

**THE ROLE OF PERSONALITY, HARDINESS, RESILIENCE AND GRIT IN
MEDIATING SUBJECTIVE CAREER SUCCESS IN COMMERCIAL DEEP SEA
DIVERS**

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DECLARATION

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ABSTRACT

Since the 16th century, man has been diving in the waters around the world. This phenomenon initially came about as a form of exploration, but eventually, commercial interests lead to the formation of diving as an occupation (Commercial Diving, n.d.). Commercial Deep Sea Diving (CDSD) as an industry is responsible for a vast array of sub-aquatic activities that include bridge and pipeline maintenance and the construction of sub-aquatic structures. The industry attracts many artisan-type employees to work all over the world on various projects associated with a multiplicity of related industries. However, as a profession, very little research has been done on CDSDs. That research that is available stems from the 1970s and 1980s and focuses primarily on technical specifications of equipment, and medical phenomena. After extensive reviews of available literature, the researcher has found no research pertaining to psychological attributes of CDSDs - illustrating a clear gap in the knowledge currently held about CDSDs and the industry as a whole, as it pertains to psychology. Of further interest to the researcher are the parallels that the CDSD industry shares with military deployments - this is with reference to the fact that both military personnel and CDSDs are required to operate under stressful conditions, away from the support of their family and social circles (Lagrone, 1978). With this notion in mind, the researcher will investigate the influence that the possession of personality, hardiness, resilience and grit has on the subjective experiencing of career success (CS) by CDSDs as well as the inter-relationships between these constructs. This study may prove to be an inroad into the better understanding of the psychological make-up of CDSDs.

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CHAPTER 1

INTRODUCTION

A healthy job is likely to be one where the pressures on employees are appropriate in relation to their abilities and resources, to the amount of control they have over their work, and to the support they receive from people who matter to them. As health is not merely the absence of disease or infirmity but a positive state of complete physical, mental and social well being (W.H.O., 1986), a healthy working environment is one in which there is not only an absence of harmful conditions but an abundance of health-promoting ones. – World Health Organisation

1.1. INTRODUCTION AND MOTIVATION FOR THE STUDY

Man has been exploring the waters of this planet throughout centuries past, and in all corners of the globe. With the limitations of somewhat primitive technological assistance, such exploration was limited to diving, without the use of breathing apparatus, although Acott (1999) indicates that early versions of the snorkel may have existed from as early as 384AD, as was referenced in the writings of Aristotle. These initial pursuits were borne from subsistence requirements, where island villagers became aware of the need to explore the coastal waters for sources of food. The prevailing opinion, based on archaeological and archival evidence, suggests that this subsistence requirement paved the way for the adaptation of diving in military pursuits, with various French manuscripts indicating that Alexander the Great made use of divers for underwater demolitions in the Siege of Tyre. Since then, interest in diving has advanced to the recreational and eventually commercial interests lead to the formation of diving as an occupation (Commercial Diving, n.d.).

Diving as an industry can take many shapes and forms. Perhaps most notably popular form of diving lies in the recreational industry, most commonly referred to as Self Contained Underwater Breathing Apparatus (SCUBA) diving, which has been explored in literature throughout the latter part of the 20th century (Torok, 1989; Edmunds, 1999). This version of diving is experimented with by individuals around the world, often diving in exotic locations where the best oceanic life can be viewed in their natural habitats. Due to its recreational

