	0,65
	Within Groups	217,685	194	1,122		
	Total	219,516	197			
Dedication	Between Groups	5,159	3	1,72	1,24	0,30
	Within Groups	269,381	194	1,389		
	Total	274,54	197			
Absorption	Between Groups	6,494	3	2,165	2,06	0,11
	Within Groups	204,279	194	1,053		
	Total	210,773	197			
Work	Between Groups	3,977	3	1,326	1,32	0,27
Engagement	Within Groups	194,903	194	1,005		
	Total	198,88	197			
Safety	Between Groups	3,34	3	1,113	0,73	0,54
Compliance	Within Groups	295,641	194	1,524		
	Total	298,981	197			
Safety	Between Groups	12,091	3	4,03	1,79	0,15
Participation	Within Groups	437,988	194	2,258		
	Total	450,079	197			

Safety	Between Groups	6,049	3	2,016	1,30	0,28
Behaviour	Within Groups	300,415	194	1,549		
	Total	306,464	197			

Table 110: Welch robust tests of equality of means for the tenure category

		Statistica	df1	df2	Sig.
Self-Awareness	Welch	9,283	3	83,252	0
Self-Efficacy	Welch	4,377	3	82,78	0,007
Resilience	Welch	1,91	3	76,695	0,135

LOCATION

Table 111: Test of homogeneity of variances based on the mean for the location category

	Levene Statistic	df1	df2	Sig.
Self-Awareness	3,332	2	195	0,04
Transparency	2,568	2	195	0,08
Ethical/Moral	1,487	2	195	0,23
Balanced Processing	0,511	2	195	0,60
Authentic Leadership	1,885	2	195	0,16
Self-Efficacy	11,534	2	195	0,00
Hope	1,098	2	195	0,34
Resilience	4,04	2	195	0,02
Optimism	0,341	2	195	0,71
PsyCap	3,663	2	195	0,03
Vigour	1,638	2	195	0,20
Dedication	5,235	2	195	0,01
Absorption	2,751	2	195	0,07
Work Engagement	3,782	2	195	0,02
Safety Compliance	10,344	2	195	0,00
Safety Participation	1,145	2	195	0,32
Safety Behaviour	3,711	2	195	0,03

Table 112: ANOVA table for the location category

		Sum of Squares	df	Mean Square	F	Sig.
Transparency	Between Groups	27,824	2	13,912	6,89	0,00
	Within Groups	393,487	195	2,018		
	Total	421,311	197			
Ethical/Moral	Between Groups	25,75	2	12,875	4,94	0,01
	Within Groups	508,185	195	2,606		
	Total	533,935	197			
Balanced Processing	Between Groups	18,529	2	9,264	3,21	0,04

	Within Groups	562,721	195	2,886	
	Total	581,25	197		
Authentic Leadership	Between Groups	29,163	2	14,581	7,71 0,00
	Within Groups	368,842	195	1,891	
	Total	398,004	197		
Hope	Between Groups	2,496	2	1,248	1,49 0,23
	Within Groups	163,603	195	0,839	
	Total	166,099	197		
Optimism	Between Groups	0,203	2	0,102	0,08 0,93
	Within Groups	254,511	195	1,305	
	Total	254,714	197		
Vigour	Between Groups	3,235	2	1,617	1,46 0,24
	Within Groups	216,282	195	1,109	
	Total	219,516	197		
Absorption	Between Groups	8,38	2	4,19	4,04 0,02
	Within Groups	202,393	195	1,038	
	Total	210,773	197		
Safety Participation	Between Groups	3,167	2	1,583	0,69 0,50
	Within Groups	446,912	195	2,292	
	Total	450,079	197		

Table 113: Welch robust tests of equality of means for the location category

		Statistica	df1	df2	Sig.
Self_Awareness	Welch	11,891	2	58,92	0,00
Efficacy	Welch	5,297	2	53,132	0,01
Resilience	Welch	2,509	2	54,899	0,09
PsyCap	Welch	2,606	2	54,972	0,08
Dedication	Welch	3,793	2	60,144	0,03
WorkEngagement	Welch	3,336	2	58,251	0,04
Safety_Compliance	Welch	5,089	2	54,041	0,01
Safety_Behaviour	Welch	2,764	2	57,597	0,07

APPENDIX H: TURNITIN REPORT

