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Determinants of team resilience

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ABSTRACT

The business environment is inherently subjected to adverse events that jeopardise its effectiveness, functionality, and advancement, necessitating an ever-broadening understanding how to overcome these events. To this end the phenomena of resilience is instructive. With organisations relying on team-based work arrangements to achieve the organisational goals, understanding how to overcome adversity at a team level is of particular interest. However, research in the field of team resilience remains limited.

Considering the importance of team resilience, this research investigates the determinants of team resilience using the Stoverink et al. (2020) conceptual model. The model identified team potency, team capacity to improvise, team mental model of teamwork and team psychological safety as factors of team resilience.

An online questionnaire was utilised to obtain data from individuals who are required to work together to achieve an organisational goal. The research employed a cross-sectional time horizon which resulted in a sample size of 220. Through multiple regression, it was determined that team potency, capacity to improvise and team mental model of teamwork are statistically significant determinants of team resilience. This research offers valuable insights on the determinants of team resilience that may add value to the business environment on improving a team's resilience.

Keywords

Team resilience, team potency, team capacity to improvise, team mental model of teamwork, team psychological safety

Plagiarism Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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CHAPTER ONE: INTRODUCTION TO RESEARCH PROBLEM

1 Introduction

The intention of Chapter One is to identify the research need that exists in the domain of team resilience. The chapter conveys the context and underlying background for this research and thereafter explores the research problem identified. Following that, the chapter details the purpose of research, and its significance to both a theoretical and business perspective.

1.1 Research background

The business environment is exposed to volatility, uncertainty, complexity and ambiguity (VUCA), which presents itself as adverse events. The severity of adverse events may range from minor to major disruptions (Hartwig et al., 2020), and may vary in terms of duration (Scholten et al., 2020). An example of a minor event may take the shape of a setback in a project, or the loss of an employee. Whilst the Covid-19 outbreak constituted an example of a major worldwide event that had devastating impact upon countries, organisations, and individuals alike, with long-term ramifications (Kuntz, 2021). More recently, the Russia-Ukraine war has had a significant impact due to global macroeconomic and sociopolitical interconnectedness (Cumming, 2022). In future, changes in legislative requirement to address climate change would require organisations to adapt in order to respond to these challenges (Çop et al., 2021). Whilst some of these changes or challenges are able to be pre-empted (e.g., changes to address climate change), others remain uncertain and unexpected. These uncertain and unexpected events are not isolated to a specific country, location, or industry, but are prevalent across a multitude of areas.

Seeing that organisations are implicitly subjected to adverse events that jeopardise their effectiveness, functionality, and advancement (Chapman et al., 2020), managers are increasingly interested in understanding how to overcome these events (Vera et al., 2017). The ability to overcome an adverse event determines if an organisation will survive or collapse (Vera et al., 2017). This ability can be understood by the term resilience (Hartwig et al., 2020). Although there are other constructs similar to resilience, of which adaptability, coping, and adjustment are some examples (Raetze et al., 2022), resilience is distinct.

Resilience indicates an ability to “recoil”, “bounce back”, “rebound” or “jump back” (Klein et al., 2003; Raetze et al., 2022). The concept dates back to the 1970s (Chapman et al., 2020), however it is only recently that research in resilience has gained traction, primarily focusing on an individual and organisational level, to gain insight into overcoming adverse events (Raetze et al., 2022). Teams are also exposed to adversity, and hence are not immune to it (Adler et al., 2022), however extant research on team resilience remains less prevalent (Chapman et al., 2020).

Team-based work arrangements have become more common and are increasingly being included in organisational structures as a crucial component of organisational performance (Degbey & Einola, 2020; West et al., 2009). Therefore, individuals within an organisation are required to work interdependently within teams to attain a given goal (Chapman et al., 2020; Sundstrom et al., 1990).

The collective interactions, experiences and skills that exist between members in a team (Pavez et al., 2021) can increase the performance of an individual (Chapman et al., 2020; Park et al., 2020). However, this collective expertise could also hinder the team’s performance, due to arguments that may arise (Stoverink et al., 2020), or could hinder how efficiently and effectively a team can agree on a decision. Furthermore, a team’s resilience is influenced by the individual’s characteristics that existed before the individual joining the team, as well as the relationships and connections that are established as a result of being a member of the team (Gucciardi et al., 2018). Hence, having resilient individuals in a team does not necessarily translate into a resilient team (Stoverink et al., 2020). Similarly, having a resilient organisation does not imply a resilient team (Stoverink et al., 2020). This can be explained through the heterogenous manner in which the various teams experience and respond to adverse events (Bui et al., 2019) and the faster decision making of a team as compared to an organisation, thereby emphasising the difference between the levels (Stoverink et al., 2020).

Hence, the meso-level of a team ought to be distinguished from the individual and an organisational level. Furthermore, seeing that teams are not immune to adverse events (Adler et al., 2022), there is a need to understand what capabilities are required by the team to overcome adversity through the phenomena of team resilience (Bowers et al., 2017). As a result, understanding the combined ability of a team to overcome adversity through team resilience is important (Chapman et al., 2020).

1.2 Research problem

Whilst understanding a phenomena from a multilevel perspective is normally developed from an individual level upwards (Chan, 2019), this is not the case with resilience research, where an understanding of both the individual and organisational level were developed simultaneously (Raetze et al., 2022). As a result, studies on team resilience is less prevalent (Chapman et al., 2020), highlighting the requirement to further understand the phenomena of resilience at the team level.

Due to team resilience being at its nascent stages, there have been varying definitions of the nature of the phenomena (Raetze et al., 2022). Raetze et al. (2022) recognise that this diversity of definitions can pose challenges, but maintain that it helps to a more in-depth understanding of the phenomenon. These definitions can be articulated through the "input, process, output (I-P-O)" model, which can be used to identify team resilience as a capacity or the input, mediator or the process, or an outcome (result) respectively (Chapman et al., 2020). Leveraging of the I-P-O model, conceptual models have been proposed to provide a framework for team resilience.

Researchers who indicate that the phenomena exists as a result of the behaviours, abilities, and processes, refers to a team's resilient state an "outcome" (Gucciardi et al., 2018). The model suggested by Gucciardi et al. (2018) identifies that a given phenomenon results from the individual's resources, interactions between the members over time, and emergent processes that enables coordination that results in an outcome of a resilient team.

However, the analysis of past research shows that a substantial percentage of work in the field of resilience is centred around resilience as being a capacity or as a process, with less research on resilience as an outcome in teams (Raetze et al., 2022). An example of a conceptual model that defines team resilience as a mediating role (process) is the model suggested by Hartmann et al. (2020). The conceptual framework considers team resilience as a mediator that influences a team's emotions, interpersonal processes, as well as performance and behaviours (Hartmann et al., 2020).

Alternatively, researchers who conceptualise team resilience as the capability to recover identify the ability to recover as an outcome (Bryman & King, 2021). A team's capability to do so is based on an emergent state (Bryman & King, 2021), implying that there are certain determinants required to enable a team to be resilient (Varajão

et al., 2021). Seeing that a majority of previous research has identified team resilience as a capacity, various conceptual models have been devised. These models vary in terms of the determinants of team resilience as well as the level of interactions and influence on the phenomena that they explain. Whilst the I-P-O model is a basis for these models, Bowers et al. (2017) and Hartwig et al. (2020) argue that the I-P-O framework lacks consideration of the dynamic complexities of team behaviours, and hence, propose the "Input-Mediator-Output-Input (I-M-O-I)" framework.

Bowers et al. (2017) refer to a team's resilience as a "second-order emergent state" in their proposed conceptual model, which asserts that team resilience is the result of the combined effects of other emergent properties. The model considers a holistic perspective on team resilience, which result in team emergent states (Bowers et al., 2017). The model considers influencing factors on the individual level (e.g., optimism, task focus, patience), team level (e.g., trust, assertiveness), and at the organisational level (e.g., diffused power) (Bowers et al., 2017). Similarly, Hartwig et al.'s (2020) conceptual model indicates contextual factors (such as transformational leadership), team factors (e.g., team culture) and individual factors (communication skills, resilience) as inputs. These inputs result in a team state that enable team resilience. Some of these states include cohesion, psychological safety, and trust (Bowers et al., 2017; Hartwig et al., 2020). Both of the conceptual models, which conclude that team resilience results in maintaining performance, reduction of errors, the desire to remain (Bowers et al., 2017), health, and team functioning (Hartwig et al., 2020), were developed based on a systematic literature review of past work in team resilience.

Contrary to the other conceptual models available, the conceptual model proposed by Stoverink et al. (2020) consider team resilience as a capacity, and is of particular interest due to its basis on which it was developed. Stoverink et al. (2020) leverage Wieck's (1993) taxonomy of organisational resilience as a basis for their model. Duchek (2020) emphasises Wieck's (1993) taxonomy of organisational resilience as one of the first and most important concepts used across studies related to organisational resilience. Weick's (1993) taxonomy was based on the 1949 Mann Gulch fire disaster, where the situation was analysed to understand what went wrong, and thereafter was used to evaluate what capabilities would have been required for an organisation to overcome the unexpected event. Weick's (1993) taxonomy

identified four sources required for organisational resilience, namely “attitude of wisdom”, “improvision and bricolage”, “virtual role systems”, and “respectful interactions” on an organisational level. Even though there may be similarities of constructs across the various levels (Raetze et al., 2022), it is argued that on a team level, there are stronger interdependencies as compared to an organisational level (Stoverink et al., 2020). Hence Stoverink et al. (2020) argues that Weick’s (1993) taxonomy would present itself as “team potency”, “team capacity to improvise”, “team mental model of teamwork”, and “team psychological safety” on the team level.

Although there are overlaps in terms of the input factors for the various conceptual models, there is no unanimous agreement on a unified conceptual framework for team resilience (Hartwig et al., 2020). Regardless, it is emphasised by Gucciardi et al. (2018) that conceptual models provide a basis for empirical testing. However, Hartwig et al. (2020) indicate that conceptual models lack empirical testing and therefore call for the empirical testing on team resilience. This is corroborated by Raetze et al. (2022), who indicate that there has also been a call for researchers to delve deeper into understanding those factors that contribute to resilience via quantitative approaches. Furthermore, Hartwig et al. (2020) specify that researchers should also consider including those factors that are more powerful, enabling team resilience. This suggests that, whilst there are theories on the factors related to team resilience, there is still lack of research in terms of testing and evaluating of these factors.

Therefore, this research will determine the factors of team resilience to address the gap in literature. This will be achieved by leveraging the conceptual model developed by Stoverink et al. (2020) considering two reasons, namely: (1) that the Weick’s (1993) taxonomy has been an important model used in the understanding of organisational resilience; and (2) considering that there are construct similarities across the various levels (individual, team and organisational) (Raetze et al., 2022) would imply that Weick’s (1993) taxonomy adapted for the team level could be relevant. This provides the reason for selecting the Stoverink et al. (2020) conceptual model as a model to evaluate the factors of team resilience.

1.3 Research purpose

Considering the fact that research on team resilience is at its nascent stages, there is a lack of testing of team resilience conceptual models and there has been a call

from researchers to delve deeper into identifying which factors contribute to team resilience (Raetze et al., 2022). Therefore, by focusing on this requirement, this research seeks to broaden the understanding of team resilience.

This research will contribute by applying Stoverink et al.'s (2020) model to understand the factors that influence team resilience. Consequently, this research question addressed is: "What are the determinants of team resilience?" The research will investigate the following determinants of team resilience as per Stoverink et al.'s (2020) conceptual model: team potency, team capacity to improvise, team mental model of teamwork, and team psychological safety.

1.4 Theoretical relevance of the research

The lack of testing of the conceptual models developed by researchers in the field of team resilience has been highlighted as a limitation (Stoverink et al., 2020). Therefore, there has been a call for researchers to consider quantitative approaches to delve deeper into understanding the factors that contribute towards resilience (Raetze et al., 2022).

This research will contribute to the current knowledge base on team resilience by evaluating the factors identified in Stoverink et al.'s (2020) conceptual model. The primary objective is to advance knowledge in this subject by integrating theory and practice by collecting and evaluating quantitative evidence for the proposed model. Furthermore, the testing of the model will allow the refinement of the model to be further developed based on the outcomes. This research will provide a tested conceptual model on which other researchers can expand for other purposes.

1.5 Business relevance of the research

Tasks are frequently performed by teams through which the actions of an organisation is achieved (Degbey & Einola, 2020; King et al., 2023). Teams are inevitably exposed to adverse events that impact their performance (Adler et al., 2022). The importance of understanding how to overcome adversity can be the result of an organisation surviving or collapsing (Vera et al., 2017). As a result, managers are becoming more concerned about the future of an organisation, especially during downturns, and hence, are becoming more interested in how to develop teams that are resilient to these changes (Vera et al., 2017).

Consequently, this study can have major implications for organisations and team leaders or managers by providing insights into understanding what team capabilities are required to be developed in order to better equip their teams to respond to adverse events. In doing so, this will enable managers to empower their team in maintaining their performance, health, and the functioning of the team (Hartwig et al., 2020), especially in adverse situations.

CHAPTER TWO: LITERATURE REVIEW

2 Introduction

The research gap in the field of team resilience was identified in the first chapter, resulting in the research question of the determinants of team resilience. To address the research question, the study sought to investigate the following determinants of team resilience, as per Stoverink et al.'s (2020) conceptual model, namely: team potency, team capacity to improvise, team mental model of teamwork, and team psychological safety.

Building on the first chapter, this chapter intends to provide a summary of prior research on the topic of team resilience. The literature review details the evolution of resilience; distinguishes a team from the individual and an organisational level; differentiates team resilience from team adaptability; identifies the attributes and types of team resilience; and thereafter identifies the various team resilience conceptual models and the reason for selecting the Stoverink et al. (2020) conceptual model. Afterwards, the literature will focus on the Stoverink et al. (2020) conceptual model by firstly discussing the Weick's (1993) taxonomy, which was the basis for the Stoverink et al. (2020) model, the theory which underpins the Stoverink et al. (2020) conceptual model and thereafter the justification of the constructs proposed by the Stoverink et al. (2020).

2.1 History of resilience

The word resilience denotes an ability to "recoil", "bounce back", "rebound" or "jump back" (Klein et al., 2003; Raetze et al., 2022). Therefore, resilience research focuses on an entities ability to positively overcome an adverse event or challenge (Raetze et al., 2022). In contrast, the lack of an ability to rebound is defined as brittleness, where the impact of the adverse event leaves the subject in a vulnerable state (Barton & Kahn, 2019).

Originally, resilience was used in a scientific context to describe the properties of material that could sustain external pressures without breaking (Barton & Khan, 2019). However, in the 1970s, this concept was metaphorically adapted to explain what resilience is by exploring the experiences of individuals subjected to adverse events such as trauma and disaster (Chapman et al., 2020). Individuals who were

able to bounce back or for whom there was a lack of an adverse impact, were classified as resilient individuals (Chapman et al., 2020). In the 1980s and 1990s, the focus transitioned to understanding 'how' resilience was developed by exploring the individual's traits in relation to their environment (such as family and extended social systems) and comprehending the facets of building resilience, as well as the impact of cross-level interactions on resilience (Chapman et al., 2020). During this period, focus was placed on individuals who worked in challenging work environments, with limited research on understanding how an organisation can overcome an adverse event (Raetze et al., 2022). Although there was limited research on organisational resilience, work that was done in this area leveraged Wieck's (1993) Mann Gulch fire case study to assist in identifying sources of resilience (Raetze et al., 2022).

The initial years of research in the field of resilience was mainly at an individual level. However, interest in understanding an organisation's resilience was sparked by the global financial crisis, which started in 2007 (Raetze et al., 2022). This event significantly increased the amount of publications in organisational resilience with 160 new papers published on this topic during a five year period (Raetze et al., 2022).

However, based on the systematic literature review conducted by Raetze et al. (2022), approximately fifty percent of the published literature identified as part of the research sample was from 2017 to 2019. These publications contributed towards organisational resilience ,with an interest in entrepreneurial, multilevel interactions and team-based studies (Raetze et al., 2022). However, the proportion of resilience research available on the organisational and individual level exceeds that of research on resilience at the team level (Gucciardi et al., 2018).

Despite the phenomena of resilience dating back to the 1970s, understanding of the phenomena is still in its nascent stages (Raetze et al., 2022), in particular at a team level. As a result, investigating the determinants of team resilience will provide insight into what is required by a team to positively overcome adversity.

2.2 A multilevel perspective of resilience

Resilience occurs at an individual, team, and organisational level, and for this reason, it is a multilevel phenomenon. The understanding of a multilevel phenomenon is usually developed from an individual level upwards (Chan, 2019). However, this was not the case with resilience as majority of previous research has focused on

resilience on either an individual or an organisational level (Chapman et al., 2020). The statement is confirmed by Raetze et al. (2022), who observe that more than 78% of published articles related to resilience from 1982 to 2019 were focused on resilience at an individual and on the organisational levels. With the pervasiveness of teams within the business environment (Degbey & Einola, 2020; West et al., 2009), the value of understanding how to optimise the interactions between these individuals became apparent (Bryman & King, 2021; Chapman et al., 2020). This is particularly important when teamwork is critical in order to prevent negative consequences (Hartwig et al., 2020). Despite this, there exists limited research on resilience at a team level (Stoverink et al., 2020).

Whilst there are overlaps of resilience characteristics across the organisational, team and individual levels, there are also significant differences (Stoverink et al., 2020). These differences lie in the manner in which events unfold and how the various levels respond (Raetze et al., 2022). There is a consequent need to research resilience from a collective team perspective that has gained traction (Hartmann et al., 2021).

2.2.1 Individual versus team level distinction

Even though a team comprises of individuals, the presence of resilient individuals does not imply that the team is resilient (Stoverink et al., 2020). A resilient individual may be able to address an adversity successfully by themselves; however, in a team context, the individual's actions may be detrimental to the team (Gucciardi et al., 2018). This is due to the individual member having to collaborate and consider the collective team member's knowledge, skills, and capabilities in decision-making, which is different to an individual's considerations in an adverse event.

When compared to an individual, teams are interdependent, and hence, are reliant on one another (Stoverink et al., 2020). Teams consist of team members (individuals) who may have different skill sets, knowledge and experience (Pavez et al., 2021). The interactions, ties and variance in experiences between these team members can enhance an individual's capabilities, thus elevating the team's functioning and performance level (Chapman et al., 2020; Park et al., 2020). Moreover, dyadic interactions between individuals in a team influences the tendencies and aspirations of the individuals (Barton & Kahn, 2019). Therefore, a team's resilience is a product of the individual factors that existed prior to the creation of the team, as well as the

interactions and relationships that occurs as a result of being part of the team (Gucciardi et al., 2018).

In addition, teams are also required to collaborate during decision-making, contrasting from an individual's decision-making process (Stoverink et al., 2020). Whilst collaboration can enhance the outcome of the decision, this may also result in divergent views between team members which could create tension and arguments (Stoverink et al., 2020).

Hence, the contact, interactions, and collaboration required amongst team members in decision-making, and the collective knowledge, skill and experience contributed by a given individual are ways in which a team may be distinguished from an individual.

2.2.2 Organisational versus team level distinction

Organisational resilience or workplace resilience results from the agility and flexibility of the human resource management systems or processes (Bui et al., 2019; Lengnick-Hall et al., 2011). Systems such as managing of communication, psychological risk, and the training of teams and individuals are ways to increase organisational resilience (Kuntz, 2021). However, Stoverink et al. (2020) emphasise that a resilient organisation does not imply a resilient team. The reason for this is that different teams experience and react to adverse events in a variety of different ways (Bui et al., 2019), where there is no homogeneity in approach. Furthermore, when compared to the organisation, a team's faster decision-making ability with increased interdependency highlights the difference between these levels (Stoverink et al., 2020).

Hence, the heterogeneity of approach of a team and the quicker decision-making of a team differentiates it from the organisation.

2.2.3 Cross-level impacts

An additional element highlighted in literature is cross-level interactions, and their impact on resilience. For example, Vera et al. (2017) indicate that organisations implementing practices that includes training, adequate employee work-life balance, career opportunities, and communication, constitute some ways that can promote team resilience. Recent research indicates that the individual and organisational levels have an influence on a team's resilience. This can be noted in the research

by Bowers et al. (2017), in which a multilevel perspective of team resilience was suggested. Similarity, Hartwig et al. (2020) present a conceptual model that also considers these level as factors to team resilience. Understanding the phenomena from a multi-level perspective provides a broader perspective of what organisational and individual factors influence a team (Park et al., 2020; Kozlowski & Chao, 2018). This allows researchers to understand and analyse the interactions of the various levels on a team (Park et al., 2020; Kozlowski & Chao, 2018).

Whilst research in understanding the relationships between the different levels proves relevant, Raetze et al. (2022) indicate that a systematic method is required to understand the factors at the different levels. For this reason, seeing that team resilience is at its nascent stages, research concentrating on the team level is still needed.

2.3 Distinguishing team resilience from team adaptability

Raetze et al. (2022) identified twenty-six constructs, which are similar to resilience or used in conjunction with resilience, of which adaptability, coping, and adjustment are examples. These themes were evident across the various levels, whilst some were specific level (e.g., robustness was on an individual level).

Stoverink et al. (2020) indicate that adaptability displayed the construct with the most overlap, leading to a necessary distinction between team adaptability and team resilience. Team constructs can be distinguished by three points, namely: 1) the activity involved; 2) the measure of the outcome; and 3) the action required. This is discussed below.

The first distinction is related to the activity involved. Team adaptability is related to adapting to the change in the environment, whereas resilience is to recover from a change (Stoverink et al., 2020). Adapting is related to the changes in the processes and inputs, whereas resilience is focused on the outcome (Gucciardi et al., 2018).

The second distinction refers to the measure of the outcome. Seeing that team adaptability requires changes to the process or inputs, the measure used to evaluate this construct is based on changes made during or after an adverse event (Gucciardi et al., 2018). In contrast to adaptability, a team's performance prior to an adverse event can be compared to the performance post-adverse event, to measure resilience (Gucciardi et al., 2018).

The third distinction is that resilience requires a team to overcome an adverse event. Actions such as adaption may be required, however the team would still need to perform in order to overcome the event (Stoverink et al.,2020) In addition, team adaptability is a strategy required for a team to overcome adversity, hence may be considered as an input to the resilience (Stoverink et al.,2020).

Although team adaptability and team resilience are similar, the nature of the activity involved, the outcome measurement and the action required differs, thus highlighting the distinct nature of the two constructs.

2.4 Team resilience attributes

In defining team resilience, researchers have identified unique attributes of the phenomena (Chapman et al., 2020). There are two distinct attributes, namely an adverse event or setback experienced and to positively overcome the adverse event (Chapman et al., 2020).

2.4.1 An adverse event

A common attribute of team resilience is that it exists as the result of disturbance in the environment resulting in a challenge, adversity, or stress (Raetze et al., 2022). These events are discrete in nature, are defined by a start and end time (Schmutz et al., 2023) and are heterogenous to a team (King et al., 2023). The characteristic of an adverse event includes the source of the event, the form or nature of the adversity, and the extreme nature of or the event's relative degree of intensity.

An adverse event can result from an external or internal factor to the team. External adverse events are as a result of factors that originate outside the team (e.g., delays in logistics), which would require a team to take quick action (King et al., 2023). Internal team adversity arises from the team's operating environment (King et al., 2023). This internal team adversity may be acute or chronic in nature (Stoverink et al., 2020). Acute stressors are often sudden events that are normally of a high degree of intensity (e.g., team conflict), whilst chronic stressors occur over a prolonged timeframe (e.g., excessive workload of work, fatigue, or burnout) (Stoverink et al., 2020). Whilst an external adverse event does not necessarily trigger team adversity, if the team lacks experience, this may affect the severity of team adversity (King et al., 2023).

Depending on the industry, adversity can occur in three forms (Raetze et al., 2022). The first is a dynamic environment, in which there are no actual adverse events, however, the nature of the business environment is complex and ambiguous (Raetze et al., 2022). The second form is when there is an adverse event that could potentially hinder the team or organisation's performance (Raetze et al., 2022). The third takes place when there is actual damage to the team or organisation, known as a disruption (Raetze et al., 2022).

The degree of the extremeness of the adverse event may differ, and is influenced by the environment that a team operates in, the activities that the team is required to execute, and lastly, the consequences of the outcome (Schmutz et al., 2023). For example, a window cleaning team who are required to clean household homes would constitute a low degree of extremeness, as compared to a team required to clean windows on a skyscraper (Schmutz et al., 2023).

2.4.2 Positive outcome

The second attribute of resilience is that there is a positive outcome in maintaining performance after an adverse event (Chapman et al., 2020). This refers to the ability of a team to "bounce back" (Stoverink et al., 2020) or overcome the crisis (Chapman et al., 2020).

These positive outcomes are further classified into subcategories based on the pre- and post-performance of a team after an adverse event (Raetze et al., 2022). The first category is the resistance trajectory, where the performance of the team remains unaffected post the adverse event (Raetze et al., 2022). The recovery trajectory (second category) is one in which the team experiences the negative effects of the adverse event; however, is able to recover over time (Raetze et al., 2022). Gucciardi et al. (2018) elaborate that, in addition to the recovery trajectory, if a team can quickly recover from the adverse event, this is referred to as the bounce-back trajectory. The third trajectory is the thriving trajectory, in which a team grows when exposed to an adverse event (Raetze et al., 2022). Assessing the pre- and post-performance of a team can be evaluated through the measure of team performance. Team performance, which is a pragmatic measure to team resilience function, is measured through efficiency, quality, quantity, and effectiveness (Gucciardi et al., 2018).