nature and the relatively limited level of expertise required for one to partake in what is essentially considered a sport, this type of diving does not typically carry with it a great amount of risk to the emotional, psychological or cognitive integrity of the respective diver. The risks involved are of a more physical nature, with pressure being placed on the respiratory systems of the divers, and equalisation of air particles trapped in the ear cavities causing discomfort and could possibly even lead to rupturing (Brubakk & Neuman, 2003). The primary challenge faced by these recreational divers is ensuring that they follow the commands of their instructors, so as to remain physically healthy. The researcher does not wish to expand on the SCUBA or sport diving at great lengths due to the established distinct lack of emotional resilience potentially required to engage in such an activity. This primary potential for stress being placed on a recreational diver amounts to physical exertion as opposed to mental, emotional or cognitive exhaustion. Focus will rather shift to the other two categories of diving that can be regarded as occupations - one falling within the domain of the military, and the other falling within the civilian commercial domain. Each of these will be discussed separately as it is the belief of the researcher that each represents a distinct and rather different category of diver. One is rigorously trained within the realm of military standards and is primarily utilised for maintenance work on a daily basis (Van Wijk, 2002a), and the other, Commercial Deep Sea Diving (CDSD), has been trained within the civilian realm and is typically employed on larger salvage operations, often at various locations off international coastlines. CDSD as an industry is responsible for a vast array of sub-aquatic activities that include bridge and pipeline maintenance and the construction of sub-aquatic structures (R. Logan, personal communication, 7 October, 2013). The industry attracts many artisan-type employees to work all over the world on various projects associated with a multiplicity of related industries. It is imperative that distinctions be made between the nature of the work that is performed by military divers and CDSDs, as well as the respective environments within which they operate.

South African Navy (SAN) divers get paid a monthly salary according to their ranks, and they and their families have full access to medical service provided by the South African National Defence Force (SANDF). Van Wijk (2002b; 2008) has conducted some rather extensive research on divers within the SAN. He has shown in his 2002 study that recreational divers generally score lower than group norms on levels of anxiety, although they tend to be spread out over a large range. SAN divers, on the other hand, are often exposed to potentially

threatening environments and working conditions during their daily tasking, and ultimately more anxiety-provoking conditions. This lead to an exploration of the hypothesis that, due to the fact that military members may have more hostile tendencies because of the nature of their work, SAN divers may appear to be more hostile as a group. Van Wijk's (2002b) findings complimented a study conducted on United States Navy Divers, illustrating that the anxiety scores of the SAN divers fell within the normal limits and did not deviate from the general population. This has been stated as being a sound attribute for these divers, as too little anxiety may cause a diver to be careless, whereas too much anxiety may cause them to lose focus and impair performance. It is stated in Van Wijk's findings that divers exposed to many operations involving strenuous situations may have decreased levels of anxiety, owing to the development of a belief they have formulated that they are competent. Similar results were found in a similar study conducted with recreational SCUBA divers, although their sample of $n=10$ leads one to be cautious about making too drastic an inference. SAN divers did indeed display an elevated level of hostility as compared to their civilian counterparts in the norm groups. This may be due to the inherently hostile nature of the military in general, and the capacity for the diving branch of the SAN to attract physically assertive members. In a more recent study conducted by Van Wijk (2008), he investigated the levels of resilience that was held by SAN divers as well as submariners - hypothesising that these groups should have slightly elevated levels due to the nature of the occupations. His results found that SAN divers were a particularly physically healthy group of individuals - attributing this to the demands for physical fitness that the SAN divers branch has. Also noteworthy is the high levels of psychological resilience demonstrated by the group, partly attributable to the rigorous psychological testing that said divers must endure for selection into the branch. The work that Van Wijk has done on the SAN divers has created a better understanding of the psychological nature of the SAN divers, which as a group bear quite possibly the closest resemblance to that of the CDSs. Although there are certain similarities with regards to military divers and CDSs, there also remain many differences as well. The commercial diving industry will hence be discussed, and this will follow with a summary of the differences and similarities between these groups, providing further motivation for the nature of this research.