2.5 Types of resilience

As identified, there are two features of team resilience, namely: 1) the presence of an adverse challenge or event; and 2) a team's ability to positively overcome the adverse event. These attributes are relevant for a range of contexts, and hence, relevant across a large spectrum of situations. This includes project teams (Pavez et al., 2021), within sales teams (Sharma et al., 2020), in virtual teams (Degbey & Einola, 2020), military (Chapman et al., 2021), supply chains (Scholten et al., 2020) and sports teams (Filho et al., 2022).

Even though adversity is a feature of resilience, it should be highlighted that a team does not necessarily need to undergo an adverse event in order to be resilient (Stoverink et al., 2020). A team can either be resilient, or they can have the capacity to demonstrate resilience (Stoverink et al., 2020). In order to demonstrate resilience, an adverse event is required so that the ability can be demonstrated, whilst being resilient implies a pro-active approach to avoid adverse events (Stoverink et al., 2020).

There are three different types of resilience, namely proactive resilience, development resilience, and reactive resilience (Raetze et al., 2022). Similarly, Stoverink et al. (2022) identifies that teams are required to be prepared (proactive resilience), detect (develop resilience), and strategise (reactive resilience).

2.5.1 Proactive resilience

The development of resilient resources and capabilities to prepare for a future adverse event is denoted as proactive resilience (Raetze et al., 2022). Proactive resilience reinforces reactive resilience, as confirmed by Jia et al. (2020). In order to develop proactive resilience, Stoverink et al. (2022) state that teams are required to practice identifying and troubleshooting various challenges whilst applying the concepts of the identified factors for team resilience (i.e., team potency, team improvisation, team mental model of team work, and team psychological safety).

2.5.2 Development resilience

Development resilience refers to the functional development of the phenomena, regardless of the presence of a risk or adverse event (Raetze et al., 2022). It is suggested that improving a team's ability to identify adverse events accurately and quickly, would require resilient teams to invest in resources (Stoverink et al., 2022).

Development resilience is considered to be the factor that protects a team by considering both internal and external resources required to ensure that a team can function (Raetze et al., 2022).

2.5.3 Reactive resilience

Reactive resilience refers to the immediate response to overcome an adverse event (Raetze et al., 2022). Reactive resilience is distinct, as it focuses on a short-term perspective, whilst development and proactive resilience focuses on a long-term perspective (Raetze et al., 2022). This resilience clearly shows how resources are employed to overcome a given event (Raetze et al., 2022). Furthermore, reactive resilience is enhanced through relational capital, which is the strength of the relationship between key partners (Jia et al., 2020).

2.6 Team resilience definition

Whilst the attributes of team resilience are defined, ambiguity remains in terms of the definition of resilience. Varajão et al. (2021) emphasise that context and scope are important to understand in order to define resilience. The field of resilience studies has shifted from an enduring trait to a dynamic process, which allows for scientist to hypothesise on the behaviours and the conditions leading to resilience (Bowers et al., 2017). Furthermore, a majority of the articles analysed through the systematic review by Raetze et al. (2022) point out that resilience is dynamic in nature. Due to the dynamism of the phenomena, there are various definitions of team resilience. These definitions include team resilience as a process, ability, outcome, belief or capacity depending on the disciplinary assessment and the context (Degbey & Einola, 2020; Raetze et al., 2022). A majority of extant research refers to resilience as at a capability or ability, followed by resilience being defined as a process and to a slighter extent resilience as an outcome (Raetze et al., 2022).

However, there is no agreement amongst the researchers on a common definition for team resilience (Gucciardi et al., 2018; Degbey & Einola, 2020). Whilst the lack of a definition can impede researchers in evaluation and validating resilience (Bowers et al., 2017; Davydov et al., 2010), it is stated that by having the variation allows for the phenomena to be fully understood (Raetze et al., 2022).

2.7 Team resilience: Conceptual models

Due to the ambiguity of team resilience, the development of conceptual models is based on how the phenomena is defined. Bryman and King (2021) indicate that for consistency in the approach of undertaking the understanding of the phenomena, researchers ought to clearly define the concept. Hartwig et al. (2020) confirm that a majority of researchers either provide team resilience definitions based on their own understanding, or adapt the definition based of other researchers. Researchers leverage the I-P-O model to develop conceptual models of team resilience (Chapman et al., 2022). This model can address the variations of team resilience from either a process, ability, mediator, outcome, belief or capacity (Chapman et al, 2020). These models also identify that contextual factors have an influence on the phenomena.

This section will identify the conceptual models available for team resilience starting with the least common definition of resilience being an outcome, followed by resilience as a process and thereafter resilience as a capacity.

2.7.1 Resilience as an outcome

When understanding team resilience as an outcome, the phenomena is defined as a result of the behaviours, abilities, and processes (Gucciardi et al., 2018). Team resilience is described as an emergent outcome that is as a result from an individual's resources and their interactions in Gucciardi et al.'s (2018) conceptual model. The model considers the human capital resources (viz. knowledge, aptitudes etc.), the capacities and processes in a unified model. However, the concept of resilience as an outcome is the least prevalent when compared to the other definitions (Raetze et al., 2022).

2.7.2 Resilience as a process

Research of resilience on small groups and individuals commonly define the phenomena as a process (Raetze et al., 2022). The definition of team resilience as a process suggest that resilience develops as a result of being exposed to various events which eventually results in the positive adaption of the team (Hartmann et al., 2020; McLarnon & Rothstein, 2013). In doing so, this allows one to consider that resilience is temporal and developed (Hartmann et al., 2020; Fischer et al., 2018). The conceptual model proposed by Hartmann et al. (2020) considers resilience as

a process whereby team resilience mediates a team's connectivity, positive emotions and team structures, resulting in the character and quality of a team's performance.

2.7.3 Resilience as an ability

Researchers who define team resilience as an ability to recover indicates that the recovering is an outcome, where the team's ability to do so is as a result of an emergent state (Bryman & King, 2021; Stoverink et al., 2020). This implies that there are determinants which are required to enable a team to be resilient (Varajão et al., 2021), as a result of collective co-ordination of individuals interacting with each other in a team to overcome an adverse event (Barton & Kahn, 2019). Researchers have identified various collective co-ordination determinants that contribute to team resilience.

Bowers et al. (2017) and Hartwig et al. (2020) argue that the I-P-O framework lacks consideration for the dynamic complexities of team behaviours and hence postulates that the I-M-O-I framework as an alternative option. Bowers et al.'s (2017) conceptual model for team resilience argues that the phenomenon does not emerges as a first order, but rather as a second order state. The model considers the multi-level factors, which includes the influence of the individual, team, and an organisation on team resilience (Bowers et al., 2017). Some examples of these input attributes at the team level included trust, assertiveness, and redundancy. These inputs are facilitated through processes such as leadership, planning, and performance monitoring, that result in the first order emergent state of shared mental models, familiarity, cohesion, and collective efficacy (Bowers et al., 2017). As a result of the first order is an emergent state, team resilience emerges (as a second order emergent state).

Similarly, Hartwig et al.'s (2020) conceptual model indicates emergent behaviours are as a result of inputs. These inputs include contextual or organisational related factors (e.g., organisational norms and practices, leadership style), team factors (e.g., culture of the team) and individual factors (communication skills, resilience). These inputs result in a team emergent state of cohesion, psychological safety and trust, which enables team resilience (Hartwig et al., 2020).

Both Bowers et al. (2017) and Hartwig et al. (2020) conclude that team resilience results in a team's ability in maintaining performance, reduction of errors, the desire to remain (Bowers et al., 2017), health and team functioning (Hartwig et al., 2020).

2.8 Conceptual model gap

While different conceptual models exist that detail team resilience as an outcome, ability, capability or process, there is no consensus on a unified theoretical framework for team resilience (Hartwig et al., 2020). In addition, researchers who have developed conceptual models have emphasised the absence of empirical testing to support these conceptual models (e.g., Hartwig et al., 2020; Stoverink et al., 2020). This sentiment is supported by Raetze et al. (2022), who indicates that there has also been a call for researchers to delve deeper into understanding the factors contributing to resilience via quantitative approaches. Hartwig et al. (2020) elaborates that researchers should also consider including which factors are more significant in enabling team resilience. This suggests that, whilst there are theories on the factors, there is still lack in research in terms of empirical testing of these factors.

The prevalent models consider team resilience as an ability or capability (Raetze et al., 2022). These models were informed through systematic literature reviews on resilience, and hence their basis is fairly similar (e.g., Bowers et al., 2017 and Hartwig et al., 2020). However, the model of Stoverink et al. (2020) is of particular interest. The model was based on Weick's (1993) taxonomy, which identified factors that contribute to organisational resilience, and has been widely used in the field of organisational resilience (Duchek, 2020). Considering that there may exist similarities in constructs across the various levels (Stoverink et al., 2020), Stoverink et al.'s (2020) conceptual model adapted Weick's (1993) taxonomy for the team level. This provides a compelling basis on which the model was developed. Therefore, this model was leveraged as part of the current study as a conceptual model used for testing. Further information on this will be detailed below.

2.9 Stoverink et al. (2020) conceptual model

2.9.1 Basis for Stoverink et al. (2020) conceptual model

The conceptual model developed by Stoverink et al. (2020) adapts Weick's (1993) taxonomy to isolate and discuss the factors of team resilience. Stoverink et al. (2020)

argue that there is a higher level of interdependency on a team level, as compared to the organisational level, thus requiring the proposed factors to be adapted to a team level. These factors include team potency, team capacity to improvise, team mental model of teamwork, and team psychological safety (Stoverink et al., 2020). The basis on which the model was developed will be discussed, followed by a detail on each construct identified by Stoverink et al. (2020).

2.9.2 Weick's (1993) taxonomy

In 1993, Karl E. Weick published a paper entitled "*The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster*," analysing the Mann Gulch wildfire disaster of 1946. The Mann Gulch incident occurred when 13 trained firefighters attempted to put out a wildfire, however, in doing so, tragically lost their lives (Weick, 1993). Weick uses the historical event as a case study to examine how organisations can make sense of confusing and complicated situations. The event provided a setting for his investigation into the notion of "sense-making". Weick (1993) argues that the orthodox approach of organisational analysis results in decision making; however, indicates that organisations require sense-making when faced with adversity.

Weick's (1993) model indicates that an organisation will be less vulnerable to adversity if the group can improvise and bricolage, where there is a virtual role system, respectful interactions and an attitude of wisdom. Weick's (1993) model explains that these factors enable the organisation to make sense of the situation in order for an organisation to cope with an adverse event.

Duchek (2020) identifies Wieck's conceptualisation of organisational resilience as one of the first and most important concepts that is used in many organisational resilience related studies. Furthermore, Duchek (2020) highlights that many researchers leverage Weick's (1993) four pillars as part of research in organisational resilience. Similarly, Stoverink et al. (2020) leverage the findings from the research by Weick (1993) to adapt it to the team level to develop a conceptual model for team resilience.

2.9.3 Conservation of resources (COR) theory

The conceptual model of Stoverink et al. (2020) is underpinned by the conservation of resources (COR) theory. This theory states that that human behaviour is driven through the resources, and that because individuals do not work in isolation, the

influence of these interactions enables the transfer of resources between them (Stoverink et al., 2020). The COR theory is explained by three principles which are related to the resource and focused on the individual level (Degbey & Einola, 2020). The first principle is that loss of resources is more prominent than their gain (Degbey & Einola, 2020). The second principle relies on the premise that in order to reduce resource loss, resource investment is required (Degbey & Einola, 2020). This implies that teams are required to invest in resources as more resources makes a team less vulnerable (Degbey & Einola, 2020). It is suggested that teams with fewer resources are brittle (Stoverink et al., 2020). Lastly, individual tend to value resource gain due to the difficulty experience as a result of resource loss (Degbey & Einola, 2020).

Stoverink et al. (2020) state that a resilient team are more interactive, thereby enabling the transfer of resources and behaviours. Furthermore, team members interactions enable individuals to observe the other team members actions in adverse events, causing those behaviours to be learnt by the individual, which in turn will become the normal behaviour of the team (Stoverink et al., 2020).

The COR theory has been used to underpin many studies in the field of resilience (e.g., Brykman and King, 2021; Degbey & Einola, 2020). Consequently, this theory is an adequate theory for Stoverink et al.'s (2020) conceptual model.

2.9.4 Constructs to Stoverink et al. (2022)

2.9.4.1 Team potency

Weick (1993) indicates that the attitude of wisdom a factor that is needed for an organisation to be resilient. Wieck (1993) explains that wisdom reflects a person's approach or attitude towards their values, knowledge, and skills that a person holds and a person's ability to be neither over-confident nor extremely cautious in their approach. Wieck (1993) further elaborates that with overconfidence, the ability to seek new information and being open to new ideas is limited, which can be detrimental to organisations, while being overly cautious can create unnecessary uncertainties and doubt. Therefore, a balance between these two aspects is required. Duchek (2020) supports this sentiment, explaining that resilient organisations leverage their knowledge, but should also be aware of their limitations.

Team potency, which is analogous to Weick's (1993) attitude of wisdom at an organisational level, was identified as a factor of team resilience (Stoverink et al., 2020). Team potency refers to the consensus amongst the individuals in the team

that the team can be successful in handling various situations (Gevers et al., 2020; Guzzo et al.,1993). It is having a shared belief that strengthens the motivation and enhances states that promote the team's performance (Gevers et al., 2020). However, teams may become overly confident in the team's potency, which could result in the team's inability to identify risks (Stoverink et al., 2020). Therefore, a balance of team potency is required for the team to remain vigilant (Stoverink et al., 2020). This is to prevent complacency (high team competency) or vulnerability (low team competency) (Stoverink et al., 2020).

Both team leaders and the interaction of the team members demonstrate an impact on team potency. Kim et al.'s (2022) research showed that peer mentoring was effective in enhancing the developmental assistance provided by team leaders to their team members, which in turn improved team potency. Peer mentoring refers to the support provided through means of practical and emotional support, to assist fellow team members to excel in their current job (Kim et al., 2022). Furthermore, the research showed that the quality of relationship between the team leader and the team members plays an important role in improving a team's potency and team performance (Kim et al., 2022). Leaders should also display charismatic leadership skills to enhance a team's potency (Le Blanc et al., 2021). A charismatic leader is able to motivate the team by communicating with a high level of trust of the team's abilities in achieving the goals (Le Blanc et al., 2021).

Pavez et al. (2021) has empirically tested and confirmed that team potency enhances a team's resilience. However, in analysing conceptual models proposed by Hartmann et al. (2021), Bowers et al. (2017) and Gucciardi et al. (2018), these models lack team potency as a construct. Through the systematic review conducted by Hartwig et al. (2020) it was identified that team potency did feature in the review (as a mediating state); however, the construct was not identified as a common construct tested empirically nor as a frequent code in the research search and was not considered as part of the conceptual model.

Team efficacy, on the other hand, was identified in the conceptual model of Bowers et al. (2017). Team efficacy is a similar concept to team potency; however, team collective efficacy relates to specific tasks (Le Blanc et al., 2021). Vera et al. (2017) also empirically evaluates and confirms that team resilience is dependent on team-efficacy.

However, Stoverink et al. (2020) specifies team potency as a factor considered in the conceptual model, as this is the shared belief that enhances a team's motivation and improves performance (Gevers et al., 2020), especially in difficult situations.

2.9.4.2 Team capacity to improvise

Improvisation is a novel way in which a challenge or problem can be addressed (Vera et al., 2016; Ye & Chen, 2021). According to Weick's (1993) taxonomy, improvisation is an important factor in organisational resilience. Weick (1993) indicates that the ability of an organisation to improvise when the standard procedures are insufficient to overcome an adverse event can make an organisation resilient. This is supported by Su and Junge (2023) and Bahri et al. (2021), who found that improvisation is a key component to improving an organisation's resilience, as it allows the company to redesign their strategies and structures in order to remain competitive. Improvisation to redesign strategies and structures has been illustrated during the Covid-19 pandemic, when both organisations and governmental functions were required to find new ways of working in order to overcome the adversity (Cunha et al., 2022) (e.g., mobile hospitals, and work from home policies). Furthermore, individuals also play an important role in an organisation's resilience seeing that an individual's ability to improvise is recognised as a key behavioural attribute that can enhance an organisation's resilience (Gerschberger & Gerschberger, 2023).

Leveraging Weick's (1993) taxonomy, Stoverink et al. (2020) suggests that a team's capacity to improvise is analogous to Weick's taxonomy for improvisation. Whilst Weick identifies both improvisation and bricolage, Stoverink et al. (2020) only consider a team's capacity to improvise (also referred to as team improvisation in this research). Weick (1993) indicates that bricoleurs are able to remain creative under challenging conditions, as this is their natural manner to address various circumstances. Although the concept of improvisation and bricolage are similar, they are not the same. Research done by Talat and Riaz (2020) shows that bricolage mediates a team's ability to analyse and interpret circumstances, and in response to be resilient, hence, bricolage does not have a direct influence on team resilience. Therefore, Stoverink et al. (2020) suggestion that only a team's capacity to improvise at team level has a direct relationship to team resilience is supported.

Stoverink et al. (2020) indicate that a team's capacity to improvise is reflected in a team's creativity and their transactive memory. Stoverink et al. (2020) and Vera and Crossan (2005) specify that improvisation draws on previous experience and knowledge to create a novel solution. Knowledge is encoded an individual's transactive memory, which contributes at a team level through the contributions of individuals of 'who knows what' (Stoverink et al., 2020; Wegner, 1987). It is the team's joint repository of knowledge which contributes to a team's ability to overcome an adverse event (Stoverink et al., 2020; Gomes et al., 2014). This increased knowledge enables a team to use a broader perspective to address the problem, provide a wider range of ideas to consider, and enables innovation and creativity (Ye & Chen, 2021). Similarly, Cheng et al. (2023) explains that the knowledge of employees is necessary in assisting a team to overcome an unexpected event. Cheng et al. (2023) argue that the knowledge of the team contributes in assisting a team to make sense of the situation by facilitating the assessment of the problem, the establishment of plans and obtaining the support to address the concern. This is reconfirmed by Ye and Chen (2021), who indicate that the lack of knowledge results in a team's inability to link task elements and reduces a team's decision making-capabilities. However, Ye and Chen (2021) argue that improvisation depends on how effectively the team can integrate the individual's knowledge to respond to an adverse event. This is supported by Ali et al. (2020), who indicate that participative and shared leadership, moderated through team voice and team creativity efficacy, showed a positive association with team creativity. Furthermore, Zenk et al. (2022) argues that whilst having experience in a specific industry is important, it is required that continuous learning and training enables a team to make quicker decisions.

Zenk et al. (2022) also emphasises that immediate action is required for improvisation. Immediate action requires a team to not only react to unexpected event, but they are required to perform professionally, accept risks, and adapt in real time (Zenk et al., 2022). Noting that unexpected real-time events do not allow for prepared plans to be utilised, it is necessary that team need to create, test and execute new ideas (Zenk et al., 2022).

In developing a measure of improvisation, Vera and Crossan (2005) considers the two factors of spontaneity and creativity. This is in line with the views of Stoverink et al. (2020), Ye and Chen (2021), and Zenk et al. (2022).

Whilst improvisation has been identified in Stoverink et al. (2020) model, other researchers have not included this as a factor towards team resilience. This includes the model developed by Bowers et al. (2017), Hartmann et al. (2020), Hartwig et al. (2020), and Gucciardi et al. (2018). Hartwig et al. (2020) identifies creativity as part of the literature review, however, does not include this as part of the proposed conceptual model. Regardless, based on a review of extant literature, team improvisation, which incorporates both creativity and spontaneity, proves important, as it empowers a team to respond in a flexible way to an adverse event (Stoverink et al., 2020; Weick, 1998).

2.9.4.3 Team mental model of teamwork

Weick (1993) has argued that an adverse event can result in the breakdown of formal roles, where having a virtual role system thus becomes important. A virtual role system is a mental understanding of those tasks required to be completed and to take on additional roles in the event of a disaster (Weick, 1993).

Stoverink et al. (2020) reason that virtual role systems at an organisation level are equivalent to a team mental model of teamwork (also referred to as team mental models in this research) on a team level. Team mental model of teamwork represent the underlying understanding of each member's role, responsibilities, and connectedness (Stoverink et al., 2020). According to Stoverink et al. (2020), it is particularly important how accurately the team understands the requirements of a task, and if this understanding is shared as a common understanding within the team. Filho et al. (2015) further explain that team 'mental models' is a multifaceted phenomenon, which consists of the "what", the "how" and game plan required, and the lack thereof leads to team disruptions (Hartwig et al., 2020; Sims & Salas, 2007). This is especially the case during adverse events when formal responsibilities can break down (Stoverink et al., 2020; Weick, 1993).

Team mental models integrate both "shared mental models" and "complementary mental models" (Filho et al., 2022). The capacity of a team to visually understand their role, their team member's roles, and the overall function of the team is referred to as shared mental models (Stoverink et al., 2020). Shared mental models in adverse conditions facilitate a coordinated aligned action by the team (Carrington et al., 2019). Carrington et al. (2019) highlight the value of having a shared mental model, especially on the leadership level. In the absence of this, team members get

confused about the team's role and vision, especially during a crisis (Carrington et al., 2019). Therefore, leadership plays a significant role in guiding the teams. Furthermore, Lines et al. (2022) explain that shared mental models are influenced on the individual, and team level. Hence, in order to enhance shared mental models in teams, a holistic approach should be considered. Lines et al. (2022) indicate that on an individual level, interventions such as role clarity are required so as to ensure that each team member (individual) knowns what needs to be done. On a team level, interactions between team members, team performance monitoring and, establishing team norms are required so as to enhance shared mental models (Lines et al., 2022).

In addition to shared mental models, complementary mental models are also important. Complementary mental models constitute the individual members' knowledge and skills to compensate for and complement other team members (Filho et al., 2022), especially during an adverse event. It is the complementary abilities of team members that assists each other in times of crisis.

Although both shared mental models and complementary mental models are important for a team's mental model (Filho et al., 2022), Bowers et al. (2017) and Gucciardi et al. (2018) consider shared mental models as an emergent state or input in their conceptual respective models for team resilience. Furthermore, even though Stoverink et al. (2020) and Hartwig et al (2020) refer to team mental models in their models, the inclination is towards the shared mental model. Seeing that complementary mental models can play a role in supporting and complementing team members in adverse events, both shared mental models and complementary mental models, would encompass team mental models in this research.

2.9.4.4 Team psychological safety

Wieck (1993) indicates that vulnerability can be counteracted by focusing on the individual's interactions, which is referred to as the respectful interaction in the taxonomy. Respectful interactions relate to honesty, trust, and self-respect among people (Weick, 1993). Having these qualities enhances the ability of creativity, adaptation, and a trusting environment in the event of adversity (Weick, 1993). Mokline and Ben Abdallah (2022) highlight that respectful interaction is the only factor that has the potential to save an organisations after an adverse event whereby formal structures and role systems fall away.

According to Stoverink et al. (2020), psychological safety within a team is analogous to Weick's (1993) factor of respectful interactions at the organisational level. Team psychological safety is reflective of a setting in which members in a team feel free to communicate their views or opinion without fear of ridicule by the team (Stoverink et al., 2020). Cauwelier et al. (2019) express that a setting in which there is psychological safety allows for individual to consider mistakes and failures as an opportunity. This results in a setting in which the individual feel comfortable to share their mistakes and allows other to provide opinions and ideas to the mistake (Cauwelier et al., 2019). In sharing this information, this also increase the team's shared mental models in allowing the team to know what each team member is working on (Cauwelier et al., 2019). Similarly, Bui et al. (2019) concurs with this, as the authors highlighted that psychological safety is an important factor for resilience as it promotes knowledge sharing and cohesiveness between the members.

Psychological safety is influenced by contextual factors. For example, research conducted by Kinoshita and Sato (2023) showed that in a sports context, a coach who is rude to his team can erode the psychological safety in the team, thereby creating a lack of psychological safety. In addition, it was found that, whilst power parity in a team can create higher performance, this also creates a negative environment and reduces the psychological safety in the team (Carter et al., 2020).

Empirical research shows that team psychological safety and team resilience are positively correlated (Fransen, 2020). Similarly, conceptual models developed for team resilience include the psychological safety construct, either in the exact form, or a similar construct. For example, Hartwig et al. (2020) identifies team psychological safety as a mediator to team resilience. On the contrary, the psychological safety construct was not included as part of the antecedent in Hartmann et al. (2020) and Bowers et al. (2017) conceptual models, but rather respectively considers the team's connectivity and cohesion as constructs, which Bui et al. (2019) identifies as a result of psychological safety.

A similar construct to psychological safety is employee voice. Employee voice, which is the perception that a team is encouraged to speak up, is a proximal antecedent of team resilience (Bryman & King, 2021; Li & Tangirala, 2022). Whilst employee voice is not psychological safety, it shares similar features to psychological safety, being a more specific team state (Bryman & King, 2021; Morrison et al., 2011). Li and Tangirala (2022) emphasise the importance of employee voice, especially

during adverse events, when there is a need for the team to generate ideas and share knowledge to overcome the event. According to Degbey and Einola (2020), sensemaking necessitates a setting in which team members can voice their opinions and feel comfortable doing so. This will provide the team with clarity of the adverse event and allow for a diverse response of alternative options.

Therefore, psychological safety, which fosters team voice, plays an important role in allowing a team share knowledge and communicate their view. This becomes particularly important during an adverse event, when it is required to make sense of the situation by understanding the various perspectives of the situation and to gain insights on how to overcome the adversity.

2.10 Stoverink et al. (2020) conceptual model

Although the conceptual model by Stoverink et al. (2020) also includes the outcomes as a result of team resilience, this research will only focus on the determinants of team resilience (refer to Figure 1).

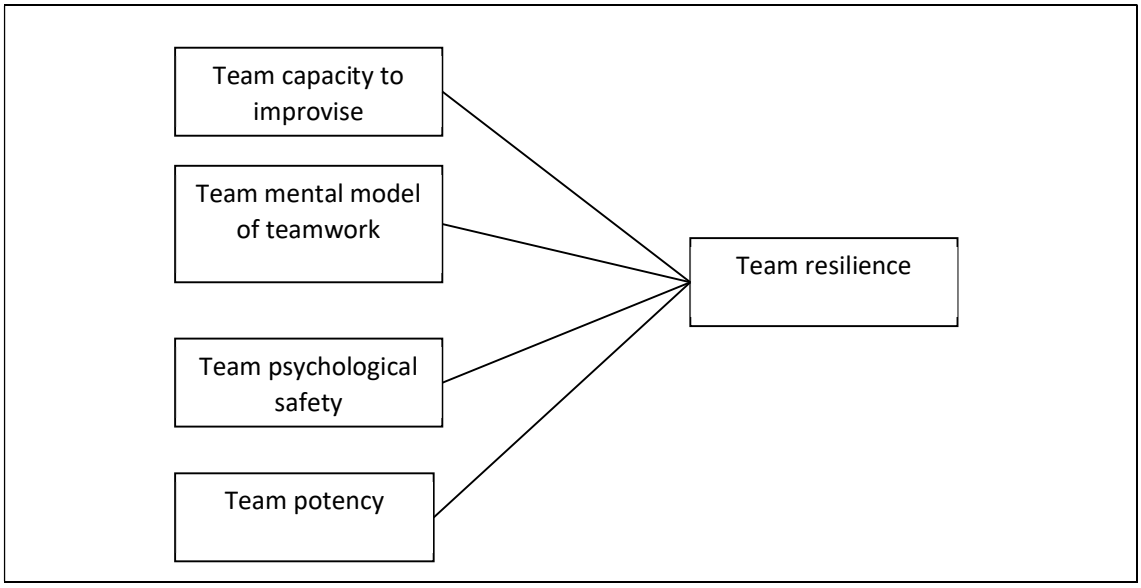

Figure 1: Conceptual model to be tested, adapted from Stoverink et al. (2020)

Furthermore, seeing that researchers have observed that the contextual factors in which a team operates, in particular team factors, have an influence on team resilience (Chapman et al. 2020), some of these aspects will be included as part of the research as control variables. Examples of team factors, such as the size of the team, the make-up of the team (i.e., gender) and the reliance of each member on one another, are some factors that influences a team's resilience (Chapman et al.

2020). In recent studies, team size has been used as a control variable (Brykman & King, 2021). While, other factors, such as leadership style and organisational culture have also been identified as possible factors that was considered as part of research studies (Vera et al., 2017).

2.11 Conclusion

Although the phenomena of resilience dates back to the 1970s, it is only recently that resilience gained traction (Raetze et al,2022). Resilience has been identified as a multilevel phenomenon, which is relevant at an individual, team, and organisational level. However, research on the team level is not as prevalent as it is on the individual and organisational level (Gucciardi et al., 2018). With the pervasiveness of teams within the business environment (Degbey & Einola, 2020; West et al., 2009), the value of understanding how to optimise the interactions between these individuals became apparent (Bryman & King, 2021; Chapman et al., 2020).

Due to the ambiguity of team resilience, the development of conceptual models is based on how the phenomena is defined. Bryman and King (2021) indicate that for consistency in the approach of undertaking the understanding of the phenomena, researchers should clearly define the concept. Researchers leverage the I-P-O model in the development of conceptual models of team resilience. This model can address the variations of team resilience from either a process, ability, mediator, outcome, belief, or capacity. While different conceptual models exist that detail team resilience as an outcome, ability, capability or process, there is no unanimity on a unified theoretical framework for team resilience (Hartwig et al., 2020). Furthermore, researchers who have developed conceptual models have emphasised the absence of empirical testing to support them (e.g., Hartwig et al., 2020; Stoverink et al., 2020).

The prevalent conceptual models available consider team resilience as an ability or capability (Raetze et al., 2022). These models were informed through systematic literature reviews in the field of resilience and hence their basis is fairly similar. However, Stoverink et al.'s (2020) model is of particular interest. The model was based on Weick's (1993) taxonomy, which identified factors that contribute to organisational resilience and has been widely used in the field of organisational resilience (Duchek, 2020). Seeing that there may exist similarities in constructs across the various levels (Stoverink et al., 2020), Stoverink et al.'s (2020) conceptual

model adapted Weick's (1993) taxonomy for the team level. This provided a compelling basis on which the model was developed. Therefore, this model was leveraged as a conceptual model that was used for empirical testing.

The model will assist in closing the gap in research by addressing the research question of: "What are the determinants of team resilience?" In particular, focusing on Stoverink et al.'s (2020) determinants of team potency, team capacity to improvise, team mental model of teamwork, and team psychological safety.

CHAPTER THREE: RESEARCH QUESTION

3 Introduction

The purpose of the research is to assess the determinants of team resilience. To achieve the purpose of the research, the Stoverink et al. (2020) conceptual constructs were investigated as factors considered the determinants of team resilience (refer to Figure 1). The section unpacks the research questions of the proposal.

3.1 Research questions

The need to understand the factors that influence team resilience led to the overarching question of: “What are the determinants of team resilience?” Based on the Stoverink et al.’s (2020) adapted conceptual model (refer to Figure 1), the research sub questions are detailed below.

3.1.1 Research sub-Question One: Team potency and team resilience

Research sub-Question One: What is the relationship between team potency and team resilience?

The objective of Research sub-Question One is to determine whether there is a relationship between team potency and team resilience. Based on the literature review, Stoverink et al. (2020) adapted Weick’s (1993) factor of attitude of wisdom at an organisational level to team potency at a team level. Stoverink et al. (2020) indicate that team potency has a positive influence on team resilience, hence, the hypothesis that was tested was as follows:

H1: Team potency is positively associated with team resilience

3.1.2 Research sub-Question Two: Team capacity to improvise and team resilience

Research sub-Question Two: What is the relationship between a team’s capacity to improvise and team resilience?

The objective of Research sub-Question Two is to determine if there is a relationship between a team’s capacity to improvise and team resilience. Based on the literature review, Stoverink et al. (2020) adapted Weick’s (1993) factor of improvisation and

bricolage at an organisational level to only team improvisation at a team level. Hence the hypothesis that was tested was as follows:

H2: A team's capacity to improvise is positively associated with team resilience

3.1.3 Research sub-Question Three: Team mental model for teamwork and team resilience

Research sub-Question Three: What is the relationship between team mental model for teamwork and team resilience?

The objective of Research sub-Question Three is to determine if there is a relationship between team mental models and team resilience. Based on the literature review, Stoverink et al. (2020) adapted Weick's (1993) factor of virtual role systems at an organisational level to team mental models for teamwork at a team level, indicating that this has a positive influence on a team's resilience. Hence, the hypothesis that was tested was as follows:

H3: Team mental model for teamwork is positively associated with team resilience

3.1.4 Research sub-Question Four: Team psychological safety and team resilience

Research sub-Question Four: What is the relationship between team psychological safety and team resilience?

Similar to the previous constructs, the objective of Research Question Four is to determine whether there is a relationship between team psychological safety and team resilience. Based on the literature review, Stoverink et al. (2020) adapted Weick's (1993) factor of respectful interactions at an organisational level to psychological safety at a team level. Stoverink et al. (2020) indicates that team psychological safety positively influences team resilience, hence, the hypothesis tested is as follows:

H4: Team psychological safety is positively associated with team resilience

3.2 Conclusion

Levering off the conceptual model proposed by Stoverink et al. (2020), the objective of the research was to evaluate the determinants of team resilience. These factors included team psychological safety, team capacity to improvise, team mental model for teamwork, and team potency.

CHAPTER FOUR: RESEARCH METHODOLOGY

4 Introduction

The aim of Chapter Four is to provide a detailed methodology on how the research question can be addressed. As identified in Chapter One, this research objective serves to address a gap in literature by answering the research question: “What are the determinants of team resilience?” by investigating the following determinants of team resilience as per Stoverink et al.’s (2020) conceptual model: team potency, team capacity to improvise, team mental models, and team psychological safety. Chapter Two provided an analysis of the previous research completed in the field of resilience, with focus on the reasons for the selected constructs. Chapter Three identified the hypotheses derived from the conceptual model of Stoverink et al. (2020) that this research aimed to test. Building on chapters One to Three, Chapter Four provides the justification and support for the chosen research design and methodology so that the research objective is met.

This section will detail the research design, identify the population, define the unit of analysis, describe the sample methods and sample size required. Thereafter the measurement instruments used to gather the data will be explained, followed by the data gathering, preparation and analysis approach followed in the research.

4.1 Research design and methodology

A research design has been identified as the “master plan” that gives a framework or action plan for the research (Zikmund et al., 2019). A researcher should understand the various research designs alternatives in order to select a suitable design, as this will influence the quality of the research (Saunders & Lewis, 2018).

This research adopted an explanatory positivism philosophy, using a deductive quantitative survey approach over a cross-section time horizon. The considerations and support for this design is detailed below.

4.1.1 Research design

A research objective can be divided into three categories: namely exploratory, descriptive, and explanatory (Rahi, 2017). Exploratory research seeks to clarify unclear circumstances, explanatory research seeks to characterise people, groups

or organisations whilst explanatory (casual) research seeks to identify cause-and-effect relationships (Rahi, 2017; Zikmund et al., 2019). Furthermore, exploratory and descriptive research provides the foundation for explanatory research (Zikmund et al., 2019). Explanatory research can only be completed after there is a decent understanding of the phenomena, seeing that only then can a researcher make predictions about the correlations to be tested (Zikmund et al., 2019). This requirement is met by the conceptual model proposed by Stoverink et al. (2020), which was derived from Weick's (1993) taxonomy, which has been widely used in understanding organisational resilience (Duchek, 2020). Additionally, Rahi (2017) explains that explanatory research can be used to either build, elaborate or test theory. Therefore, seeing that the research objective served to test theory by determining whether there was a relationship between team potency, team improvisation, team mental models, team psychological safety and team resilience (phenomena), the explanatory research was adopted.

Given that the research objective is explanatory, the research approach was underpinned by a positivist philosophy. This philosophy enabled the researcher to confirm or refute relationships leading to law-like generalisations (Saunders & Lewis, 2018). The positivist philosophy is based on the premise that there is a common view of the world and has the purpose to obtain an understanding of the cause and effect of a given phenomenon (Nyein et al., 2020). Rahi (2017) emphasises that the positivist seek to gain knowledge through scientific methods. Therefore, this philosophy aligned to the research objective of identifying the determinants of team resilience.

A deductive method, which aligns with the positivist philosophy, assists in developing theory through the testing of theoretical hypotheses (Saunders et al., 2012) and using logical reasoning in order to derive a conclusion (Zikmund et al., 2019). As a result, the deductive approach can either prove or refute hypotheses (Saunders & Lewis, 2018). Rahi (2017) recommends the use of a deductive approach when it is required to verify assumptions of a conceptual model. The decision to use the deductive approach for this research was based on the research objective to determine whether there is positive association between the identified constructs and team resilience.

The research applied a mono-quantitative method through a survey strategy. A mono-quantitative method indicates that the research made use of only one

quantitative method (Saunders & Lewis, 2018), in this case the research employed a survey. According to Hartwig et al. (2020), a quantitative method provides the empirical evidence of the conceptual determinants identified and makes it possible to understand which determinants can contribute to helping teams to be resilient. The survey technique enables the researcher to obtain quantitative data for analysis using inferential and descriptive statistics (Saunders et al., 2012). The survey approach is commonly linked to the deductive approach and quantitative methodology (Saunders et al., 2012) as it can test theories and causal relationships between constructs (Pinsonneault & Kraemer, 1993). Furthermore, the survey strategy obtains standardised quantitative information, which can be analysed to determine relationships between variables (Pinsonneault & Kraemer, 1993). Rahi (2017) characterises the method as obtaining data from the targeted population, and evaluating the information obtained, without considering the individual's feelings, emotions or contextual factors. This approach was further validated, seeing that previous researchers have also made use of existing surveys available based on the constructs being investigated (Carmeli et al., 2021; Li & Tangirala, 2022; Pavez et al., 2021; Vera et al., 2017).

A cross-sectional time horizon indicates that the data from the respondents were collected in a single time period (Saunders and Lewis, 2018). In the recent research conducted by Vera et al. (2017) and Pavez et al. (2021), a cross-sectional time horizon strategy was employed. Consequently, this research was conducted over a cross-sectional time horizon.

4.2 Population

Adversity and the need to overcome adversity is prevalent in various contexts, which explains the reason for team resilience research spanning across a spectrum of fields, for example, project teams (Pavez et al., 2021), virtual teams (Degbey & Einola, 2020), sales teams (Sharma et al., 2020), military (Chapman et al., 2021), and sports teams (Filho et al., 2022). Brykman and King (2021) specifies that it is required to define what constitutes a team, due to the dynamic nature of teams (Brykman & King, 2021). Therefore, the condition for inclusion in the population was that a team must comprise of individuals working interdependently within teams to accomplish a goal or objective (Chapman et al., 2020; Sundstrom et al., 1990). It is suggested that a team consist of at least three members, this is in addition to the

team leader (Brykman & King, 2021). However, Brykman and King (2021) also argue that teams of less than three members can provide valuable information. This research defined a team as a minimum of two individuals, in addition to the team leader. This was reconfirmed by research completed by Vera et al. (2017) in which the study had a team size ranging from two to thirty-seven individuals.

Although a key attribute of resilience is an adverse event that would weaken the team's performance or cause stress or strain on the team (Hartwig et al., 2020), it is argued that it is not necessary for a team to experience an adverse event as a team can be resilient, implying a pro-active approach to avoid adverse events (Stoverink et al., 2020). Additionally, it was identified in the literature review that resilience can be developmental or reactive (Raetze et al., 2022). Therefore, a pre-requisite for teams to experience an adverse event was not required.

Gucciardi et al. (2018) highlight that the behaviours and conditions that influence team resilience will vary depending on the situation experienced by the team. Furthermore, Branicki et al. (2019) emphasise that the level of resilience required is dependent on the occupation of the group. However, a positivist philosophy will verify or refute the determinants of team resilience in order to allow for law-like generalisation. Therefore, contextual or demographic differences such as age, organisation size, industry, location and gender were not considered as limiting characteristics, but were used to provided additional insights. The only restrictions imposed on the sample was that the individuals were firstly required to work in a team, and secondly, the team in which they worked in was required to consist of two or more people (excluding the team lead). By reducing the restrictions imposed on the population, this allowed this research to access a large sample size. This suited the research since data from a large representation was necessary to assure generalisation, validity, and reliability (Nyein et al., 2020).

4.3 Unit of analysis

The individual or entity that provides the information and the aggregated level at which the data is collected are the two features that are used to define the unit of analysis (Zikmund et al., 2019). The unit of analysis was individuals who are required to work together within a team to achieve an organisational goal. The team included the team leader or manager of the team. While the research aimed to assess a team's resilience, the unit of analysis at an individual level was employed. This was

informed from previous research which showed that evaluating a team's capabilities based on the individual is common (e.g., Pavez et al., 202; Carmeli et al., 2021), hence the same approach was followed for this research.

4.4 Sampling method

The choice of sampling is determined by the researcher's understanding of the population. Sampling methods are classified as probability and non-probability sampling (Zikmund et al., 2019). Probability sampling is used when the entire list of the population is known, thereby guaranteeing that each member has a chance of being chosen (Saunders & Lewis, 2018; Zikmund et al., 2019). The alternative method is non-probability sampling, which implies that the population is unknown and hence the sample is chosen based on personal judgement or convenience (Zikmund et al., 2019). Since this study does not have a comprehensive list of all individuals who are working in teams, the non-probability method was used.

In particular, non-probability purposive sampling and snowballing sampling was used. According to Rahi (2017), purposive sampling is defined as the selection of respondents based on a specific characteristic of the sample member, whilst the snowball sampling leverages the initial respondents to obtain additional respondents (Zikmund et al., 2019). Snowball sampling provides a means to quickly and economically obtain a large number of responses (Zikmund et al., 2019). The purposive sample was achieved through the researcher's existing networks.

4.5 Sample size

An appropriate sample size is required to achieve the research objective (Daniel, 2011), since statistical methodologies are impacted by it (Rahi, 2017). However, there is no one established method in determining the sample size and remains a challenge for researchers (Rahi, 2017).

Daniel (2011) provides guidance that the sample size for non-probability survey analysis should be between 400 to 2500 participants. Furthermore, based on previous cross-section time horizon research of team resilience, the samples ranged from 214 team members to 1167 team members (Brykman & King, 2021; Pavez et al., 2021; Vera et al., 2017). Therefore, the research aimed to obtain feedback from a minimum of 400 respondents, in line with the suggestion of Daniel (2011).

4.6 Measurement instrument

The research objective was to determine the factors that influence team resilience. Quantitative research requires data collection related to the research problem, which is analysed to assist the researcher to describe the data (Rahi, 2017). A survey in the form of a questionnaire was utilised as the measuring tool to gather the data (refer to section 9.1 for the questionnaire), which is a favourable method for quantitative research (Saunders and Lewis, 2018). In addition, researchers such as Hartmann et al. (2021), Li and Tangirala (2022) and Carmeli et al. (2021) have used questionnaires in their research on team resilience.

The information required to be collected was based on the constructs identified in Stoverink et al. (2020) model, namely team potency, team capacity to improvise, team mental model for teamwork, team psychological safety, and team resilience. The questionnaire was therefore aimed to collect information that measures these constructs.

SurveyMonkey was used to capture the data for the questionnaire. The survey consisted of seven sections, excluding the front page, where the consent information was provided for the respondent's information. Section One of the questionnaire consisted of prequalifying questions and the second section consisted of the demographic information. Sections Three to Seven posed questions related to the various constructs to be measured. In total, the survey had 53 questions. One key aspect that was included into the survey was identifying what was team membership, similar to the work of Brykman and King (2021). This ensures that the individual reflect on their experiences within a team (Brykman & King, 2021) and answers the survey based on a team perspective. The research leveraged established scales from the literature to measure the constructs. These measurements depend on the team member's rating to assess the constructs.

4.6.1 Prequalifying questions

Two prequalifying questions were included upfront of the questionnaire to exclude respondents who did not meet the criteria. This criterion considered two questions, namely: 1) do you work in a team and 2) is your team composed of two or more members (including yourself and excluding your manager). If the answer to any of the two questions was 'no', the respondent was directed to the end of the survey, thus not allowing them to proceed.

4.6.2 Demographic information

Demographic information, such as the respondent's gender, age, industry that they work in, the size of the company, job level, and job function were obtained. Furthermore, details on how long the respondent has been in the team and the number of members in the team were obtained. This information was used to understand the sample characteristics.

4.6.3 Team potency measure

Guzzo et al. (1993) developed a scale to measure the potency of a team. This scale was recently used in empirical studies completed by Gevers et al. (2020) and Pavez et al. (2021) to determine whether there was an association between team potency with team performance and team resilience, respectively. The Cronbach's alpha of the scale developed by Guzzo et al. (1993) was 0.88, thus indicating it is a reliable measure.

Guzzo et al.'s (1993) scale is based on an eight-item scale (refer to section 9.1). These items are rated on a five-point Likert scale which was anchored by (1) "To no extent" and (5) "To a great extent". This research used the rating scale and items as it was in the article.

4.6.4 Team capacity to improvise measure

The Vera and Crossan (2005) scale was developed to measure a team's capacity to improvise. Based on a landscape analysis of measures available to measure improvisation, it was identified that the scale established by Vera and Crossan (2005) was one of the most commonly used scales in organisational improvisation (Ciuchta et al., 2021). Although Ciuchta et al. (2021) recognises the need for novel scales, the current Vera and Crossan (2005) measure was used.

The measure consisted of seven-items and was adapted from an employee creativity scale and a scale based on spontaneity (Vera and Crossan, 2005). Refer to section 9.1 for the items in the construct. Four of the seven questions were related to the creativity aspect, whilst the other three questions were related to the spontaneity aspect (Vera and Crossan, 2005). Similar to Vera and Crossan (2005), a seven-point Likert scale that was anchored on "strongly disagree" and "strongly agree".

4.6.5 Team mental model measure

Filho et al.'s (2022) 11-item scale was used to measure a team's mental model which includes both shared and complementary mental models (refer to section 9.1). The scale was tested in a sports context. For that reason, some questions were slightly adapted to a business or organisational context. Respondents were required to rate the items on a Likert scale that ranged from (0) "Not at all" and (10) "Strongly agree".

4.6.6 Team psychological safety measure

The research relied on the team psychological safety scale developed by Edmondson (1999), which consists of seven-items (refer to section 9.1). Harvey et al. (2019) indicate the Edmondson (1999) scale to be a one of the most common scales leveraged to assist researched in measuring a team's psychological safety. Newman et al. (2017) further confirms that, due to the extensive validation of the scale, the measure has construct validity. In addition, the reliability of the measure has been consistent across a diverse sample range (Newman et al., 2017). Hence, this scale was used in this research.

The seven-point Likert scale was used to rate the items of the scale. This was anchored by (1) "Very inaccurate" and (7) "Very accurate". This research used the existing items and rating scale. The scale included three reverse questions which required editing (discussed in section 4.9.1).

4.6.7 Team resilience measure

A majority of prior research relied on already available resilience measures, which were focused mostly on the individual level and less on the team or collective level (Raetze et al., 2022). Studies completed at the team level developed their own measure for team resilience (Raetze et al., 2022). However, of these developed measures, only a few have been used in research more than once (Raetze et al., 2022). Seeing that there is no single measure for team resilience, the strategy of altering an already existing metric was used.

The Connor-Davidson resilience scale (CD-RISC) was used to measure a team's resilience (Connor & Davidson, 2003; Hartmann et al., 2021). Based on the already existing measures for team resilience, the CD-RISC scale ranks the highest when assessing the total number of operational definitions (Raetze et al., 2022). The CD-RISC scale was developed on an individual level; however, this research aims to

understand a team's capacity to overcome adversity (Hartmann et al., 2021). Therefore, based on guidance by Chan (1998), the referent was shifted from the person to the team, as was done in the research undertaken by Hartmann et al. (2021).

The Connor and Davidson (2003) 10-item scale was used (refer to section 9.1), which was rated using the five-point Likert scale that ranged from (0) "Not at all" and (4) "True nearly all the time".

4.6.8 Control variables

Team resilience is influenced by team factors and contextual factors. Chapman et al. (2020) indicates that team factors such as team size, the composition (gender) of the team and other team factors can influence team resilience. Based on recent studies, it was observed that team size is a factor that could influence a team's resilience (Brykman & King, 2021). This research also considered the age of the respondent, gender, team size, age of the respondents and the length of time that the respondent as control variables.

4.7 Pilot test

After ethical clearance and prior to the data gathering process, a pilot test was implemented. The reason for the pilot test was to ensure that the questionnaire on SurveyMonkey was working, that the questions were not ambiguous, and to ensure that the data was recorded correctly (Saunders & Lewis, 2018). In addition, the pilot data collected was used to assessed to determine whether the research objective was met, thereby ensuring content validity (Saunders & Lewis, 2018).

Guided by the recommendation of Hill (1998), who indicates that the pilot test sample size should not be less than 10, the pilot test survey was sent to 11 respondents that were selected from the researcher's networks. The respondents were sent an email including the link to the survey and were requested to provide feedback to identify any ambiguity or errors in the survey via email or WhatsApp.

In line with the reason of conducting the pilot test, issues related to the functionality of the survey, identification of ambiguous questions, and data recording were raised as a concern. In terms of functionality, two respondents highlighted that option to select the "other" choice in the survey was not working. Three respondents indicated that the introduction (consensus) summary wording was unclear, and that the

indicative duration for the survey should be reduced from 40 minutes to 20 minutes. Furthermore, one respondent highlighted that the definition of a team needed to be elaborated to ensure respondents would understand it. In terms of data selection, it was suggested that the originally selected bar scale used for the team mental models be updated with a Likert scale. The reason for selecting the bar scale was because the 11-point Likert category was not found. Furthermore, it was requested that the organisational size categories be increased. These suggestions were considered and updated.