Upon reviewing the relevant literature pertaining to CDS, it has been noted that the era perhaps most prevalent with publication of academic articles researching the occupation is during the 1970s and 1980s, showing a distinct lack of contemporary academic research,

particularly pertaining to the field of psychology. With this in mind, the researcher sought to gain a first-hand perspective from individuals that currently work as CDSDs and Saturation System Technicians (responsible for the maintenance of all of the ventilation and decompression apparatus on board the offshore platform), so as to best illustrate the nature or the commercial diving industry. R. Logan (personal communication, 7 October 2013) in conjunction with L. Thomson, L. Gerardo and B. Thomson (personal communication, 5 October, 2013), each with at least 10 years of commercial diving experience, assisted the researcher with pertinent information with regards to the occupational specifics of a CDSD. Typically, the commercial diving industry is called upon to become involved in projects that require sub-aquatic expertise, and are situated 'offshore' - a term that has become akin to the divers explanation of their working terrain - meaning 'off the mainland, out at sea'.

These projects range from salvage operations of sunken vessels, to routine maintenance on oil pipelines, to emergency situations involving chemical leakages. As such, these divers are required to have a diverse array of technical skills, owing to the specifics of the task at hand, which places an added emphasis on their cognitive abilities. The vessel that the divers work, and ultimately live on, during their offshore rotation is known as the dive 'platform'. Divers typically work on a rotation system, meaning that six weeks are spent offshore, and six weeks are spent at home, in their countries of origin. There is an exception to this rule, however, depending on the nature of the divers employment - some divers choose to work on a contract basis where they are not guaranteed any work after their current contract has lapsed, meaning that another project must be sought thereafter, resulting in fluctuations in time spent offshore and at home. As a part of their occupational demands, these divers are required to submerge to depths of up to 300m (when diving on mixed gas, known as saturation diving) and up to 80m when diving on regular 'air' (non-helium saturated air compound), where they will be required to follow the radio prompts of their dive supervisor (monitoring from the platform vessel via video attached to the diver or a Remote Underwater Vehicle) and execute the maintenance task at hand.

Divers may be submerged for up to 10 hours a day (when air diving) and may be required to enter into the decompression chambers once the day's dive has been completed (effectively meaning that the diver's body is maintained under the same pressures as was exerted on him/her whilst submerged). The saturation divers are required to be maintained at the same

barometric pressure as releasing said pressure on their bodies too rapidly equates to emerging from the depths of the water too quickly, which has an effect on the mixed gasses that they have been inhaling into their lungs and has fatal consequences if not monitored properly (Brubakk & Neuman, 2003). The nature of the CDS industry requires that divers deploy to various locations around the globe, depending on where their services are required by their employers (who are often sub-contracted by other larger conglomerates for the performance of a particular maintenance or emergency task), meaning that the job entails much time spent away from home, lots of travelling, and often working with different people, in various locations, within a variety of environmental settings, and in various climates. It would appear through the brief exploration of the industry that volatility and unpredictability are apt descriptions of the environments, and that divers would have to be flexible enough to adjust to their ever-changing surroundings.

This becomes an important factor that bears many similarities to the nature of military personnel exposed to deployments. Pincus, House, Christenson and Adler (2001) have outlined the experiences that are held by military families whilst their significant spousal partners are on deployment. It can be said, due to the often-erratic nature of the deployment timeframes experienced by many CDSs, that the psychological processes experienced by the families left at home are akin to those experienced by the military families of deployed soldiers. Although the commercial diving industry does not bear with it the turmoil of war and extreme violence associated therewith, it remains that the environmental stressors placed on CDS are also harsh, foreign and may amount to stressors (personal communication, R. Logan, 7 October 2013). Families that remain behind are often faced with having the breadwinner and typically the head of the household (as CDS is predominantly a male dominated industry) absent for family decisions and possible dilemma's. Whereas military deployment is typically fixed to a particular timeframe (Bartone, 1999a), contractual diving work is not, leading to periods away from the home environment that are often unpredictable. Whilst offshore, the CDSs families are forced to operate under a different household head (typically the mother) which may carry with it rebellion from the children and an application of a different set of rules and decision making, particularly when it comes to finances (Pincus, et al., 2001; LaGrone, 1978). Upon the husbands return from offshore, he must assume his role as the head of the household once more, with often brings with it challenges in discipline and enforcing rules, as well as re-establishing intimacy with his spousal partner. The fundamental