The pilot data was thereafter downloaded from SurveyMonkey, and analysis completed using “Statistical Package for the Social Sciences” (SPSS) a statistical software used to confirm whether the data can be analysed and if it would meet the research objective. The initial bar scale selected for the team mental models was difficult to analyse, seeing that the data was inconsistent with the other constructs. This also motivated the reason to change the bar scale to a Likert scale, while identifying the anchoring points and a middle value category.

4.8 Data gathering process

The data gathering process commenced after the pilot test was completed and updates as per the feedback were include. The data collection approach was based on a non-probability purposive sampling and snowballing sampling method. Hence, the questionnaire was distributed via email and WhatsApp and posted on LinkedIn to people within the researcher’s network. Furthermore, the snowballing approach was followed, whereby the participants were requested to forward the survey to their network or to post on social media accounts (such as Telegram, LinkedIn, Instagram, Facebook).

The questionnaire was created on the 19 July 2023, and was closed on the 26 August 2023, resulting in a duration of five weeks and three days. During this period, respondents were sent reminders to complete the survey and to forward the survey to their networks. During this period, a total of 281 responses was received.

4.9 Data preparation

Once the data gathering was completed, the data was extracted from SurveyMonkey in a numerical format. According to Zikmund et al. (2019), raw data may not be in

the required format required for the analysis and hence the data required editing and coding to develop a data file. Thereafter, the data file can be used for the analysis.

4.9.1 Data editing

Data editing requires that the data be adjusted for inconsistency and omissions (Zikmund et al., 2019). Two common methods have been used to address missing data, namely deletion and single imputation methods (Baraldi & Ender, 2010). Whilst these methods have been used, there are limitations in terms of a reduced sample size and estimates that are biased respectively (Baraldi & Ender, 2010). Modern techniques of multiple imputation and maximum likelihood estimations provide a more advanced technique for addressing missing data (Baraldi & Ender, 2010).

The design of SurveyMonkey was setup to ensure that the previous question was answered before the respondent can move onto the next question. Hence, respondents who did not make it to the end of the survey were omitted (deleted) from the analysis. Furthermore, the two qualifier questions, namely: 1) do you work in a team; and 2) is the team composed of two or more members (including yourself and excluding your manager), automatically disqualified these participants if the answer was ‘no’ to any of the questions. In so doing, this ensured that the unit analysis was correct for this research.

Editing was also required for certain questions in the Edmondson’s (1999) scale for psychological safety as the scale had three reverse questions. In addition, scales that began at zero (team mental model and team resilience measure) was edited as SurveyMonkey started the scale at one.

4.9.2 Data coding

Data not in the correct format required data coding to allow the data to be analysed. The Likert scale was required for the various measures. This data was in the format of interval scale. In order to analyse the data, a numerical code was assigned to the data based on how it was anchored. This was done in SurveyMonkey, where as a consequence, when the data was extracted in the numerical format, it was in the correct format. An example of a Likert scale can be noted in Table 1 below.

Table 1: Likert scale coding

Likert scale	Value
To no extent	1
To a limited extent	2
To some extent	3
To a considerable extent	4
To a great extent	5

Furthermore, to easily identify the questions related to the specific constructs, the questions were coded as follows:

Table 2: Construct coding

Construct	Code
Team potency	TP
Team capacity to improvise	TIMP
Team mental models	TMM
Team psychological safety	TPS
Team resilience	TRESIL

4.9.3 Data storage

The data was stored on Google drive and will be retained for a period of five years.

4.10 Analysis approach

Once the data was edited and coded, SPSS software was used to analyse it. According to Ong and Puteh (2017), SPSS is a widely used software programme amongst researchers, due to the various statistical tests that it can perform.

The data analysis was completed in a phased approach, with the initial phase of understanding the sample demographic through descriptive analysis. The data used for this analysis was obtained from Section Two of the questionnaire, which focused on collecting the demographic information of the sample. Thereafter, the second phase was to check the reliability and validity of the constructs. From there, the third phase was to conduct a factor analysis to understand which constructs could be simplified. The last phase was to test the hypotheses through a linear regression and thereafter a multiple regression to understand which factors are determinants of team resilience.

4.10.1.1 Sample: Descriptive analysis

Conducting a descriptive analysis was required to describe the characteristics of the sample (Saunders et al., 2012; Zikmund et al., 2019). Descriptive analysis of the sample, which was the first phase, was based on Section Two of the survey (refer to section 9.1). This section provided insights to the respondent's gender, age, industry that they work in, the size of the company, job level, job function were obtained. Furthermore, it was established how long the respondent has been in the team and the number of members in the team. This information was used to understand the sample characteristics.

4.10.1.2 Test for reliability

Ensuring consistency of results is important in research, and a key factor in achieving this is in the reliability of the measure used (Saunders & Lewis, 2018). Reliability refers to the measures of internal consistency, making it an important indicator in research (Zikmund et al., 2019). For a measure to be reliable, the data should converge to the same result (Zikmund et al., 2019). Even though the research questionnaire for the various measures was obtained from previous literature, the reliability of the questions for this study needed to be checked.

The evaluation of internal consistency requires the use of high-quality methods (Tavakol & Dennick, 2011). Cronbach's alpha provides a means to ensure internal consistency by measuring the variables of a construct to ensure it is reliable (Tavakol & Dennick, 2011; Hair et al., 2019). Tavakol and Dennick (2011) suggest a value of between 0.70 and 0.95. On the other hand, Hair et al. (2019) recommends that the Cronbach's alpha lower limit can be 0.70 to ensure the reliability of the measure. Therefore, for this research, a minimum Cronbach's alpha of 0.70 was adhered to.

4.10.1.3 Test for validity

The validity of research is ensuring that the method used for data collection accurately measures what it is planned to measure (Hair et al., 2019). Therefore, the construct validity evaluates how accurately a measure represents the concept (Zikmund et al., 2019). This can be assessed by two concepts, namely convergent validity and discriminant validity (Swank & Mullen, 2017; Zikmund et al., 2019).

The assumption that related measures shows a relationship or correlation is referred to as convergent validity (Zikmund et al., 2019), whilst the expectation that unrelated

measures should have a weak relationship or correlation is referred to as discriminant validity (Zikmund et al., 2019).

Swank and Mullen (2017) recommend that a means to determine validity is via a bivariant correlation analysis. According to the authors, the statistical test depends on the data collected. They further elaborate that the Pearson correlation is commonly used when the data is interval or ratio variables. Therefore, this research used the Pearson correlation to verify if the constructs were aligned to the validity test.

4.10.1.4 Factor analysis

Factor analysis was used to determine the dimensionality of the research's key variables (Zikmund et al., 2019). To explain the interdependency of the factors, by statistically reducing the number of factors from a large number of variables, the factor analysis approach was used (Zikmund et al., 2019). When bringing the number of variables down to a manageable level, the factor analysis approach makes the analysis of the reduced component easier (Zikmund et al., 2019). There are two methods that can be used for a factor analysis, namely the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA). When there are uncertainties in the number of factors within a variable, the EFA approach is used (Zikmund et al., 2019). Whereas, when the researcher understands the factors, the CFA method is employed (Zikmund et al., 2019). Hurley et al. (1997) explains that the EFA is normally used in the development phase of scales, whilst the CFA is applied when there is a well-established theory of the measurement. It is further elaborated that the CFA would require a theoretical basis for the analysis to be performed (Hurley et al., 1997).

4.10.1.4.1 EFA

The factor analysis was analysed by understanding how many factors existed per variable (Zikmund et al., 2010). A requirement for the EFA was that there is no cross-loading between the variables (Hair et al., 2019). This was checked in section 4.10.1.3.

The next measure checked was the Kaiser-Meyer-Olkin (KMO) measure, which assesses the adequacy of the sample size for the factor analysis (Shrestha, 2021). The requirement for the KMO measure should be between 0.80 and 1.00 for an adequate sample size (Shrestha, 2021). Lastly, the Bartlett's test of sphericity, which

provided an indication whether or not the factor analysis can be conducted on the data set, was checked. Shrestha (2021) indicates that this value ought to be less than 0.005.

The Eigenvalue were evaluated to understand how many variances existed in each measure. The rule in evaluating the number of variances is based on the number of variables that has an Eigenvalue greater than one (Zikmund et al., 2019). In situations where the Eigenvalue had more than one variable, the rotated component matrix was used to determine which factors should be grouped per measure.

Table 3: EFA analysis criteria

Measure	Requirement
KMO	0.8 to 1
Bartlett's test	<0.05
Eigenvalue	1

4.10.1.5 Descriptive analysis of the constructs

The constructs, namely team potency, team capacity to improvise, team mental model of teamwork, team psychological safety, and team resilience, were analysed to determine the mean, median and standard deviation.

Furthermore, the Shapiro-Wilk test and the Kolmogorov-Smirnov tests, which are commonly used to check for normality (Hair et al., 2019), were performed to assess the data's normality distribution. Data that is non-normally distributed has a p-value that is less that the level of significance. In this case, a level of significance was set at 0.05. When undertaking data analysis, it is important to understand the normality distribution of the data (Shapiro & Wilk, 1965).

4.10.1.6 Correlation analysis

A correlation analysis was required to establish the potential relationship between the identified constructs and team resilience. The correlation analysis is used to determine the linear correlation between two variables (Wegner, 2020). There are various methods that are available to determine correlations, however the methods are dependent on the data collected. This research will focus on the Pearson's coefficient and the Spearman rank correlation which are commonly used in research. The Pearson coefficient can be used on any sample data as there are limited

assumptions (Schober et al., 2018). However, Schober et al. (2018) indicates that if the generalisation of the outcomes is to be generalised for a population, there are assumptions that need to be adhered to. These include:

- According to Schober et al. (2018), continuous data is required for the test. However, according to Zikmund et al. (2019), interval or ratio data is also appropriate for the test.
- Both variables require the data to be normally distributed (Schober et al., 2018). Akoglu (2018) emphasises that the Pearson coefficient is a parametric test, which requires normally distributed data. The normality of the data can be tested using the Shapiro and Wilk (1965) test available in SPSS (discussed in section 4.10.1.5). Alternatively, a scatter plot can be used to access the normality as normally distributed data should lie close to the linear line.

Seeing that the construct data were not normally distributed (discussed in results, section 5.5.1.1), Schober et al. (2018) suggest that the Spearman rank correlation can be used to address this deviation.

The Pearson coefficient and Spearman rank coefficient provide a result that is scaled the same way, and hence the results are analogous (Schober et al., 2018). The coefficient provides a direction and strength of the relationship (Wegner, 2020). The coefficient ranges from -1 and +1, which a -1 indicates that there is an indirect relationship, whilst a +1 indicates that there is a direct relationship between the variables (Akoglu, 2018; Schober et al.,2018). According to Akoglu (2018), the strength of the relationship differs, where as a consequence, there is no concrete definition of the results.

4.10.1.7 Linear regression

Wegner (2020) explains that a correlation provides the strength of the relationship, whilst a simple linear regression provides the equation that represents the relationship between an independent variable and a dependant variable. The linear regression also enables the researcher to test the model for significance (Wegner, 2020). Therefore, in order to accept or reject the postulated hypotheses, a linear regression was used.

However, the linear regression requires certain assumptions to be adhered to in order to ensure the accuracy of the results. This information was checked prior to

the analysis of the linear regression results. These assumptions include (Field, 2018):

- Linearity: A linear relationship should exist between the input and output variable (Field, 2018).
- Independent errors: There should be no correlation between the residual terms (Field, 2018). This can be determined through the Durbin-Watson test. independence between the two constructs, which ranges between 0 to 4. A value of 2 is required to ensure that the construct residual is not correlated. However, Field (2018) suggests that a value below 1 and above 3 is a concern.
- Homoscedasticity of the residual terms. This was checked by analysing the scatter plot of standardisation of the outcome predicted vales (ZPRED) on the x-axis and the standardised errors or residuals (ZRESID) on the y-axis, which was required to be between -3 and +3 (Field, 2018).
- Normality of the residuals. Schützenmeister et al. (2012) indicates that the assumptions for linear regression assumptions can be validated by residual plots. To assess this criterion, the histogram plot of the residual was checked for normality. Further, the normal P-P plot of the residual was checked to ensure the graph was a straight line (Field, 2018).

For a linear regression, there are five components that were evaluated, namely the p-value in the ANOVA table, p-value in the co-efficient table, the co-efficient of determination (R^2), the standardised Beta co-efficient (β) and the unstandardised B-coefficient. Each measure provides important information in understanding the relationship between the constructs. The p-value in the ANOVA table indicates if the regression model is statistically significant (Zikmund et al., 2010). For a statistically significant regression, the p-value should be less than 0.05 (Zikmund et al., 2010). Similarly, the p-value in the co-efficient table indicates if the construct is statistically significant. The R^2 provides an indication of how closely the independent and dependant are associated (Wegner, 2020). A R^2 value of zero indicates no association, whilst a R^2 value of one implies perfectly associated. R^2 values closer to one would mean a strong association and a lower association closer to zero (Wegner, 2020). The standardised Beta coefficient (β) provides allows for the comparison of the strength of relationship between each of the independent variables and the dependant variable (Field, 2018). Lastly, the unstandardised B-

coefficient provides an indication of the degree to which the independent variable impacts the dependant variable, if the influence other variables are held constant (Field, 2018).

4.10.1.8 Multiple regression

According to Hair et al. (2019), multiple regression analysis is utilised when research needs to determine a relationship between various independent factors (i.e., team potency, improvisation, mental models and psychological safety) and the dependant variable (team resilience). A multiple regression takes into consideration all identified independent variables and provides a statistical model based on these factors and the dependant variable (Wegner, 2020). Furthermore, the control variables were included as part of the multiple regression. Dummy codes were assigned to the control variables, which can be found in section 9.7, with a value of one assigned to the higher percentage selected items.

In addition to the assumptions identified for a linear regression in section 4.10.1.7, additional assumptions were required for multiple regressions:

- the data of the dependant variable should be continuous;
- there are more than two independent variables;
- there should not be multicollinearity between the data (it is important to access if multicollinearity exists between the constructs because if this exists, it makes it difficult for the multiple regression analysis to determine the importance of the independent variable (Field, 2018). This was checked by the Pearson correlation to identify if the dependant variables were more that (0.8) (Field, 2018). Furthermore, the guidelines for multicollinearity of variance inflation factor (VIF) were checked to make sure the data was less than 10 (Field, 2018); and
- there should not be significant outliers.

Assumption One and Two were met at the data was in-line with the requirements. In analysis of the other assumptions, the data was acceptable and therefore the multiple regression was performed (details of the assumptions tested is presented in section 6.4).

Similar to the linear regression, namely the p-value in the ANOVA table, p-value in the co-efficient table, the co-efficient of determination (R^2), the standardised Beta

co-efficient (β) and the unstandardised B-coefficient. Once the statistically significant variables were obtained (p-value in the co-efficient table), the multiple regression was re-run to consider these factors only.

4.11 Quality controls

The outcome of the research is to provide reliable and information (Zikmund et al., 2019). The research therefore will focus on reliability and validity in the manner in which the research methodology was selected with the following controls:

- Pilot testing of the survey was completed to ensure that the questions are understandable and will not be misinterpreted, therefore ensuring that the research objective can be achieved (Saunders & Lewis, 2018). Addressing the concerns raised in the pilot testing ensured that the content was valid to meet the objectives of the research.
- Utilising existing surveys for similar purposes ensures construct validity. Saunders and Lewis (2018) warn that, whilst previous questionnaires can be used, care must be taken to ensure that the questionnaires are suitable for the context of the research.
- The use of survey questions from previous literature will be used as a basis. However, to ensure the measures are reliability and validity, the measure will be checked by calculating the Cronbach's alpha (minimum of 0.7) and the Pearson correlation respectively.
- In order to allow for generalisation of the data, a large sample size was required. In order to improve the response rate, follow-ups will be used (Zikmund et al., 2013).
- Edmondson's (1999) psychological safety scale provided a quality control in ensuring that there was consistency in the respondent's answers due to the reverse questions.
- Data was analysed to ensure that the correct test was conducted to allow for the data generalisation (e.g., Spearman rank coefficient used which provides a better generalisation of the data).
- Checks to ensure that tests performed on the data met the underlying assumptions (e.g., multiple regressions equation). This was to ensure that the output results were accurate.

4.12 Limitations

Whilst the research aims to provide insight into the determinants contributing to team resilience, limitations have been identified for this proposal.

Firstly, the research will be conducted using a cross-sectional time horizon. Raetze et al. (2022) and Branicki et al. (2018) suggest that information on how resilience develops over a period of time will allow the theory of resilience to expand. It is proposed that future research can build on this research by considering a longitudinal time horizon.

Secondly, quantitative surveys require a large sample size to allow for generalisation of the data. However, a limitation of surveys is their generally low response rate (Zikmund et al., 2013). In addition, surveys research does not provide detailed information as compared to other research strategies (Saunders & Lewis, 2018).

Lastly, the purposive and snowball sampling pose a risk of bias of the sample seeing that the respondents were limited to the researcher's networks and the respondent's networks. This would be a limitation to the research as the aim was to obtain data from a large representation to assure generalisation, validity and reliability (Nyein et al., 2020).

CHAPTER FIVE: RESULTS

5 Introduction

The objective of the research was to understand the determinants of team resilience. This research aimed to investigate the relationship of team potency, team capacity to improvise, team mental model for teamwork, and team psychological safety with team resilience.

In order to achieve this objective, the research adopted an explanatory positivism philosophy, using a deductive quantitative survey over a cross-section time horizon. The survey leveraged established questionnaires available in literature and used a purposive and snowballing sampling approach. The data for the research was obtained from individuals who work in teams, through SurveyMonkey. The data was collected over a period of five weeks and three days. Once the survey was closed, the data was extracted edited and coded prior to being analysed.

The purpose of this section is to present the results of the study. The section will detail the sample size obtained and provide a descriptive analysis of the sample. Thereafter, the validity and reliability results of the constructs will be discussed and thereafter the construct descriptive statics will be provided. Lastly, the results of the hypothesis testing will be presented using linear regression, followed by the multiple regression prediction model. Overall, the results section will identify the determinants of team resilience.

5.1 Research sample

The survey was divided into seven sections, the first of which included pre-qualifier questions and the second section focused on the respondents' demographic information. Section One, the pre-qualifier section, consisted of two questions while Section Two, the demographic information section, had eight questions. Sections Three through Seven included questions on the various constructs, namely team potency, team improvisation, team mental models, team psychological safety and team resilience.

Data was collected over the course of five weeks and three days, during which period a total sample of 281 responses were received. The information was edited in two stages. Firstly, the respondents who did not work in a team or who had less

than two members (including the respondents excluding the team leader) were excluded from the samples. This was done to ensure the relevant sample was used in the analysis of the data. The first stage reduced the sample size from 281 to 270 (3.9 % reduction). In addition, 50 additional data points were removed, where the respondents abandoned the survey (missing data removed). This further reduced the sample from 270 to 220 respondents, thus reducing the sample to 78.3% of the original number of responses. Refer to Table 4 for details on the sample exclusions.

Table 4: Sample size used in the research

	Number of respondents	Percentage of the sample (%)
Sample size (raw data)	281	100
Sample disqualified	11	3.9
Incomplete surveys	50	17.8
Final sample size	**220**	**78.3**

5.2 Descriptive analysis

The respondent's demographic information was captured in Section Two of the questionnaire. This information was required to describe the characteristics of the sample (Saunders et al., 2012). Data of the respondent's gender was obtained via the first descriptive question. As indicated in Table 5, the portion of female and male respondents was about equal, with 50.00% being female and 49.09% being male. Less than 1% opted not to disclose their gender.

Table 5: Gender of the respondents

Respondent gender	Number of respondents	Percentage of the sample (%)
Male	108	49.09
Female	110	50.00
Prefer not to say	2	0.91
Total	**220**	**100**

Information pertaining to the respondents age was obtained through descriptive Question Two. Approximately 85.5% of the respondents were between the ages of 31 to 60, of which 47.27% were between the age of 31 to 40 years, 21.82% were between 41 to 50 years and 16.36% was 51 to 60 years (refer to Figure 2). There

were no respondents below 20 years old, and limited respondents between 20 to 30 years (8.64%) and older than 60 years (5.91%).

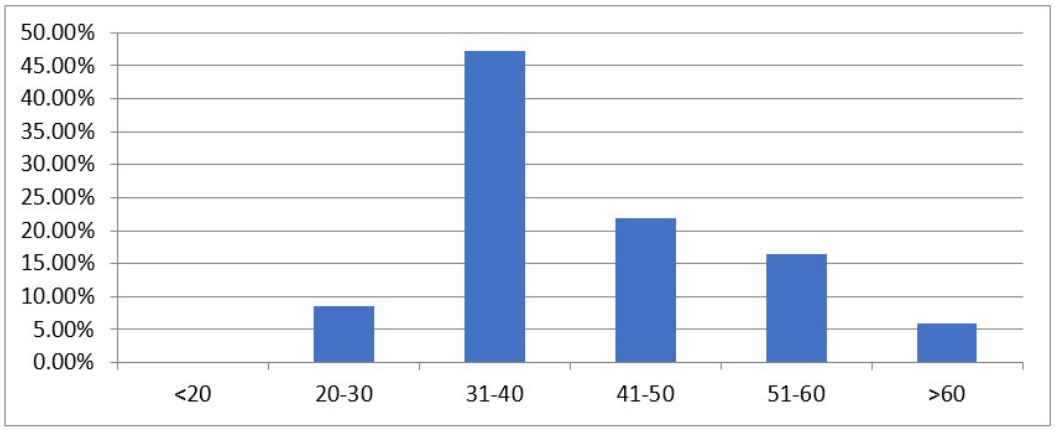

Figure 2: Respondent's age

Descriptive Question Three aimed to understand the industry in which the respondent works in (refer to Table 6). The respondents ranged across a wide range of industries, with a large portion of respondents were from the manufacturing industry (20.45%) and the financial industry (16.82%). A large portion also selected other, which, upon analysis, were from the chemicals, energy, and petrochemical industry (26 respondents).

Table 6: Industry in which the respondent works

Industry	Number of respondents	Percentage of the sample (%)
Agriculture, hunting, forestry, and fishing	3	1.36%
Manufacturing	45	20.45%
Mining and quarrying	8	3.64%
Wholesale and retail trade	11	5.00%
Financial intermediation, insurance, real estate and business services	37	16.82%
Electricity, gas and water supply	14	6.36%
Construction	3	1.36%
Healthcare	19	8.64%
Other (please specify)	80	36.36%
Total	**220**	**100%**

The descriptive Question Four related to the company size at which the respondents work (refer to Table 7). Approximately 66.82% of respondents were from large companies (251 or more employees), whilst 33.18% were from micro to medium size companies (10.91% in micro size companies (less than 11 employees), 15.45% in small size companies (11 to 50 employees) and 6.82% in medium size companies (51 to 250 employees)).

Table 7: Company size in which the respondent works

Company size	Number of respondents	Percentage of the sample (%)
Less than 11	24	10.91
11 to 50	34	15.45
51 to 250	15	6.82
251 to 500	8	3.64
501 to 1 000	9	4.09
1001 to 5 000	26	11.82
5001 to 10 000	19	8.64
More than 10 000	82	37.27
Not sure	3	1.36
Total	**220**	**100**

Descriptive Question Five focused on understanding the respondent's current job level (refer to Figure 3) of which majority of the respondents were either in senior management (24.55%), middle management (35.91%) or on the intermediate level (24.55%), with limited respondents from the executive level (10.00%) and entry level (1.36%). A portion of respondents (3.64%) specified the 'other' category, which included consultant, freelancer and flat structure.

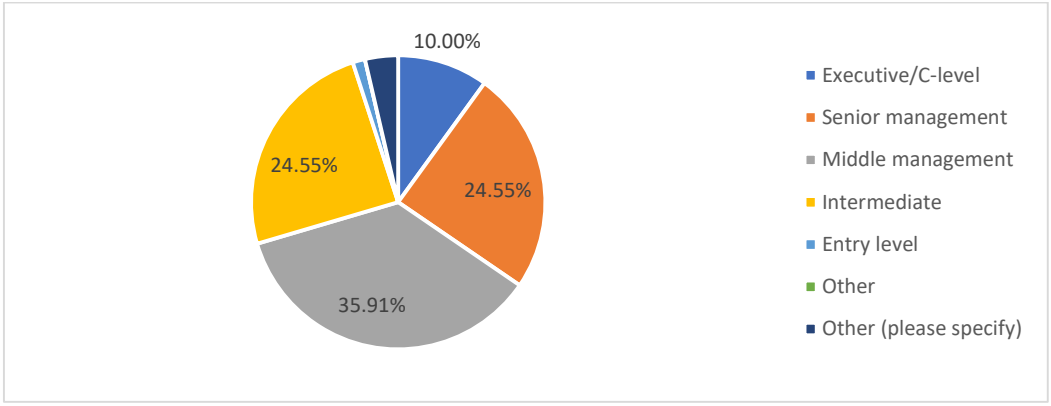

Figure 3: Respondent's current job level

The job function of the respondent ranged considerably (refer to Table 8). However, engineering, management, analysts, business development, information technology, consulting and sales accounted for 56.36% of the respondents.

Table 8: Job function of respondents

Job function	Number of respondents	Percentage of the sample (%)
Engineering	33	15.00
Management	22	10.00
Analyst	19	8.64
Business Development	14	6.36
Information Technology	13	5.91
Consulting	12	5.45
Sales	11	5.00
Finance	10	4.55
Project or Product Management	10	4.55
General Business	8	3.64
Other (please specify)	8	3.64
Accounting	7	3.18
Administrative	7	3.18
Legal	5	2.27
Production	5	2.27
Advertising / Marketing	4	1.82
Customer Service	4	1.82
Dental Work (Dentist, Dental Hygienist)	4	1.82
Human Resources	4	1.82
Supply Chain	4	1.82
Educator (e.g., teacher, lecturer, professor)	3	1.36
Art/Creative/Design/Writing	2	0.91
Health Care Provider (other than doctor or nurse)	2	0.91
Quality Assurance	2	0.91
Science	2	0.91
Prefer not to answer	2	0.91
Construction	1	0.45
Distribution	1	0.45

Doctor	1	0.45
Total	**220**	**100**

The objective of understanding how long a respondent has been with the team was met through descriptive Question Seven. A majority of the responders have been part of the team for more than a year (77.27%), with 35.45% having been in the team for more than five years. Of the respondents, 22.73% have been in the team for less than a year.

Table 9: Duration that the respondent has been in the team

Duration	Number of respondents	% of the sample
Less than six months	21	9.55
More than six months but less than one year	29	13.18
More than one year but less than two years	31	14.09
More than two years but less than three years	29	13.18
More than three years but less than four years	19	8.64
More than four years but less than five years	13	5.91
More than five years	78	35.45
Total	**220**	**100**

Information with regards to the respondent's team size was obtained via descriptive Question Eight (refer to Figure 4). Approximately 87% of the respondents were from team sizes between 3 to 17 team members (this included the respondent and the manager/team lead). Of this, 43.64% of the respondents belong to a team size that were between 5 to 10 members (including the respondent and the manager/team lead). There was an equal weighting of respondents who worked in teams with a team size of 3 to 4 members and 11 to 17 members (21.82%), whilst there were fewer respondents from larger team sizes.

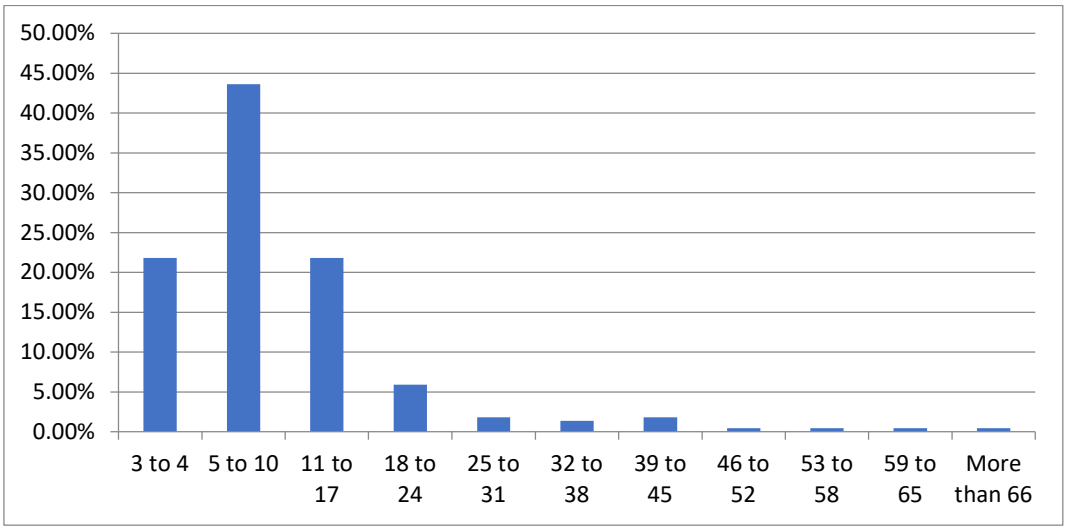

Figure 4: The number of members in the team (including the respondent and team leader)

5.3 Test for reliability

Previously developed scales were used to measure the various constructs in this research. To confirm that the measures was internally consistent, the Cronbach's alpha for the various measures were checked to ensure a minimum requirement of 0.70 was met (as per guidance of Hair et al., 2019 in section 4.10.1.2). All measures were deemed reliable and will be detailed below.

5.3.1 Team potency

The measure of team potency, which was based on Guzzo et al. (1993), consisted of eight questions. The result for reliability resulted in a Cronbach's alpha of 0.923, higher than the specified minimum requirement of 0.70 (refer to Table 10). As a result, the variables in the construct were consistent and hence reliable.

Table 10: Team potency Cronbach's alpha

Cronbach's alpha [criteria >0.7]	Cronbach's alpha based on standardised items	Number of items
0.923	0.925	8

5.3.2 Team capacity to improvise

A team's capacity to improvise, which was Section Four of the survey, consisted of seven questions. Seeing that the EFA results identified that two constructs are prevalent in the scale (refer to section 5.5), this was split out for the Cronbach's alpha test. Running the test for reliability for the two subconstructs, namely team

creativity and team spontaneity, yielded a Cronbach's alpha of 0.895 and 0.861 respectively (refer to Table 11), which was higher than the minimum requirement of 0.70. As a result, the variables in the construct were consistent and hence reliable.

Table 11: Team improvisation Cronbach's alpha

	Cronbach's alpha [criteria >0.7]	Cronbach's alpha based on standardised items	Number of items
Team creativity	0.895	0.896	4
Team spontaneity	0.861	0.864	3

5.3.3 Team mental model for teamwork

The test for reliability resulted in a Cronbach's alpha of 0.958 for team mental models (refer to Table 12), exceeding the minimum threshold limit of 0.70. This result was based on the eleven questions scale created by Filho et al. (2022) to measure a team's mental model. Therefore, the variables in the construct was consistent and hence reliable.

Table 12: Team mental models Cronbach's alpha

Cronbach's alpha [criteria >0.7]	Cronbach's alpha based on standardised items	Number of items
0.958	0.960	11

5.3.4 Team psychological safety

Psychological safety, which consisted of seven questions, was measured using the Edmondson (1999) scale. Of the seven questions, three questions were reverse questions. Prior to conducting the Cronbach's alpha test, the three questions were edited and thereafter used in the reliability test. The result for reliability yielded a Cronbach's alpha of 0.830, higher than the specified minimum requirement of 0.70 (refer to Table 13). Therefore, the variables in the construct was consistent and hence reliable.

Table 13: Team psychological safety Cronbach's alpha

Cronbach's alpha [criteria >0.7]	Cronbach's alpha based on standardised items	Number of items
0.830	0.832	7

5.3.5 Team resilience

Team resilience was measured based on the scale developed by Connor and Davidson (2003), which consisted of ten questions. The scale was adapted for a team level seeing that the scale was based on an individual level. The test for reliability yielded a Cronbach's alpha of 0.926, exceeding the minimum requirement of 0.70 (refer to Table 14). Therefore, the variables in the construct was consistent and hence reliable.

Table 14: Team resilience Cronbach's alpha

Cronbach's alpha [criteria >0.7]	Cronbach's alpha based on standardised items	Number of items
0.926	0.929	10

5.4 Test for validity

The test for construct validity evaluates how accurately a measure represents the concept (Zikmund et al., 2019). The validity test was completed using the Pearson correlation by evaluating each item within the construct against the total score for the construct. Based on the outcome, all constructs were valid as the p-value was less than 0.001, meeting the criteria. Refer to section 9.2 to section 9.6 for the results.

5.5 Exploratory factor analysis

The model fit was determined using the principal component analysis. The KMO result was analysed to confirm that the sample size was appropriate for the EFA, whilst the Bartlett test for sphericity was evaluated to ensure that the factor analysis can be applied to the data (refer to Table 15 for the results).

Table 15: EFA results

Construct	KMO [criteria >0.5)	Bartlett's test for sphericity [criteria<0.05]	Number of components extracted	% variance extracted
Team potency	0.914	<0.001	1	65.7
Team capacity to improvise	0.873	<0.001	2	78.11

Team psychological safety	0.829	<0.001	1	50.00
Team mental models	0.956	<0.001	1	71.43
Team resilience	0.935	<0.001	1	61.27

The KMO of the constructs was above 0.5 (refer to Table 15) which implies that each construct had a good sampling adequacy. In addition, the Bartlett test of sphericity of the constructs was less than the threshold of 0.05, implying that the data was adequate to conduct an EFA.

Based on the EFA results, all constructs resulted in one measure variance, with the exception of the team improvisation measure, which required the construct to be divided into two. As previously identified, team improvisation comprised of two themes, namely creativity and spontaneity. Therefore, based on this, the construct was divided into the components recommended in the rotated component matrix.

The information of the spilt construct is as per Table 16, which indicates that both the KMO and Bartlett's test met the criteria for the factor analysis.

Table 16: Team improvisation constructs separated

Construct	KMO [criteria >0.5]	Bartlett's test for sphericity [criteria<0.05]	Number of components extracted	% variance extracted
Team creativity	0.83	<0.001	1	76.2
Team spontaneity	0.73	<0.001	1	78.6

5.5.1 Individual construct descriptive statistics

5.5.1.1 Overall

Descriptive statistics for the individual constructs were calculated. This included the mean, median, and standard deviations. The difference between the mean and median for the various constructs was less than 10%, thus indicating that there are no outliers in the data (refer to Table 17). Furthermore, the data was negatively skewed as per the Skewness statistic.

Table 17: Overall descriptive statistics of constructs

Construct	N statistics	Scale range	Mean	Median	Standard deviation	Skewness statistic	Kurtosis statistics
Team potency	220	1 to 5	3.99	4.00	0.73	-1.04	1.56
Team creativity	220	1 to 7	5.51	5.75	1.27	-1.28	1.79
Team spontaneity	220	1 to 7	5.79	6.00	1.17	-1.60	3.37
Team mental models	220	0 to 10	7.19	7.45	1.97	-0.84	0.69
Team psychological safety	220	1 to 7	5.25	5.43	1.28	-0.99	1.05
Team resilience	220	0 to 4	2.96	3.00	0.66	-0.81	1.66

The Shapiro-Wilk and Kolmogorov-Smirnov tests were checked to determine if the data was normally distributed. The data from these tests were less than the significant level (less than 0.05), implying that the data is non-normally distributed (refer to Table 18).

Table 18: Test for normality

Construct	N statistics	Kolmogorov-Smirnov[a]		Shapiro-Wilk	
		Statistic	Sig.	Statistic	Sig.
Team potency	220	0.095	<0.001	0.931	<0.001
Team spontaneity	220	0.180	<0.001	0.848	<0.001
Team creativity	220	0.143	<0.001	0.891	<0.001
Team mental models	220	0.089	<0.001	0.948	<0.001
Team psychological safety	220	0.092	<0.001	0.932	<0.001
Team resilience	220	0.097	<0.001	0.951	<0.001

a. Lilliefors Significance correction

A detailed analysis of each item in the constructs was completed in order to understand the mean average and determine the deviations for further analysis in the discussion.

5.5.1.1.1 Team potency

Overall, the team potency measurement has a mean average of 3.99 (scale between one to five), indicating that the respondents believed that team potency was evident to a considerable extent in their team (refer to Figure 5). Of this, three questions related to working hard, the belief that the team can be productive, and the expectation to be a high-performing team exceeded the average.

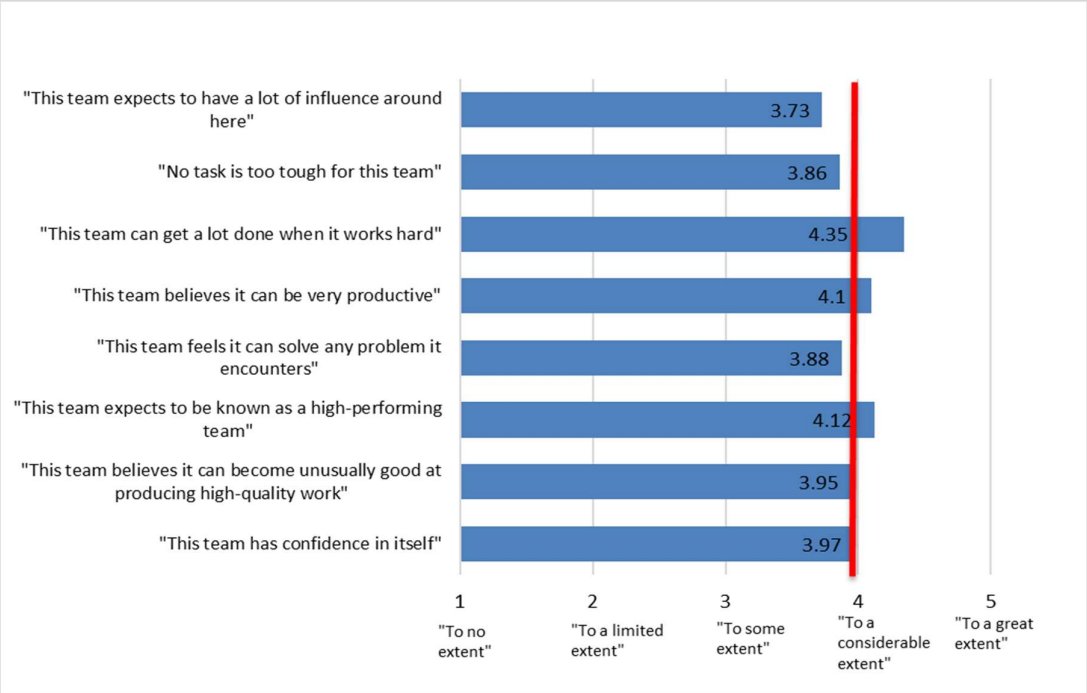

Figure 5: Team potency mean average rating per question (questions from Guzzo et al. (1993))

The difference between the mean and median was less than 10% for the various questions in the scale, thus indicating that there are no outliers in the data (refer to Table 19). The majority of the questions had a median of four, indicating that the respondent's view that team potency was "To a considerable extent" present in their team.

Table 19: Team potency mean average, median and standard deviation

Question	N statistics	Mean	Median	Standard deviation
"This team has confidence in itself"	220	3.97	4.00	0.87
"This team believes it can become unusually good at producing high-quality work"	220	3.95	4.00	0.91
"This team expects to be known as a high-performing team"	220	4.12	4.00	0.92
"This team feels it can solve any problem it encounters"	220	3.88	4.00	0.96
"This team believes it can be very productive"	220	4.10	4.00	0.86

“This team can get a lot done when it works hard.”	220	4.35	5.00	0.80
“No task is too tough for this team”	220	3.86	4.00	0.93
“This team expects to have a lot of influence around here”	220	3.73	4.00	1.03

Note: Questions from Guzzo et al. (1993)

5.5.1.1.2 Team capacity to improvise

The team improvisation construct was separated into two sub-constructs: team creativity and team spontaneity. Based on the mean average for these constructs, team spontaneity was higher than team creativity. These mean average scores were 5.79 and 5.51, respectively (refer to Figure 6 and Figure 7).

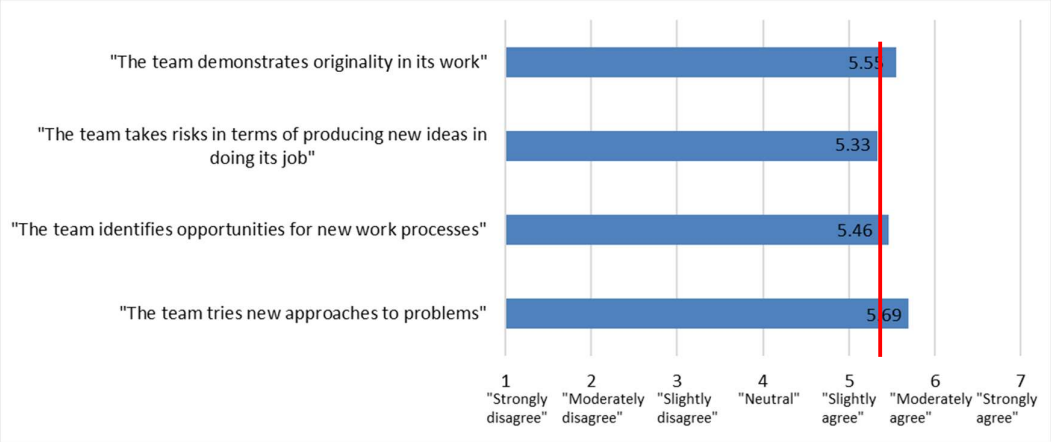

Figure 6: Team creativity mean average rating per question (questions from Vera and Crossan (2005))

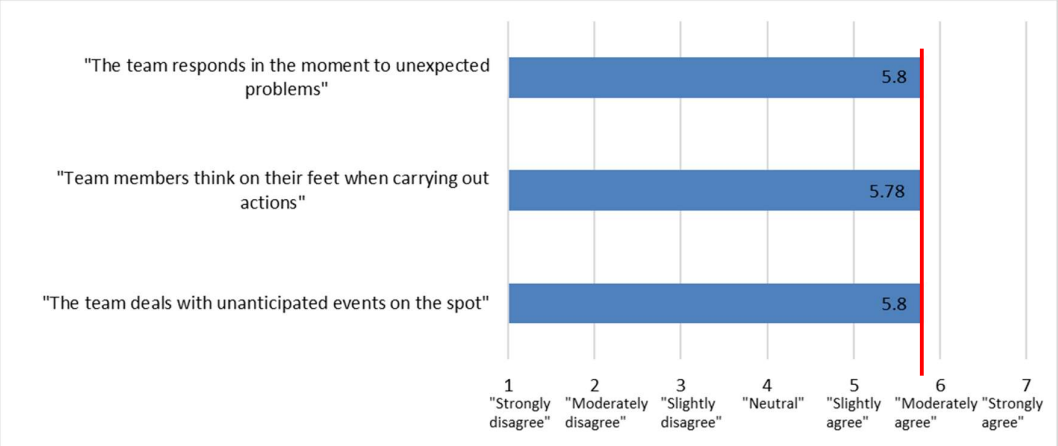

Figure 7: Team spontaneity mean average rating per question (questions from Vera and Crossan (2005))

Based on the outputs (refer to Table 20), the majority of the questions had a median of six, indicating that the respondents moderately agreed that team creativity was

present in their team. Similarly, this was the same for team spontaneity refer to Table 21.

Table 20: Team creativity mean average, median and standard deviation

Question	N statistics	Mean	Median	Standard deviation
"The team tries new approaches to problems."	220	5.69	6.00	1.39
"The team identifies opportunities for new work processes."	220	5.46	6.00	1.55
"The team takes risks in terms of producing new ideas in doing its job."	220	5.33	6.00	1.44
"The team demonstrates originality in its work."	220	5.55	6.00	1.43

Note: Questions from Vera and Crossan (2005)

Table 21: Team spontaneity mean average, median and standard deviation

Question	N statistics	Mean	Median	Standard deviation
"The team deals with unanticipated events on the spot."	220	5.80	6.00	1.40
"Team members think on their feet when carrying out actions."	220	5.78	6.00	1.34
"The team responds in the moment to unexpected problems."	220	5.80	6.00	1.22

Note: Questions from Vera and Crossan (2005)

5.5.1.1.3 Team mental models

A mean average score of 7.19 (scale between zero to ten) was obtained for team mental models, implying that the respondents strongly agreed that team mental models was present in their team. From the items in the construct, the question with the lowest mean score was one regarding the workload not being equally distributed between the team members (refer to Figure 8).

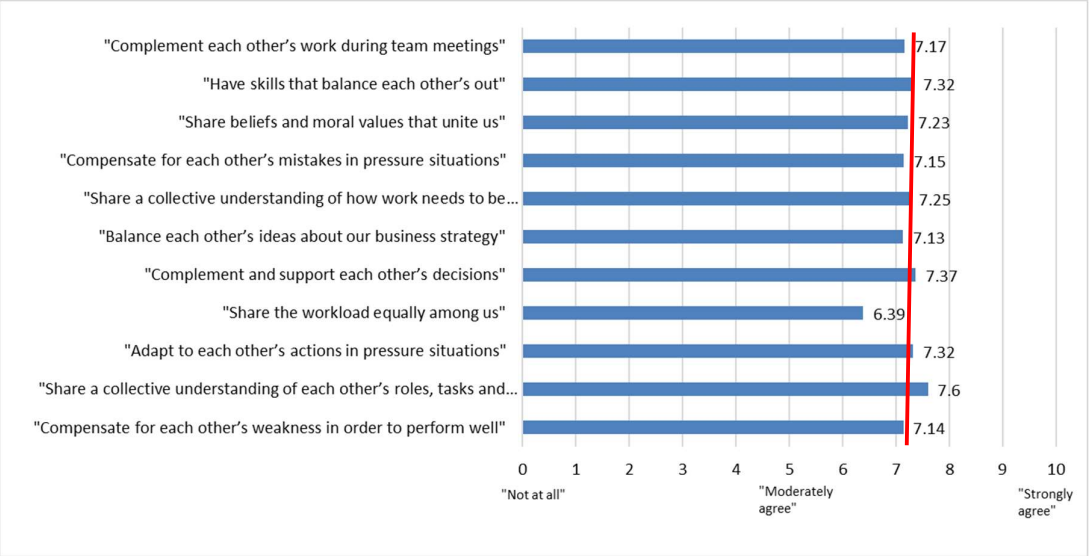

Figure 8: Team mental models mean average rating per question (questions from Filho et al.'s (2022))

Based on the outputs (refer to Table 22), it can be noted that the majority of the questions have a median greater than eight, indicating that the respondent's view on team mental models was toward "Strongly agree."

Table 22: Team mental models mean average, median and standard deviation

Question (We as a team…)	**N statistics**	**Mean**	**Median**	**Standard deviation**
"Compensate for each other's weakness in order to perform well."	220	7.14	8.00	2.47
"Share a collective understanding of each other's roles, tasks and responsibilities."	220	7.60	8.00	2.20
"Adapt to each other's actions in pressure situations."	220	7.32	8.00	2.25
"Share the workload equally among us."	220	6.39	7.00	2.78
"Complement and support each other's decisions."	220	7.37	8.00	2.22
"Balance each other's ideas about our" business strategy.	220	7.13	8.00	2.34
"Share a collective understanding of how work needs to be accomplished."	220	7.25	8.00	2.31
"Compensate for each other's mistakes in pressure situations."	220	7.15	7.00	2.22
"Share beliefs and moral values that unite us."	220	7.23	8.00	2.37
"Skills that balance each other's out."	220	7.32	8.00	2.22

“Complement each other’s work during” team meetings.	220	7.17	8.00	2.37

Note: Questions from Filho et al. (2022)

5.5.1.1.4 Team psychological safety

The team psychological safety construct had a mean average of 5.25 (scale between one to seven), with risk-taking and the concern of making a mistake featured lower than the other items in the construct (refer to Figure 9).

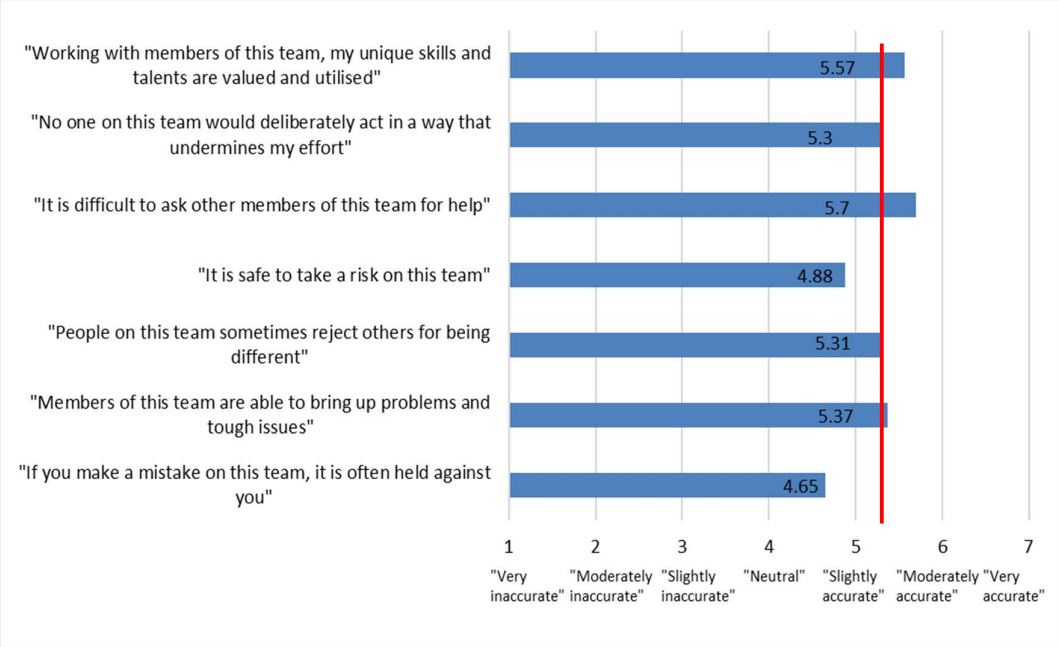

Figure 9: Team psychological safety mean average rating per question (questions from Edmondson (1999))

Furthermore, based on the outputs (refer to Table 23), it can be noted that the majority of the questions have a median greater than five, indicating that the respondents view of team psychological safety as being “Slightly accurate” and “Very accurate.”

Table 23: Team psychological safety mean average, median and standard deviation

Question	N statistics	Mean	Median	Standard deviation
“If you make a mistake on this team, it is often held against you” (reversed)	220	4.65	5.00	1.97
“Members of this team are able to bring up problems and tough issues”	220	5.37	6.00	1.70
“People on this team sometimes reject others for being different” (reversed)	220	5.31	6.00	1.92

“It is safe to take a risk on this team”	220	4.88	5.00	1.71
“It is difficult to ask other members of this team for help” (reversed)	220	5.70	7.00	1.79
“No one on this team would deliberately act in a way that undermines my effort”	220	5.30	6.00	1.93
“Working with members of this team, my unique skills and talents are valued and utilised”	220	5.57	6.00	1.71

Note: Questions from Edmondson (1999)

5.5.1.1.5 Team resilience

The team resilience measure has a mean average score of 2.96 (scale between zero to four), implying that team resilience was more towards being true fairly often (refer to Figure 10). From the items in the construct, the question with the lowest mean score was whether the ability of the team to cope with stress could strengthen the team.

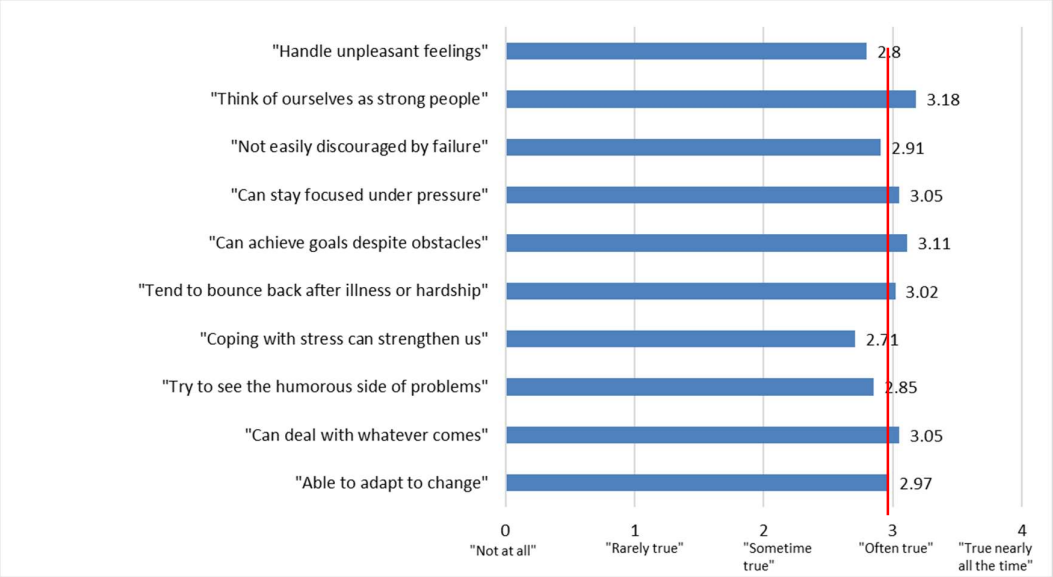

Figure 10: Team resilience mean average rating per question (question from Connor and Davidson (2003))

In addition, the difference between the mean and median is less than 10%, thus implying that there are no outliers in the data (refer to Table 24). The majority of the questions have a median of 3, indicating that the respondent’s view on team resilience was that resilience is “Often true”.

Table 24: Team resilience mean average, median and standard deviation

Question (We…)	N statistics	Mean	Median	Standard deviation
"Able to adapt to change"	220	2.97	3.00	0.88
"Can deal with whatever comes"	220	3.05	3.00	0.79
"Try to see the humorous side of problems"	220	2.85	3.00	0.98
"Coping with stress can strengthen us"	220	2.71	3.00	0.89
"Tend to bounce back after illness or hardship"	220	3.02	3.00	0.83
"Can achieve goals despite obstacles"	220	3.11	3.00	0.76
"Can stay focused under pressure"	220	3.05	3.00	0.70
"Not easily discouraged by failure"	220	2.91	3.00	0.87
"Think of ourselves as strong people"	220	3.18	3.00	0.82
"Can handle unpleasant feelings"	220	2.80	3.00	0.92

Note: Questions from Connor and Davidson (2003)

5.6 Correlation

The correlation between the constructs (a team's potency, creativity, spontaneity, mental models, and psychological safety) and team resilience was checked. The non-normally distributed data required the use of the Spearman rank correlation. Based on the outcome, all constructs were statically significant (p-value was <0.05) and positively correlated to team resilience (refer to Table 25 for the results).

Table 25: Correlation analysis

Construct		Team resilience
Team potency	Spearman correlation	0.673**
	Sig. (2-tailed)	<0.001
	N	220
Team spontaneity	Spearman correlation	0.577**
	Sig. (2-tailed)	<0.001
	N	220
Team creativity	Spearman correlation	0.643**
	Sig. (2-tailed)	<0.001
	N	220
Team psychological safety	Spearman correlation	<0.525**
	Sig. (2-tailed)	<0.001
	N	220
Team mental models	Spearman correlation	0.749**

	Sig. (2-tailed)	<0.001
	N	220
Team resilience	Spearman correlation	1
	Sig. (2-tailed)	-
	N	220

5.7 Research hypothesis

The research objective was to evaluate the hypotheses identified in section 3.1 to determine if there was an association between team potency, team improvisation, team mental models, and team psychological safety with team resilience.

5.7.1 Research hypothesis one: Team potency and team resilience

The first hypothesis was to evaluate whether there was an association between team potency and team resilience, as suggested by Stoverink et al.'s (2020) conceptual model. Therefore, the hypothesis for Research sub-Question One was:

H_1: Team potency is positively associated with team resilience.

H_{01}: Team potency is not positively associated with team resilience.

Before analysing the linear regression data, the assumptions for linear regression were evaluated to confirm that the assumptions were met. The residual plot of the data was normally distributed (refer to Figure 11), the P-P plots of the residual resembled a straight line, and the scatter plot between the standard residual and the standardised predicted value was in the range of -3 and +3, with a few outliers thus indicating homoscedasticity (refer to Figure 12). Furthermore, the Durbin-Watson value was 1.8, implying that the errors are independent and hence the errors are not correlated (criteria for independent errors was above one and below three, as per the recommendation by Field, 2018). These satisfied the linear regression requirements. Thus, the linear regression results were further analysed.

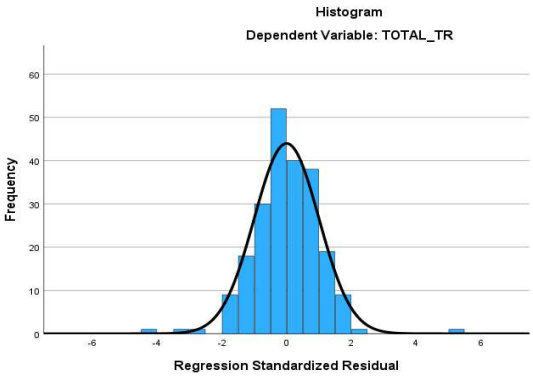

Figure 11: Histogram of standardised residual for hypothesis 1

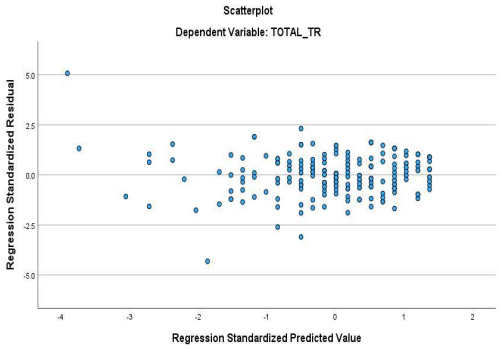

Figure 12: Hypothesis 1_Scatter plot of standardised residual and predicted value

The hypothesis was evaluated using linear regression, resulting in a statistically significant (p-value < 0.001) and positive (β = 0.658) outcome (refer to Table 26), thus indicating that there was a positive association between team potency and team resilience. With the statistically significant outcome, rejecting the null hypothesis was appropriate. Therefore, this implies that team potency and team resilience are positively associated. In terms of model fit, the R^2 value of 0.433 indicated a weak to moderate association between these two variables. The relationship can be explained such that for every unit change for team potency, there is a 0.74 increase in team resilience (B coefficient of 0.74).

Table 26: Linear regression results between team potency and team resilience

Measure	Value
p-Value (regression)	<0.001
R	0.658
R^2	0.433
Unstandardised B coefficient	0.740
Standardised β coefficient	0.658
Coefficients table Sig. value	<0.001

5.7.2 Research hypothesis two: Team capacity to improvise and team resilience

Hypothesis two aimed to understand if there was a relationship between a team's capacity to improvise and team resilience, which was based on the conceptual proposal by Stoverink et al. (2020). Therefore, the hypothesis was:

H_2: A team's capacity to improvise is positively associated with team resilience.

H_{02}: A team's capacity to improvise is not positively associated with team resilience.

Due to the EFA indicating that the construct should be separated into two constructs, the adjusted hypotheses were as follows:

H_{2a}: Team creativity is positively associated with team resilience

H_{02a}: Team creativity is not positively associated with team resilience

H_{2b}: Team spontaneity is positively associated with team resilience

H_{02b}: Team spontaneity is not positively associated with team resilience

As indicated previously, the assumptions needed to be verified before analysing the results from linear regression. Based on the residual plot, the data is normally distributed (refer to Figure 13), and the P-P plot of the residual resembles a straight line. Furthermore, the scatter plot of the standardised residual and standardised predicted value was within the range of -3 and +3 with a few outliers, implying that the data met the requirements of homoscedasticity (refer to Figure 14). The Durbin-Watson for the regression was 1.84, meeting the criteria of between one and three (as per the suggestion of Field, 2018). Hence, the assumptions of the linear regressions were met.

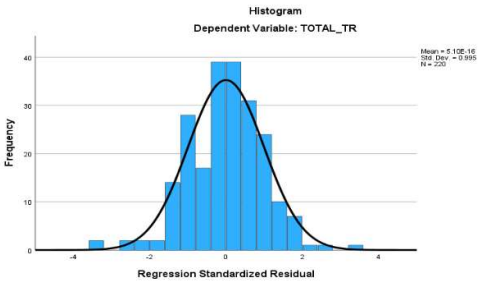

Figure 13: Histogram of standardised residual for hypothesis 2a+b

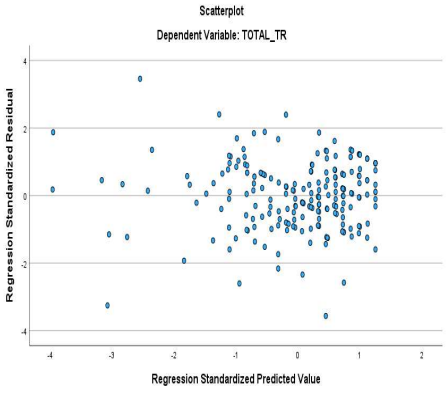

Figure 14: Hypothesis 2a+b_Scatter plot of standardised residual and predicted value

The hypotheses was evaluated using a regression. Based on the results in Table 27, the relationship between team creativity and team spontaneity with team resilience was statistically significant (p-value <0.001) and positive (β =0.478 for team creativity and β = 0.310 for team spontaneity). Therefore, the results provided sufficient support to reject the null hypothesis, owing to a significant association

between team creativity and team spontaneity with team resilience was evident. The relationship showed that for one unit change in team creativity and team spontaneity, there is an increase of team resilience by 0.624 and 0.585, respectively. Furthermore, the R^2 value indicated a moderate association between these constructs (R^2 approximately 0.5).

Table 27: Linear regression between team spontaneity and team creativity with team resilience

Construct	Team creativity value	Team spontaneity value
p-Value (regression)	<0.001	
R	0.707	
R^2	0.499	
Unstandardised B coefficient	0.624	0.585
Standardised β coefficient	0.478	0.310
Coefficients table Sig. value	<0.001	<0.001

5.7.3 Research hypothesis three: Team mental model for teamwork and team resilience

Hypothesis three was to evaluate if a team's mental models has an influence on a team's resilience. Therefore, the hypothesis was:

H_3: Team mental model for teamwork is positively associated with team resilience.

H_{03}: Team mental model for teamwork is not positively associated with team resilience.

Based on the assumption requirement for linear regression, the residual plot was fairly normally distributed (refer to Figure 15), and the P-P plot of the residual was a straight line. The requirement of homoscedasticity was met as the scatter plot of the standardised residual and predicted value was within the range of -3 and +3 with a few outliers (refer to Figure 16). Furthermore, the Durbin-Watson value of 2.01 suggested that the independent error test was met and that the variables were not correlated. These results conform to linear regression requirements, and hence, the results from the regression will be accurate.

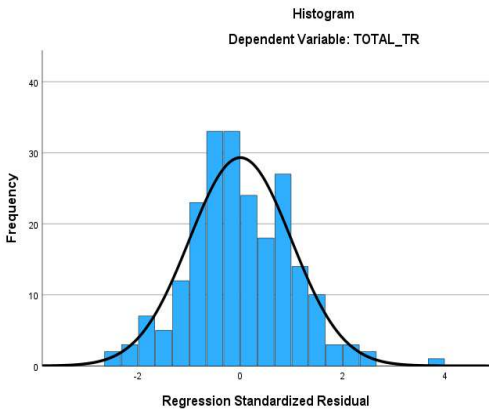

Figure 15: Histogram of standardised residual for hypothesis 3

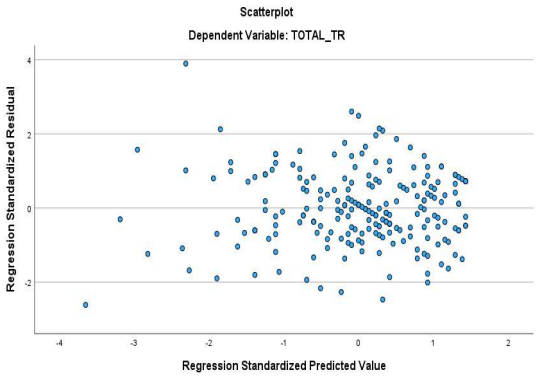

Figure 16: Hypothesis 3_Scatter plot of standardised residual and predicted value

The linear regression result indicates that the relationship between team mental models and team resilience was statistically significant (p-value < 0.001) (refer to Table 28). This result provides the evidence to disregard the null hypothesis and accept the alternative hypothesis (H_3). Furthermore, the two constructs' relationship is positively related (β = 0.777), with a moderate to strong association between the two variables (R^2 value of 0.60). This implies that team mental models can predict 60% of the variance of a team's resilience.

Table 28: Team mental models and team resilience linear regression results

Measure	Value
p-Value (regression)	<0.001
R	0.777
R^2	0.604
Unstandardised B coefficient	0.237
Standardised β coefficient	0.777
Coefficients table Sig. value	<0.001

5.7.4 Research hypothesis four: Team psychological safety and team resilience

Hypothesis four was to determine if there is a relationship between team psychological safety and team resilience, as per the Stoverink et al. (2020) conceptual model. Therefore, the hypothesis was:

H_4: Team psychological safety is positively associated with team resilience

H_{04}: Team psychological safety is not positively associated with team resilience

Based on the assumption required for linear regression, it was noted that the residual plot was fairly normally distributed (refer to Figure 17), the P-P plot of the residual was a straight line, and the requirement of homoscedasticity was met as the scatter plot of the standardised residual and predicted value was within the range of -3 and +3 (refer to Figure 18). Furthermore, the Durbin-Watson was 1.97, thus indicating that the test for independent errors was not correlated. These tests conform to linear regression requirements, and hence, the results for linear regression were analysed.

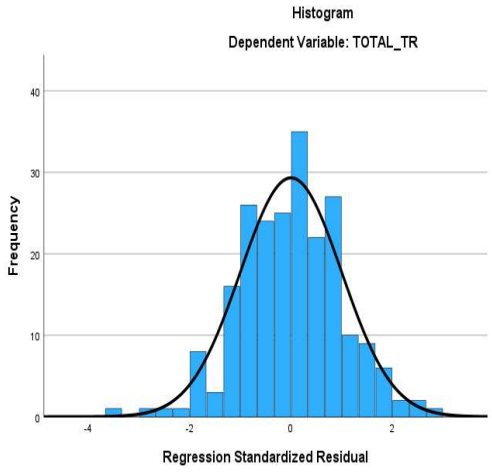

Figure 17: Histogram of standardised residual for hypothesis 4

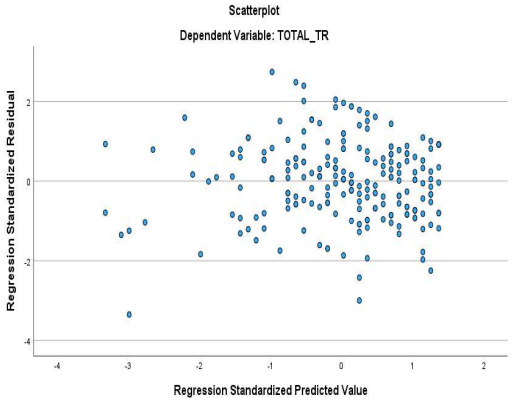

Figure 18: Hypothesis 4_Scatter plot standardised residual and predicted value

The results (refer Table 29) from linear regression indicated that the relationship between team psychological safety and team resilience was positive (β =0.62) and statistically significant (p-value<0.001). Therefore, this implies that the null hypothesis can be rejected, and the alternative hypothesis can be accepted (H_4). Furthermore, the relationship can be explained that there is a 0.454 increase in team resilience for every unit change in team psychological safety (B coefficient of 0.45). However, the two constructs have a weak association (R^2 value of 0.38).

Table 29: Linear regression results between team psychological safety and team resilience

Construct	Value
p-Value (regression)	<0.001
R	0.615
R^2	0.378
Unstandardised B coefficient	0.454
Standardised β coefficient	0.615
Coefficients table Sig. value	<0.001

5.8 Multiple regression

The correlation analysis and linear regression evidence emphasises the association that exists between the constructs and team resilience. However, multiple regression was conducted to understand which construct was statistically significant relative to each other. The model also included the control variables as part of the predictor variables. In doing so, the multiple regression would answer the question of the determinants of team resilience.

5.8.1 Identifying significant construct

For the multiple regression, it was required that the assumptions for the regression be checked to ensure that the results from the regression were accurate. Therefore, before analysing for significant constructs, the data was checked for the independence of the errors, resulting in a Durbin-Watson value of 1.87, which was within the acceptable limit between 1 and 3. The residual plot was reasonably normally distributed, thus meeting the requirement for normality (refer to Figure 19). Homoscedasticity was checked via the scatterplots, which showed that the data was within -3 and +3, with limited outliers; hence, homoscedasticity was acceptable (refer to Figure 20). Lastly, the test for multi-colliery was checked using the Pearson correlation to ensure that there was no linear relationship that existed between the dependant variables. The results from this test showed that all the constructs met the criteria except for the team mental models and team psychological safety and team mental models and team resilience, which was greater than 0.7; however, this value was not that large (0.72 and 0.78 respectively) (refer to section 9.8). Furthermore, the VFI showed that all constructs were less than 10 (refer to Table 30), thus highlighting that multi-colliery was not a concern.

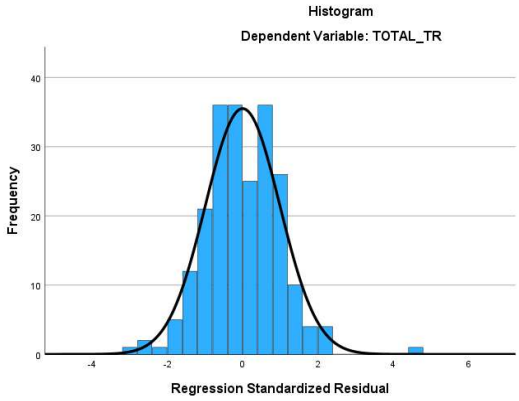

Figure 19: Histogram of standardised residual for multiple regression

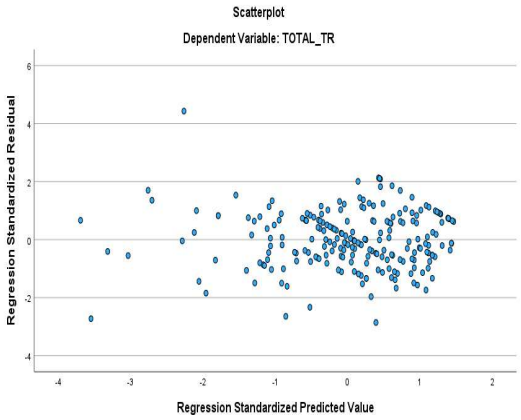

Figure 20: Multiple regression_Scatter plot standardised and predicted value

Table 30: VIF information for the constructs

Construct	VIF value
Team potency	2.27
Team spontaneity	1.80
Team creativity	2.25
Team psychological safety	2.30
Team mental models	3.18

The data from the multiple regression was analysed, seeing that the assumptions for multiple regression were fulfilled. As part of the multiple regression, control variables, identified in section 4.6.8, were included in the equation. Based on the results (refer to Table 31), team potency, team spontaneity, team creativity, and team mental models significantly impact team resilience (p-value <0.05), while team psychological safety and control variables were insignificant.

Table 31: Multiple regression model significance values of independent variables

Construct	Sig.
Team potency	0.010
Team spontaneity	0.011
Team creativity	0.009
Team psychological safety	0.067
Team mental models	<0.001
Respondent's age	0.931
Respondent's gender	0.985
Team size	0.654
Length of time in the team	0.625

Seeing that team potency, team creativity, team spontaneity, and team mental models were significant, the multiple regression was re-run with these variables. Based on the result, it is evident that the identified constructs remain statistically significant. The model fit for the multiple regression indicates that 67.7% (refer to Table 32) of the relationship is accounted for by team potency, team spontaneity, team creativity, and team mental model. Therefore, only 32.3% of the variation in team resilience is not accounted for.

Team mental model ranks the highest, with a β of 0.503, compared to the other statistically significant constructs (refer to Table 33). This is followed by team

potency and team creativity, both with a β of 0.160, lastly followed by team spontaneity (refer to Table 33).

Table 32: R and R^2 values of the multiple regression

Measure	Value
R	0.823
R^2	0.677

Table 33: Multiple regression unstandardised and standardised co-efficient

	Unstandardised Coefficients		Standardised co-efficient β	Sig.
Construct	Unstandardised B	Standard error		
Constant	2.989	1.534	-	0.053
Team potency	0.180	0.064	0.160	0.005
Team spontaneity	0.241	0.097	0.128	0.014
Team creativity	0.208	0.074	0.160	0.006
Team mental models	0.154	0.017	0.503	<0.001

Team resilience can be explained through the following equation:

TR = 2.989 + (0.180 x TP) + 0.241 (TSPONT) + 0.208(TCREATIVITY) + 0.154 (TMM)

The conceptual model is represented as follows:

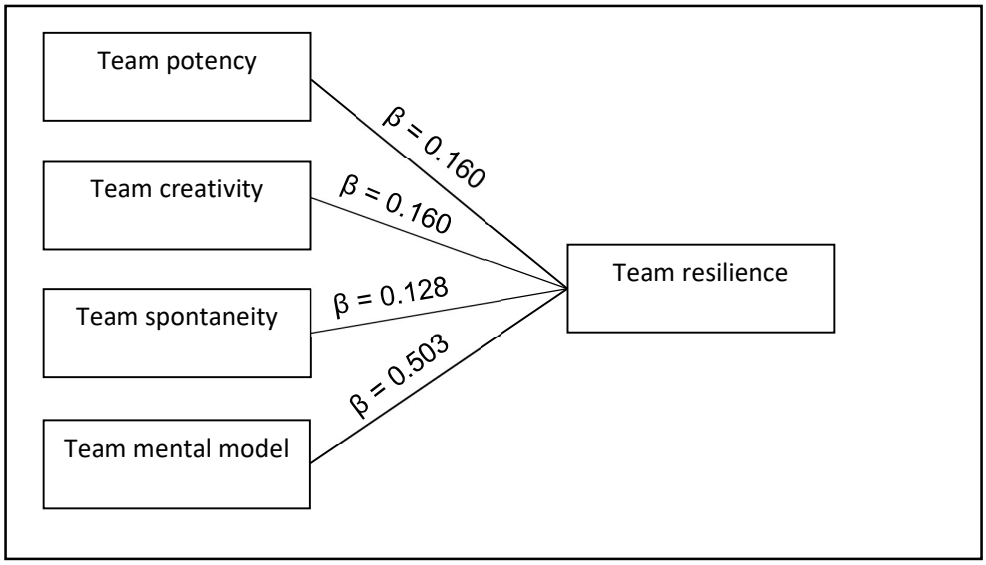

Figure 21: Beta coefficients of significant constructs

5.9 Conclusion

The research objective was to identify the determinants of team resilience by investigating the factors proposed in Stoverink et al.'s (2020) conceptual model. The data was analysed in a phased approach whereby the validity and reliability of the constructs were evaluated through the Cronbach's alpha and Pearson correlation. Based on the results, it was confirmed that the constructs were valid and reliable. Thereafter, an EFA was conducted to determine the dimensionality of the variables. Based on the results, it was required to create two subconstructs for team improvisation, namely: team creativity and team spontaneity. The next step was to determine if there was a correlation between the constructs and team resilience. Through the Spearman correlation, it was identified that all the determinants were positively correlated to team resilience. In order to accept or refute the identified hypotheses, a linear regression was conducted, which indicated that the determinants (team potency, team creativity, team spontaneity, team mental model for teamwork, and team psychological safety) and team resilience were all positively and statistically significant. The final analysis completed was to understand which of the various determinants were statistically significant when compared to the overall model. This was completed using a multiple regression that included control variables, which identified that team potency, team spontaneity, team creativity, and team mental models are determinants of team resilience.

CHAPTER SIX: DISCUSSION OF RESULTS

6. Introduction

Chapter One identified the gap in literature of determining the factors of team resilience by evaluating the factors identified in Stoverink et al.'s (2020) conceptual model. These factors include team potency, team capacity to improvise, team mental model for teamwork, and team psychological safety. Thereafter, Chapter Two analysed prior work completed on team resilience, which led to Chapter Three which identified the research question, and the hypotheses to be evaluated.

Chapter Four provided the research design and methodology employed to respond to the Chapter Three's research question and hypotheses. This design included a positivist philosophy, which leveraged the deductive approach through questionnaires to obtain the required data. The unit of analysis was individuals who work in teams. Chapter Five detailed the results of the data obtained for the research.

Chapter Six discussed the results in detail, starting with the sample, followed by an analysis to accept or refute the postulated hypotheses between team potency, team improvisation, team mental models, and team psychological safety with team resilience. Thereafter, the findings from multiple regression analysis will be discussed, indicating which determinants are predictors of team resilience.

6.1 Sample

The research attempted to achieve a sample size of at least 400, per Daniel's (2011) suggestion. However, after five weeks and three days, the survey was closed due to no further responses, despite reminder emails and posts on LinkedIn and WhatsApp. During this period, 281 responses were obtained; however, once the data was edited, the sample size decreased to 220. As part of quality controls, data editing was required to make sure that the data was appropriate for the study (by excluding respondents who did not meet the criteria and where there was missing data). The inability of the research to reach the suggested 400 sample size could be due to the purposive and snowballing sampling method used to obtain the sample, which limited this research. Regardless, Pavez et al. (2021) recently conducted research with a sample size of 214 respondents. Thus, this research is consistent with prior research, so the analysis was completed on a 220-sample size.

The sample data had an approximately even split between female and male respondents, with only two respondents who preferred not to say. Approximately 85.5% of the respondents were between the ages of 31 and 60, of which 47.27% were between the ages of 31 and 40. The respondents were mainly from the manufacturing, petrochemical, or financial industries, of which 66.82% of the respondents worked in large organisations (more than 251 employees). The remainder of the sample represented micro to medium sized companies. These respondents were predominantly either in senior management (24.55%), middle management (35.91%), or on the intermediate level (24.55%). Although the job function of the respondents varied considerably, approximately 56.36% of the respondents were from an engineering, management, analysts, business development, information technology, consulting, or a sales function.

The respondent's team size ranged from a team size of 5 to 10 members, which accounted for 43.64% of the sample, with an equal weighting (21.82%) of respondents who worked in teams with a team size of 3 to 4 members and 11 to 17 team members. Therefore, the majority of the respondents were from team sizes between 3 to 17 team members (87.28%), with a few respondents from larger team sizes. Furthermore, the respondents were part of the team for more than one year (77.27%).

As indicated, although the research adopted a positivist philosophy, the sample was limited to the people within the researcher's networks, thus limiting the positivist approach.

6.2 Discussion of the constructs

6.2.1 Team potency

Team potency, measured using the scale developed by Guzzo et al. (1993), consisted of eight items. The items in the scale were rated on a Likert scale from one to five. A score of one was equivalent to "To no extent," while five was equivalent to the rating of "To a great extent."

The data obtained for team potency suggested that the respondents believed that team potency was "to a considerably extent" present in their teams, since the team potency average was 3.99 (refer to Table 17). As indicated by Stoverink et al. (2020), team potency represents the attitude of wisdom of the team in their abilities, which also embodies a blend of both caution and confidence. Therefore, from the data,

there is consensus amongst the sample that they believe in their team abilities. This is further highlighted by the highest mean score was of 4.35 (refer to Table 19), related to the statement, “This team can get a lot done when it works hard.”

The data for the construct was not normally distributed, seeing that the Shapiro-Wilk and Kolmogorov-Smirnov test were less than 0.05. In addition, the data was negatively skewed.

6.2.2 Team capacity to improvise

To evaluate a team’s capacity to improvise, the Vera and Crossan (2005) scale, which comprised of creativity and spontaneity, was used. The results of the EFA required that the main construct be divided into the sub-constructs. The scale was assessed by a seven-point Likert scale with “strongly disagree” and “strongly agree” as the anchoring points.

The mean score for team creativity and team spontaneity was 5.51 and 5.79, respectively (refer to Table 17). This implies that the respondents slightly agreed that there was team creativity and team spontaneity in their team. The average mean for the individual questions was similar with, no question deviating significantly from the mean (refer to Table 20 and Table 21).

Since the result of the Shapiro-Wilk and Kolmogorov-Smirnov test was less than 0.05, the data was non-normally distributed, with the data being negatively skewed.

6.2.3 Team mental models

Using the Filho et al. (2022) scale, a team’s mental model for teamwork was evaluated. The scale was measured on an 11-point Likert scale, which was anchored on (0) “Not at all” and (10) “Strongly agree.”

The mean average for the 11 questions was 7.19, which implies that the respondents agreed that team mental models was present in their teams (refer to Table 17). The question with the highest mean score was: “We as a team share a collective understanding of each other’s roles, tasks and responsibilities,” with a mean score of 7.60 (refer to Table 22). This is congruent with the argument by Stoverink et al. (2020) for including this as a component since it is indicated that team mental models represent the underlying understanding of each member’s role, responsibilities, and their connectedness. Stoverink et al. (2020) explain that team mental model is based on the precision and the commonality of understanding among the team members.

The question with the lowest mean score related to the shared mental model, which relates to the following question: “We as a team share the workload equally among us,” which had a mean score of 6.39 (refer to Table 22).

The data for the construct was not normally distributed, seeing that the Shapiro-Wilk and Kolmogorov-Smirnov test were less than 0.05. In addition, the data was negatively skewed.

6.2.4 Team psychological safety

Evaluating team psychological safety was achieved through the Edmondson (1999) seven item scale. Each item in the scale was rated using a Likert scale ranging from one to seven. A score of one was equivalent to the rating “Very inaccurate,” while seven was equivalent to “Very accurate.”

The lowest means were for the following questions: “If you make a mistake on this team, it is often held against you” and “It is safe to take a risk on this team,” with mean scores of 4.65 (score reversed) and 4.88, respectively. The lower scoring implies that the respondents were neutral to slightly agreeing that mistakes and risk taking were embraced in the team (refer to Table 23). Cauwelier et al. (2019) explain that the ability of a team to share their mistakes and take risks allows for the team to learn from each other and increase the team’s shared mental models. Nevertheless, the mean average for the scale was 5.79, indicating that the sample considered that the psychological safety within their team was on the higher side of being slightly accurate.

The data for the construct was not normally distributed, seeing that the Shapiro-Wilk and Kolmogorov-Smirnov test was less than 0.05. In addition, the data was negatively skewed.

6.2.5 Team resilience

The CD-RISC scale was used to measure a team’s resilience (Connor & Davidson, 2003; Hartmann et al., 2021). The 10-item scale was rated on a five-point Likert scale, which was centred on (0) “Not at all” and (4) “True nearly all the time.”

The mean average for team resilience was 2.96, which implies that the respondents agreed that their team’s resilience was present most of the time (refer to Table 17). The question with the highest mean score was: “We think of ourselves as strong

people" and "We can achieve goals despite obstacles," with a mean score of 3.18 and 3.11, respectively (refer to Table 24).

The data for the construct was not normally distributed, seeing that the Kolmogorov-Smirnov and Shapiro-Wilk test were less than 0.05. In addition, the data was negatively skewed.

6.3 Hypotheses discussion

6.3.1 Hypothesis 1: Team potency and team resilience

Stoverink et al. (2020) stipulated that team potency was a factor of team resilience. This construct was analogous to Weick's (1993) attitude of wisdom factor for an organisation. Therefore, the objective was to determine if there was an association between team potency and team resilience, which was based on the hypothesis:

H_1: Team potency is positively associated with team resilience.

Team potency is the combined belief of a team that they are proficient and capable of various tasks or situations (Gevers et al., 2020; Guzzo et al.,1993). This collective belief increases the team's overall motivation and enhances performance (Gevers et al., 2020). While team potency is beneficial, excessive team potency can lead to overconfidence, diminishing a team's ability to identify risks (Stoverink et al., 2020). On the contrary, a lack of team potency, may leave a team vulnerable (Stoverink et al., 2020).

Based on the data received for team potency and team resilience, the Spearman rank correlation tested and confirmed the positive correlation between these two constructs. Furthermore, a linear regression resulted in a significantly positive relationship between team potency and team resilience (p-value <0.001 and β=0.658) (refer to Table 26). This result suggests that if a team believes that collectively, they can be effective and capable in various tasks or situations, the more likely the team will be resilient in the event of adversity. This relationship can be explained that for every unit change of team potency, there is an increase of 0.74 increase in team resilience (refer to Table 26). However, the R^2 shows a moderate association between these two constructs (R^2 = 0.43). This implies that only 43% of the variance in team resilience can be predicted by team potency.

This finding aligned with the research completed by Pavez et al. (2021), who also confirmed a positive association between these two constructs (β=0.658). However,

conceptual models postulated by Bowers et al. (2017), Hartmann et al. (2020), Gucciardi et al. (2018), and Hartwig et al. (2020) fail to recognise team potency as part of the models. Even though team potency was identified as part of the systematic literature review completed by Hartwig et al. (2020), this construct was not identified as a common construct tested empirically nor as a frequent code in the research search and was not considered as part of the conceptual model. On the other hand, Bowers et al. (2017) identify team efficacy as a "first order emergent state" of team resilience. Even though team efficacy and team potency are not identical, there are overlaps between these concepts (Le Blanc et al., 2021). In the Vera et al. (2017) research, it was demonstrated that team efficacy positively influenced team resilience.

Although there are varying views and results available on team potency, this hypothesis aimed to understand if there was a positive association between team potency and team resilience, which was confirmed.

6.3.2 Hypothesis 2: Team capacity to improvise and team resilience

The conceptual model proposed by Stoverink et al. (2020) postulated that a team's capacity to improvise, analogous to Weick's (1993) improvisation and bricolage factor for an organisation, was a factor of team resilience. Hence, the objective was to determine if there was a relationship between team improvisation and team resilience, as indicated by the following hypothesis:

H_2: A team's capacity to improvise is positively associated with team resilience.

A team's ability to improvise was evaluated using the Vera and Crossan (2005) scale, which considered team creativity and team spontaneity. These two subconstructs were identified as part of the EFA analysis and hence following the guidance of the research methodology, team improvisation was separated for the analysis, resulting in the following hypotheses:

H_{2a}: Team creativity is positively associated with team resilience

H_{2b}: Team spontaneity is positively associated with team resilience

These sub-constructs are aligned with literature, which shows that both creativity and spontaneity are required for team improvisation. Team improvisation, which relies on the knowledge and experience of an individual, is an innovative or novel approach to handling a problem or challenge (Vera et al., 2016; Ye & Chen, 2021).

Team improvisation benefits a team, as the collective repository of knowledge within the team allows the team to obtain a broader outlook to handle the problem, provides a diverse range of ideas to consider, and promotes innovation and creativity (Ye & Chen, 2021). However, this value is only extracted if the individual's knowledge is effectively integrated into the team (Ye & Chen, 2021). Zenk et al. (2022) also elaborate that while experience in a particular industry plays an important role, it is only through continuous learning and training that a team to make faster decisions. Further, improvisation necessitates a team to take immediate action to react to unexpected events (Zenk et al., 2022).

Based on the data received for team creativity, team spontaneity, and team resilience, the Spearman rank correlation test was completed between these constructs, which showed a positive correlation (p-value <0.001) (refer to Table 25). The hypotheses were evaluated using a regression, which indicated that team spontaneity and team creativity are indeed statistically significant (p-value < 0.001) and positively associated with team resilience (β for creativity = 0.478 and β for spontaneity = 0.310) (refer to Table 27). In terms of the relationship, for every unit change of team creativity and team spontaneity, there is an increase in team resilience of 0.624 and 0.585, respectively (refer to Table 27). This implies that if a team can find a novel way and respond rapidly to adversity, it will make the team more resilient. Furthermore, the R^2 shows that this association between team creativity and team spontaneity with team resilience is moderate (R^2 at 0.499).

This study's findings differ from the other postulated conceptual models for team resilience, as team improvisation was not considered. This includes the models developed by Bowers et al. (2017), Hartmann et al. (2021), Hartwig et al. (2020) and Gucciardi et al. (2018). Furthermore, although Hartwig et al. (2020) identify team creativity as part of the systemic literature review, this component was not included as part of the conceptual model.

Although this result differs from the current conceptual models, it aimed to understand if there was a positive relationship between team improvisation, specifically team creativity and team spontaneity, and team resilience, which was confirmed.

6.3.3 Hypothesis 3: Team mental model for teamwork and team resilience

According to Weick (1993), an adverse event can result in the breakdown of formal roles; hence, having a virtual role system becomes important. Stoverink et al. (2020) argue that team mental models for teamwork represent virtual role systems on a team level. Therefore, the objective was to determine if a relationship between team mental models and team resilience existed, which was based on the hypothesis:

H_3: Team mental model for teamwork is positively associated with team resilience.

The team mental model combines both shared and complementary mental models. Shared mental models represent a team member's role, duties, and overall functioning of the team (Filho et al., 2022). While complementary mental model is the complementary and compensatory knowledge and aptitude of members within the team (Filho et al., 2022). This combination guides a team to understand the "what", "how," and the game plan during an adverse event (Filho et al., 2022).

Based on the non-normally distributed data obtained for team mental models and team resilience, the Spearman rank correlation test was utilised to analyse the correlation between these two constructs, confirming a positive correlation (refer to Table 25). Furthermore, a linear regression confirmed that there was a positive relationship between a team's mental model and resilience (p-value <0.001 and β=0.777) (refer to Table 28). The relationship between the two constructs can be explained as every unit increase in team mental models, there is an increase of team resilience by 0.237 (refer to Table 28). Furthermore, the R^2 of 0.604 indicatives that there is a moderate to strong association between these constructs. This result suggests that if a team understands their role and interconnectedness, especially when formal roles have broken down under an adverse event, the team is more likely to remain resilient. Furthermore, if team members have knowledge and skills that complement to their team members, this would enhance a team's resilience.

Stoverink et al. (2020) justification for the inclusion of the factor was that a team's mental model provides a basis on which each team member understands the role of each team member and the interdependencies of the roles. Hartwig et al. (2020) also suggest team mental models as a mediator. Both these authors mention the term "team mental models"; however, it is more focused on the shared mental model rather than the complementary mental model. In addition, the conceptual models proposed by Bowers et al. (2017) and Gucciardi et al. (2018) consider only shared

mental models as an emergent state and as input in their conceptual models, respectively. The reason why these authors consider shared mental models as part of their conceptual model is owing to the fact that shared mental model assists in the coordination of a team's activities (Carrington et al., 2019). Lines et al. (2022) indicate that on an individual level, interventions such as role clarity are required to ensure that each team member (individual) knows what needs to be done. On a team level, interactions between team members, team performance monitoring, and establishing team norms are required to enhance shared mental models (Lines et al., 2022). It is also indicated that having a shared mental model at a leadership level is important as the absence of this would create confusion in the team on the team's role and vision, especially during a crisis (Carrington et al., 2019).

However, the suggested team resilience conceptual models do not consider the importance of complementary mental models, which are the complementary skills that assists a team in adversity (Filho et al., 2022). This research has shown that complementary team models, which is a sub-construct in team mental models, is also necessary for team resilience.

Whilst the results align to some aspects in literature, this research was able to identify that team mental models, which includes both shared and complementary mental model, is positively associated with team resilience. Furthermore, this research highlights that complementary mental models contribute to a team's resilience, which differs from the existing conceptual models.

6.3.4 Hypothesis 4: Team psychological safety and team resilience

In Weick's (1993) analysis of the Mann Gulch disaster, it was discovered that vulnerable situations can be offset by focusing on the individual's interactions, referred to as respectful interaction. These respectful interactions are captured as honesty, trust, and self-respect among people, which in turn enhances the ability of creativity, adaptation, and a trusting environment in the event of adversity (Weick, 1993). According to Stoverink et al. (2020), team psychological safety is analogous to Weick's (1993) factor of respectful interactions. Therefore, the aim of the hypothesis was to determine if there was a positive association between a team's psychological safety and team resilience as follows:

H_4: Psychological safety is positively associated with team resilience

Team psychological safety is an important factor as it offers a setting whereby members feel secure and are comfortable in communicating their ideas or options without the fear of being ostracised or humiliated by the team members (Stoverink et al., 2020). Furthermore, it provides a setting in which the team members feel comfortable to share mistakes, as mistakes are not considered failures but rather opportunities from which team members can learn (Cauwelier et al., 2019).

For this research, the data received from the sample on team psychological safety and team resilience was analysed using the Spearman rank correlation test, which showed that there is a significant and positive correlation between the constructs (refer to Table 25). Furthermore, the results from the linear regression showed that there is a significant positive relationship between team psychological safety and team resilience (p-value <0.001 and β=0.615) (refer to Table 29). However, the R^2 value of 0.378 shows a weak association between these constructs.

In terms of literature, these results are in line with the postulated conceptual models where psychological safety, either in the exact form, or a similar construct has been considered. For example, Hartwig et al. (2020) identify team psychological safety as a mediator to team resilience. Similarly, Hartmann et al. (2020) and Bowers et al. (2017) conceptual models consider the team's connectivity and cohesion as constructs of team resilience. While these constructs are not exactly the same as psychological safety, these characteristics are as a result of a psychologically safe setting. This was identified by Bui et al. (2019) who indicate that a psychologically safe setting promotes knowledge sharing and cohesiveness between the members (Bui et al., 2019).

Empirical research completed by Fransen (2020) showed that a team's psychological safety and team resilience were indeed positively associated. Further to this, another similar construct to psychological safety was employee voice, which is the perception that a team is encouraged to speak up (Bryman & King, 2021; Li & Tangirala, 2022). Although employee voice is not psychological safety, however, it shares similar features to psychological safety, with it being a more specific team state (Bryman & King, 2021; Morrison et al., 2011). Employee voice plays an important role, especially in adverse events, as it allows team members to generate ideas and share knowledge (Li & Tangirala, 2022). Employee voice has a positively influence on a team's performance in an adverse event (Li & Tangirala, 2022).

Therefore, the result that team psychological safety positively influences a team's ability to be resilient was confirmed and is in line with literature.

6.4 Multiple regression of the constructs

Seeing that the proposed conceptual model has more than one factor, multiple linear regression of the five independent variables (team potency, creativity, spontaneity, mental models, and psychological safety) and the dependent variable (team resilience) was required to determine which factors were significant.

The control variable of team size, used in previous research, was incorporated as a control value in the multiple regression. Other team-related factors such as gender, age, and how long the respondent has been in the team were included as part of the control variable. The multiple regression results identified that team potency, team spontaneity, team creativity, and team mental models were statistically significant. There was no statistical significance of team psychological safety and the control variables. A reason why psychological safety was not identified as a significant construct could be due to the construct demonstrating a mediator role rather than an input factor, as per Hartwig et al.'s (2020) proposal.

Based on the multiple regression with only the statistically significant constructs, it was identified that the significance level was less than 0.05, implying a 95% confidence level in the results. The model of the predictor variables and outcome variable has a R^2 value of 67.7%. This implies that 67.7% of the relationship is accounted for by team potency, team spontaneity, team creativity, and team mental models.

Furthermore, the β value of the team mental model ranked the highest at 0.503, followed by team potency and team creativity (both β's is at 0.160), and lastly, team creativity (β = 0.128). This would imply that if a team is: 1) aware of what needs to be done, 2) have the complementary skills to do so, 3) believe in their shared abilities, 4) are creative and 5) take immediate action, the team will be more resilient in an adverse event.

6.5 Conclusion

Stoverink et al.'s (2020) conceptual model was developed from Weick's (1993) taxonomy, which was based on organisational resilience. Stoverink et al. (2020) identified analogous constructs relevant at a team level to develop the conceptual

model. These constructs include team potency, team improvisation (team creativity and team spontaneity), team mental models, and team psychological safety.

The analysis of the data has shown that all the identified constructs (team potency, team creativity, team spontaneity, team mental models, and team psychological safety) in Stoverink et al.'s (2020) conceptual model are positively correlated to team resilience. Furthermore, the linear regression of each construct showed that these constructs were statistically significant and positively associated with team resilience. However, the multiple regression analysis revealed that team potency, team spontaneity, team creativity, and team mental models were the only constructs that were statistically significant variables to team resilience. This, therefore, answers the research question: "What are the determinants of team resilience?".

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

Research focused on team resilience has been identified to be at the nascent stages (Raetze et al., 2022). In particular, there is a lack of testing of team resilience conceptual models; hence, researchers have called to delve deeper into identifying which factors are significant predictors of a team's resilience (Raetze et al., 2022). As a result, this research was steered by the question of the determinants of team resilience. This research intended to answer the research question by evaluating the conceptual model for team resilience developed by Stoverink et al. (2020), which identified team potency, improvisation, mental model, and psychological safety as factors.

Chapter Two provided an overview of the evolution of resilience and introduced various conceptual models proposed for team resilience. However, when compared to the other conceptual models, Stoverink et al.'s (2020) conceptual model was particularly important as it leveraged Weick's (1993) taxonomy. Hence, Stoverink et al.'s (2020) model was chosen due to two reasons, namely: (1) that Weick's (1993) taxonomy has been an important model used in the understanding of organisational resilience, and (2) considering that there are construct similarities across the various levels (individual, team and organisational) would imply that Weick's (1993) taxonomy adapted for the team level could be relevant. The chapter also detailed the significance of each construct identified in Stoverink et al. (2020) conceptual model, which were presented as the hypotheses to be tested in Chapter Three.

The research used an explanatory approach that was underpinned by a positivist philosophy. The data was collected using a survey strategy that leveraged existing scales for the various constructs. Individuals who work together in a team to achieve an organisational goal was the unit of analysis used to obtain the data. The research used a cross-sectional time frame in which period a total of 281 responses were obtained. However, after data editing (removing respondents who did not work in a team or did not complete the survey), a sample size of 220 was obtained. Quality controls were undertaken, which included a pilot test, ensuring the right sample was analysed by deleting respondents who either failed to meet the sample criteria or did not complete the survey, and checking the assumptions for the various tests to

ensure the results were valid. Chapter Five presented the results, and Chapter Six discussed the results obtained.

This chapter seeks to conclude the research by answering the question: “What are the determinants of team resilience?” This will be done by summarising the findings and translating them into theoretical and managerial implications. Furthermore, the study will also identify the limitations and provide recommendations for possible future research areas.

7.2 Findings

The study focused on addressing the question: “What are the determinants of team resilience?” To answer this overreaching question, the Stoverink et al. (2020) conceptual model for team resilience provided the framework in which it was required to test the relationship between team potency, team improvisation, team mental model, team psychological safety with team resilience. The team improvisation construct was separated into team creativity and team spontaneity as a result of the EFA.

The research systematically analysed each construct to determine if there was an association with team resilience. Based on the regressions, the following were found:

1. Team potency is positively associated with team resilience
2. Team creativity is positively associated with team resilience
3. Team spontaneity is positively associated with team resilience
4. Team mental models is positively associated with team resilience
5. Team psychological safety is positively associated with team resilience

To understand which of the constructs were statistically significant, multiple regression of the independent variables (team potency, creativity, spontaneity, mental models, and psychological safety) and the dependent variable (team resilience) were tested. As part of the multiple regression model, control variables were included. This included the respondents’ gender, age, team size that they belong to, and how long the respondent has been in the team. The findings from the multiple regression highlighted that team potency, team creativity, team spontaneity, and team mental models were predictors of team resilience. Furthermore, the team mental model ranked the highest, followed by team potency and team creativity, and lastly, team spontaneity. The influence of team psychological safety and control variables were not identified as predictors of team resilience.

In summary, this research's objective was to determine the factors of team resilience using Stoverink et al.'s (2020) conceptual model. This was achieved by identifying that team potency, team creativity, team spontaneity, and team mental models were factors of team resilience.

7.3 Theoretical implications

Although the concept of resilience has been around since the 1980s, it is still nascent (Raetze et al., 2022). Furthermore, resilience research has been centred on individual or organisational levels, with limited research on the team level (Raetze et al., 2022). However, with the pervasiveness of teams in an organisation and the value achieved through teams, there is a need to understand resilience at the team level (Degbey & Einola, 2020; West et al., 2009). While there may be similarities in the capabilities across the various levels, it is evident that the manner in which adversity unfolds in a team and how a team collectively overcomes the adversity makes the team unique, thus emphasising the need to delve deeper into understanding the phenomena at the team level (Raetze et al., 2022).

This research intended to answer the question of the determinants of team resilience by utilising the Stoverink et al. (2020) conceptual model. This research found that a team's potency, creativity, spontaneity, and mental models are important predictors of team resilience. Furthermore, a particular aspect uncovered in this research was that team mental model considers both shared and complementary mental models. The insight from this research will broaden the of knowledge on team resilience by identifying the determinants of team resilience. This research will also assist future researchers who aim to develop and expand conceptual models for team resilience to consider these factors, especially if these were not included previously.

Overall, this research addressed the call for researchers to delve deeper into understanding the factors contributing to resilience via quantitative approaches (Raetze et al., 2022).

7.4 Managerial implications

This research also provides valuable insights into the business context. This is particularly relevant, seeing that adversity is relevant for various contexts. For example, the Covid-19 outbreak impacted countries, organisations, and individuals with long-term ramifications (Kuntz, 2021). On a smaller scale, teams are required to find ways to overcome setbacks in a project or the loss of an employee. These

adverse events are complex and multidimensional, considering that they can originate from external or internal sources (King et al., 2023), and the extremity of adversity is industry dependant (Schmutz et al., 2023). Therefore, this research will provide insights into what can be done to develop a work team that is resilient, thus enabling the team to be prepared in the event of adversity.

This research was able to identify that team potency, team spontaneity, team creativity, and team mental models are significant predictors of a team's ability to be resilient. Seeing that team resilience can be proactive, developed, or reactive; managerial implications will be suggested along the various types of resilience.

Proactive resilience

Firstly, in terms of team mental models, proactive actions that can be taken will include: 1) the need for the team leader to have a clear vision, 2) enhancing team interactions, 3) monitoring team performance, and 4) establishing team norms. These elements will be discussed to provide strategies to incorporate these aspects.

Carrington et al. (2019) indicate that a leader who does not have a shared mental model tends to create confusion for the team, especially during a crisis. Leadership plays an important role in guiding teams; hence a leader should have a well-defined vision and purpose of the team in relation to the organisation. Furthermore, this vision should be conveyed to the team so that everyone understands it.

Furthermore, Lines et al. (2022) explain that team interactions, performance monitoring, and establishing team norms are required to enhance mental models. Therefore, team leaders should devote time to incorporating these aspects into their activities. Improving the interactions between teams can be done by considering regular team meetings where team members are required to interact and understand the activities being executed in the team. Furthermore, to improve the interactions between team members, team-building activities can be incorporated to foster a connection between the team members.

Seeing that team performance monitoring is important; a team leader should define key performance indicators for the team and ensure it is continuously monitored to gauge progress. It is essential that the team's performance is visible to all team members to ensure that everyone in the team understands how each person contributes to the team's success. In addition, performance monitoring should be done individually to ensure that each team member understands their tasks.

Leaders should also establish team norms in terms of communication and encouraging openness. Tannenbaum (2021) explains that encouraging team members to ask questions can guide other members who may be unsure. This openness and communication allows team members to learn from one another and thus clears up uncertainties that may exist.

Secondly, this research established that team improvisation, which incorporates team spontaneity and creativity, was a predictor of team resilience. Improvisation is reflected in a team's creativity and transactive memory (Stoverink et al., 2020), therefore, these aspects would be needed to enhance a team's resilience. Knowledge is encoded in an individual's transactive memory, which contributes at a team level through the contributions of individuals who know what (Stoverink et al., 2020; Wegner, 1987). However, it is only through the effective integration of the individual's knowledge that this assists a team (Ye & Chen, 2021). Furthermore, Ali et al. (2020) show that participatory and shared leadership significantly improves team creativity. Therefore, team leaders should encourage their teams to participate in discussions, collaborate with each other, and obtain feedback for decision making. In addition, team leaders can advocate for team members to take an active leadership role, thus promoting shared leadership. Seeing that team voice and creative efficacy facilitates the relationship between the leadership style and creativity (Ali et al., 2020), it is advised that team leaders continue to cultivate a work atmosphere in which the team members openly communicate, collaborate, and share knowledge, while motivating the team members.

Zenk et al. (2022) also emphasise the need for immediate action to be taken by a team when faced with adversity. Therefore, a team leader should encourage team members to make decisions autonomously within their area of responsibility. In doing so, it encourages the team to be comfortable to make decisions and thus prepares the team in the event of adversity. This can be done through enabling participative leadership and shared leadership as identified for team creativity. These capabilities are especially important, seeing that adverse events materialise as unexpected, real-time events which require a team to create, test and execute new ideas quickly (Zenk et al., 2022).

Finally, the research has found that team resilience is enhanced through team potency. Research by Kim et al. (2022) inform that peer mentoring has been shown to enhance team potency. Similar to the suggestions for developing team mental

models, strengthening the interactions between team members can improve peer mentoring. Hence, the idea of team building would encourage team interactions. Additionally, team leaders need to recognise that the quality of their relationship with the team members has an influence on a team's potency (Kim et al., 2022). Hence, a team leader should have a healthy relationship with each team member.

Development resilience

As identified above, team mental models was a predictor of team resilience. Team mental models incorporate complementary mental models, which is the individual's knowledge and skills to compensate and complement other team members (Filho et al., 2022). As part of improving developmental resilience, team leaders are encouraged to ensure a diverse range of skills available to complement each team member. This can be encouraged through regular learning and developing expertise per team member and by instilling a team culture of openness and communication, promoting a learning environment. In addition, options of rotating team members into other functions to gain knowledge of the overall functioning of the business could improve the range of skills in the team. These elements would also develop team improvisation, seeing that Zenk et al. (2022) argue that while industry-specific knowledge is important for team improvisation, it is required that continuous learning and training enable a team to make quicker decisions.

Secondly, it is required that the leader displays a charismatic characteristic and is comfortable with sharing their responsibilities. A charismatic leader, can enhance team potency, through the ability to conveying messages to a team with conviction of the team's ability to achieve its goals, hence boosting a team's potency (Le Blanc et al., 2021). Furthermore, leaders should learn how to effectively share responsibilities with team members to enhance a team's level of creativity, as identified in the study by Ali et al. (2020). The organisation should consider training team leaders to promote these characteristics. This skill would be necessary for a team leader to help improve the team's potency and creativity.

HR could consider incorporating these aspects as part of their processes and systems. This can form part of the training to support team leaders in developing the required skills and incorporating these criteria in the recruitment and retention strategies.

Lastly, seeing that development resilience is considered as the factor that protects a team by considering internal and external resources that would be required to ensure that a team can function (Raetze et al., 2022), external focus should be considered by the team leaders. This would ensure alignment with key external stakeholders with the above suggestions of learning, openness, and communication.

Reactive resilience

Jia et al. (2020) confirm that reactive resilience is reinforced through proactive resilience. Therefore, to prepare for reactive resilience, the focus must be placed on proactively preparing to be resilient. Tannenbaum et al. (2021) identify that quick meetings to align and debrief are ways to ensure that the team is aligned and working towards the same goal in an adverse event. It also encourages learning to be shared between the team members, which could be valuable for the team.

7.5 Limitations

Although this research provided insightful information on team resilience, there are limitations.

Firstly, collecting data over a single period (i.e., cross-sectional time horizon) was a limitation. While this information did provide valuable insight into understanding which factors are predictors of team resilience, this method did not consider the dynamic nature of the phenomena. Therefore, this limited the research in understanding how this phenomenon develops over time.

Secondly, influences of contextual factors were not considered as part of this research. For example, the influence of leadership style has been shown impact team resilience. However, such external factors were not considered as part of this research. Controlling certain contextual factors could provide better insight into the phenomenon.

Thirdly, a purposive sampling method, coupled with snowballing, posed a limitation to the positivist philosophy. A positivist approach was followed to allow for the generalisation of the data. However, the sampling method restricted the randomness of the sample obtained. This could have led to a bias in the sample demographics. Furthermore, the sampling method also limited the sample size and the demographics of the respondents. Therefore, the results may not represent a

population because the sample was limited to those people in the researcher's network.

Lastly, the unit of analysis was individuals within a team and their measure of the various constructs for their teams. While this method has been used in previous research, it would be better to understand the phenomenon from a collective perspective. Hence future research should consider evaluating the constructs at a team level.

7.6 Future considerations

Team resilience has been found to be a dynamic phenomenon in the early stages of research. Therefore, while this research was able to contribute to one facet of this domain, there are still areas that researchers can consider as future research topics.

Firstly, this research concentrated on team potency, improvisation, mental models, and psychological safety. However, these factors do not constitute an exhaustive list of team input factors for team resilience. Hence, it is suggested that researchers should consider including additional antecedents to the current model to identify other significant factors. Identification of the antecedents can be done through qualitative research, via team interviews, to understand what factors are required at a team level.

Secondly, contextual factors were not considered as part of this research. Hartwig et al (2020) emphasised showed that team resilience is impacted by contextual factors. Therefore, it is suggested that future researcher delve deeper into understanding the influence of contextual factors on team resilience. Examples of these contextual factors include leadership style, organisational systems and processes, and individual characteristics. Inter-team interactions can be considered, seeing that Park et al. (2020) indicate that interactions between teams influence performance. Furthermore, Branicki et al. (2019) emphasise that the level of resilience required is dependent on the team's occupation. Thus, context-specific research can be considered.

Lastly, the various definitions of team resilience, coupled with the types of resilience (i.e., proactive, development) would require further understanding. This research considered team resilience as an ability, hence future research can consider verifying conceptual models that define the phenomena as an outcome or a process,

which was not explored in this research. This can be done in conjunction with the type of resilience.

8 References

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9 Appendix

9.1 Questionnaire

Section 1	
1. Do you work in a team?	• Yes • No
2. Is the team composed of two or more members (including yourself and excluding your manager)	• Yes • No
Section 2	
3. What is your gender?	• Male • Female • Prefer not to say
4. What is your age?	• <20 years • 20-30 years • 31-40 years • 41-50 years • 51-60 years • >60 years
5. Which of the following best describes the industry that you are in?	• Marketing, sales and after-sales service • Financial management • Human resources management • Strategy formulation • Administration • Operations / Production • Information Technology • Engineering and research and Development • Transport, logistics and storage • Other – please specify
6. What is the approximate total number of employees in your organisation?	• Less than 11 • 11 to 50 • 51 to 250 • 251 to 500 • 501 to 1000 • 1001 to 5000 • 5001 to 10000 • More than 10000 • Not sure
7. Which best describes your current job level?	• Executive/C-level • Senior management • Middle management • Intermediate

	• Entry level • Other – please specify
8. Which of the following best describe your job function?	List from SurveyMonkey
9. How long have you been in your current team?	• Less than 6 months • More than 6 month but less than 1 year • More than 1 year but less than 2 years • More than 2 years but less than 3 years • More than 3 years but less than 4 years • More than 4 years but less than 5 years • More than 5 years
10. How many members are there in your team (including yourself and your manager)?	• 3 - 4 • 5 to 10 • 11 to 17 • 18 to 24 • 25 to 31 • 32 to 38 • 39 to 45 • 46 to 52 • 53 to 58 • 59 to 65 • More than 66
Section 3: Team potency (questions from Guzzo et al. (1993))	
11. "This team has confidence in itself"	Likert scale (5 points)
12. "This team believes it can become unusually good at producing high-quality work"	
13. "This team expects to be known as a high-performing team"	
14. "This team feels it can solve any problem it encounters"	
15. "This team believes it can be very productive"	
16. "This team can get a lot done when it works hard."	
17. "No task is too tough for this team"	
18. "This team expects to have a lot of influence around here"	
Section 4: Team improvisation (questions from Vera and Crossan (2005))	
19. "The team deals with unanticipated events on the spot."	Likert scale (7 points)
20. "Team members think on their feet when carrying out actions."	

21. “The team responds in the moment to unexpected problems.”	
22. “The team tries new approaches to problems.”	
23. ‘The team identifies opportunities for new work processes.”	
24. “The team takes risks in terms of producing new ideas in doing its job.”	
25. “The team demonstrates originality in its work.”	
Section 5: Team mental models	
26. We as a team “compensate for each other’s weakness in order to perform well”	Likert scale (11 points)
27. We as a team “share a collective understanding of each other’s roles, tasks and responsibilities”	
28. We as a team “adapt to each other’s actions in pressure situations”	
29. We as a team “share the workload equally among us”	
30. We as a team “complement and support each other’s decisions”	
31. We as a team balance each other’s ideas about our” business strategy	
32. We as a team “share a collective understanding of how work needs to be accomplished”	
33. We as a team “compensate for each other’s mistakes in pressure situations”	
34. We as a team “share beliefs and moral values that unite us”	
35. We as a team have “skills that balance each other’s out”	
36. We as a team “complement each other’s work during” team meetings	
Section 6: Team psychological safety (questions from Edmondson (1999))	
37. “If you make a mistake on this team, it is often held against you”	Likert scale (7 points)
38. “Members of this team are able to bring up problems and tough issues”	
39. “People on this team sometimes reject others for being different”	
40. “It is safe to take a risk on this team”	
41. “It is difficult to ask other members of this team for help”	
42. “No one on this team would deliberately act in a way that undermines my effort”	
43. “Working with members of this team, my unique skills and talents are valued and utilised”	
Section 7: Team resilience	
44. We are “able to adapt to change”	Likert scale (5 points)
45. We “can deal with whatever comes”	

46. We “try to see the humorous side of problems”	
47. “Coping with stress can strengthen us	
48. We “tend to bounce back after illness or hardship”	
49. We can “achieve goals despite obstacles”	
50. We can “stay focused under pressure”	
51. We are “not easily discouraged by failure”	
52. We think of ourselves as strong people	
53. We “can handle unpleasant feelings”	

9.2 Validity test for team potency

Correlations

		TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TOTAL_TP
TP1	Pearson Correlation	1	.740**	.557**	.630**	.657**	.629**	.554**	.509**	.811**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP2	Pearson Correlation	.740**	1	.668**	.658**	.615**	.608**	.549**	.496**	.822**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP3	Pearson Correlation	.557**	.668**	1	.624**	.646**	.636**	.513**	.542**	.801**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP4	Pearson Correlation	.630**	.658**	.624**	1	.677**	.635**	.681**	.528**	.841**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP5	Pearson Correlation	.657**	.615**	.646**	.677**	1	.687**	.649**	.568**	.845**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP6	Pearson Correlation	.629**	.608**	.636**	.635**	.687**	1	.649**	.499**	.816**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP7	Pearson Correlation	.554**	.549**	.513**	.681**	.649**	.649**	1	.574**	.800**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TP8	Pearson Correlation	.509**	.496**	.542**	.528**	.568**	.499**	.574**	1	.739**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	220	220	220	220	220	220	220	220	220
TOTAL_TP	Pearson Correlation	.811**	.822**	.801**	.841**	.845**	.816**	.800**	.739**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	220	220	220	220	220	220	220	220	220

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

9.3 Validity test for team improvisation

Correlations

		TIMP1	TIMP2	TIMP3	Total_TSPONT	TIMP4	TIMP5	TIMP6	TIMP7	Total_CREATIVITY
TIMP1	Pearson Correlation	1	.673**	.631**	.876**	.455**	.411**	.274**	.344**	.425**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP2	Pearson Correlation	.673**	1	.732**	.905**	.602**	.584**	.437**	.474**	.601**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP3	Pearson Correlation	.631**	.732**	1	.878**	.533**	.514**	.381**	.455**	.540**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
Total_TSPONT	Pearson Correlation	.876**	.905**	.878**	1	.596**	.566**	.408**	.476**	.587**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP4	Pearson Correlation	.455**	.602**	.533**	.596**	1	.702**	.626**	.754**	.879**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP5	Pearson Correlation	.411**	.584**	.514**	.566**	.702**	1	.679**	.670**	.880**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP6	Pearson Correlation	.274**	.437**	.381**	.408**	.626**	.679**	1	.665**	.850**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	220	220	220	220	220	220	220	220	220
TIMP7	Pearson Correlation	.344**	.474**	.455**	.476**	.754**	.670**	.665**	1	.882**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	220	220	220	220	220	220	220	220	220
Total_CREATIVITY	Pearson Correlation	.425**	.601**	.540**	.587**	.879**	.880**	.850**	.882**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	220	220	220	220	220	220	220	220	220

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

9.4 Validity test for team psychological safety

Correlations

		TPS1_REV	TPS2	TPS3_REV	TPS4	TPS5_REV	TPS6	TPS7	Total_TPS
TPS1_REV	Pearson Correlation	1	.392**	.475**	.420**	.398**	.277**	.336**	.679**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS2	Pearson Correlation	.392**	1	.416**	.567**	.390**	.361**	.579**	.738**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS3_REV	Pearson Correlation	.475**	.416**	1	.314**	.646**	.349**	.448**	.747**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS4	Pearson Correlation	.420**	.567**	.314**	1	.239**	.394**	.498**	.685**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS5_REV	Pearson Correlation	.398**	.390**	.646**	.239**	1	.320**	.416**	.693**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS6	Pearson Correlation	.277**	.361**	.349**	.394**	.320**	1	.468**	.648**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	220	220	220	220	220	220	220	220
TPS7	Pearson Correlation	.336**	.579**	.448**	.498**	.416**	.468**	1	.749**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	220	220	220	220	220	220	220	220
Total_TPS	Pearson Correlation	.679**	.738**	.747**	.685**	.693**	.648**	.749**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	220	220	220	220	220	220	220	220

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

9.5 Validity test for team mental models

Correlations

		TMM1	TMM2	TMM3	TMM4	TMM5	TMM6	TMM7	TMM8	TMM9	TMM10	TMM11	TOTAL_TMM
TMM1	Pearson Correlation	1	.566**	.646**	.487**	.609**	.582**	.584**	.676**	.587**	.604**	.486**	.737**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM2	Pearson Correlation	.566**	1	.765**	.646**	.773**	.755**	.740**	.675**	.641**	.609**	.676**	.843**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM3	Pearson Correlation	.646**	.765**	1	.675**	.753**	.749**	.724**	.754**	.650**	.684**	.634**	.864**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM4	Pearson Correlation	.487**	.646**	.675**	1	.716**	.696**	.646**	.621**	.609**	.615**	.599**	.795**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM5	Pearson Correlation	.609**	.773**	.753**	.716**	1	.817**	.802**	.756**	.753**	.718**	.699**	.904**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM6	Pearson Correlation	.582**	.755**	.749**	.696**	.817**	1	.819**	.715**	.718**	.722**	.714**	.893**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM7	Pearson Correlation	.584**	.740**	.724**	.646**	.802**	.819**	1	.803**	.769**	.710**	.651**	.887**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM8	Pearson Correlation	.676**	.675**	.754**	.621**	.756**	.715**	.803**	1	.733**	.745**	.616**	.870**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM9	Pearson Correlation	.587**	.641**	.650**	.609**	.753**	.718**	.769**	.733**	1	.735**	.673**	.847**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM10	Pearson Correlation	.604**	.609**	.684**	.615**	.718**	.722**	.710**	.745**	.735**	1	.665**	.840**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TMM11	Pearson Correlation	.486**	.676**	.634**	.599**	.699**	.714**	.651**	.616**	.673**	.665**	1	.799**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	220	220	220	220	220	220	220	220	220	220	220	220
TOTAL_TMM	Pearson Correlation	.737**	.843**	.864**	.795**	.904**	.893**	.887**	.870**	.847**	.840**	.799**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	220	220	220	220	220	220	220	220	220	220	220	220

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

9.6 Validity test for team resilience

Correlations

		TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9	TR10	TOTAL_TR
TR1	Pearson Correlation	1	.723**	.477**	.447**	.513**	.612**	.634**	.498**	.596**	.558**	.776**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR2	Pearson Correlation	.723**	1	.496**	.482**	.579**	.745**	.711**	.588**	.636**	.621**	.837**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR3	Pearson Correlation	.477**	.496**	1	.550**	.462**	.492**	.466**	.449**	.481**	.551**	.708**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR4	Pearson Correlation	.447**	.482**	.550**	1	.510**	.489**	.507**	.523**	.506**	.503**	.713**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR5	Pearson Correlation	.513**	.579**	.462**	.510**	1	.658**	.544**	.448**	.514**	.453**	.724**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR6	Pearson Correlation	.612**	.745**	.492**	.489**	.658**	1	.758**	.627**	.613**	.599**	.836**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR7	Pearson Correlation	.634**	.711**	.466**	.507**	.544**	.758**	1	.712**	.654**	.669**	.846**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR8	Pearson Correlation	.498**	.588**	.449**	.523**	.448**	.627**	.712**	1	.590**	.612**	.774**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR9	Pearson Correlation	.596**	.636**	.481**	.506**	.514**	.613**	.654**	.590**	1	.615**	.792**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TR10	Pearson Correlation	.558**	.621**	.551**	.503**	.453**	.599**	.669**	.612**	.615**	1	.797**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	220	220	220	220	220	220	220	220	220	220	220
TOTAL_TR	Pearson Correlation	.776**	.837**	.708**	.713**	.724**	.836**	.846**	.774**	.792**	.797**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	
	N	220	220	220	220	220	220	220	220	220	220	220

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

9.7 Dummy variables

Control variable	Answer [Control variable coding]
What is your gender?	• Male - [0] • Female- [1] • Prefer not to say [0]
What is your age?	• <20 years [0] • 20-30 years [0] • 31-40 years [1] • 41-50 years [0] • 51-60 years [0] • >60 years [0]
How long have you been in your current team?	• Less than 6 months [0] • More than 6 month but less than 1 year [0] • More than 1 year but less than 2 years [0] • More than 2 years but less than 3 years [0] • More than 3 years but less than 4 years [1] • More than 4 years but less than 5 years [1] • More than 5 years [1]
How many members are there in your team (including yourself and your manager)?	• 3 - 4 [1] • 5 to 10 [1] • 11 to 17 [0] • 18 to 24 [0] • 25 to 31 [0] • 32 to 38 [0] • 39 to 45 [0] • 46 to 52 [0] • 53 to 58 [0] • 59 to 65 [0] • More than 66 [0]

9.8 Multiple regression: Multi-colliery checks

Correlations

		TOT_RESIL	TOT_TP	TOT_TPS	TOT_TMM	TOT_SPONTANEOUS	TOT_CREATIVE	Gender_Recode	Age_Recode	Tenure_Recode	Teamsize_Recode
Pearson Correlation	TOT_RESIL	1.000	.658	.615	.777	.591	.660	-.026	-.089	.072	-.034
	TOT_TP	.658	1.000	.478	.637	.583	.646	-.022	.038	.122	-.045
	TOT_TPS	.615	.478	1.000	.723	.376	.498	-.128	-.102	-.063	.103
	TOT_TMM	.777	.637	.723	1.000	.549	.641	-.028	-.144	.065	-.014
	TOT_SPONTANEOUS	.591	.583	.376	.549	1.000	.587	-.061	-.084	.056	-.072
	TOT_CREATIVE	.660	.646	.498	.641	.587	1.000	.075	-.071	.031	-.025
	Gender_Recode	-.026	-.022	-.128	-.028	-.061	.075	1.000	.091	.000	.019
	Age_Recode	-.089	.038	-.102	-.144	-.084	-.071	.091	1.000	-.109	.075
	Tenure_Recode	.072	.122	-.063	.065	.056	.031	.000	-.109	1.000	-.076
	Teamsize_Recode	-.034	-.045	.103	-.014	-.072	-.025	.019	.075	-.076	1.000
Sig. (1-tailed)	TOT_RESIL	.	<.001	<.001	<.001	<.001	<.001	.353	.094	.143	.307
	TOT_TP	.000	.	.000	.000	.000	.000	.370	.290	.036	.252
	TOT_TPS	.000	.000	.	.000	.000	.000	.029	.065	.176	.063
	TOT_TMM	.000	.000	.000	.	.000	.000	.338	.016	.170	.419
	TOT_SPONTANEOUS	.000	.000	.000	.000	.	.000	.183	.107	.205	.144
	TOT_CREATIVE	.000	.000	.000	.000	.000	.	.135	.148	.321	.356
	Gender_Recode	.353	.370	.029	.338	.183	.135	.	.089	.500	.389
	Age_Recode	.094	.290	.065	.016	.107	.148	.089	.	.053	.133
	Tenure_Recode	.143	.036	.176	.170	.205	.321	.500	.053	.	.129
	Teamsize_Recode	.307	.252	.063	.419	.144	.356	.389	.133	.129	.
N	TOT_RESIL	220	220	220	220	220	220	220	220	220	220
	TOT_TP	220	220	220	220	220	220	220	220	220	220
	TOT_TPS	220	220	220	220	220	220	220	220	220	220
	TOT_TMM	220	220	220	220	220	220	220	220	220	220
	TOT_SPONTANEOUS	220	220	220	220	220	220	220	220	220	220
	TOT_CREATIVE	220	220	220	220	220	220	220	220	220	220
	Gender_Recode	220	220	220	220	220	220	220	220	220	220
	Age_Recode	220	220	220	220	220	220	220	220	220	220
	Tenure_Recode	220	220	220	220	220	220	220	220	220	220
	Teamsize_Recode	220	220	220	220	220	220	220	220	220	220