tenets of this theory has been confirmed through interviews with existing CDSDs, correlating the assertion that the challenges experienced by deployed military families are similar to those of CDSDs. These stressors may negatively impact the emotional, psychological and cognitive well-being of CDSDs. Stressors may manifest themselves in a lack of concentration whilst on the job (which is particularly hazardous in the commercial diving environment where lives are at stake), concern over finances and family well-being may lead to elevated levels of anxiety, and the physical environment (often comprised of exposure to extreme temperature depending on the location) may lead to physical exhaustion, fatigue and illness, which have clear impacts on the mental performance of individuals (Pincus et al., 2001; Bartone, 1999a).

The differences and similarities between military divers and CDSDs are elaborated upon by the researcher in the literature review (see par. 2.3.1).

It has been illustrated that there are certainly psychological ramifications associated with the occupational diving industry, with both military and CDSDs. Both groups yield very similar challenges yet the SAN diver group appears to have more sound selection procedures, a greater emphasis on physical well-being, better support structures, a more stable financial income, and a lesser obligation of having to part with their families in order to work. It would seem then that although the psychological research attention paid to the SAN divers is certainly warranted, more extensive research should be paid to the multi-billion dollar international industry that is commercial diving.

Although diving has, according to archaeological evidence, existed in some form or another since as early as 4500BC (Acott, 1999), as a profession, very little research has been done on CDSDs. The research that is available stems from the 1970s and 1980s and focuses primarily on technical specifications of equipment, and medical phenomena. After extensive reviews of available literature sourced from the internet and archival inventories, the researcher has found no research pertaining to psychological attributes of CDSDs - illustrating a clear gap in the knowledge currently held about commercial divers and the industry as a whole, as it pertains to psychology. In recent years, technical and medical explorations have appeared to be on the increase, furthering on the research opportunities offered to these academic communities. Of further interest to the researcher are the parallels that the Commercial Diving industry shares with military deployments - this is with reference

to the fact that both military personnel and CDSs are required to operate under stressful conditions, away from the support of their family and social circles (Lagrone, 1978). With this notion in mind, the researcher is investigating the correlation that the possession of traits such as hardiness, resilience, grit and personality has with the subjective experiencing of career success (SCS) by CDSs. This study may prove to be an inroad into the better understanding of the psychological make-up of what are today considered 'commercial divers'.

1.2 RESEARCH PROBLEM

Due to the distinct lack of research having been conducted on CDSs as a focal industry, there appears to be little concern as to the value of psychometric testing in the recruitment and selection of CDSs - which poses a plethora of concerns that include, but are not limited to, the personal safety of divers and co-workers as well as the integrity of the dive platforms. In addition to this, there remains a very real psychological challenge associated with this occupation, which calls for a set of particular psychological strengths present in order to more readily ensure optimal performance from CDSs. Researching the constructs suggested in this thesis may provide a platform upon which the throws of nepotism and 'cronyism' may be thwarted through providing a better and more holistic understanding of the CDS and their respective psychological make-ups. The importance of such a study may be best embodied by the outputs that may be derived:

- a. As an initiating enquiry into the psychological underpinnings of this niche industry, this thesis may prove fruitful in sparking an interest in conducting further research of a similar vein.
- b. The body of knowledge created by this enquiry contributes to a more holistic understanding of both the constructs themselves, as well as their context specific applications.

- c. The results of said research may be utilised as a platform from which various diving organisations may launch a more psychologically sensitive recruitment and selection campaign.
- d. The study will examine the interrelationships that exist between Hardiness, Resilience, Grit, Personality and SCS.

This enquiry furthermore seeks to answer the following research questions and measure the statistical strength of each:

- Does there exist a relationship between personality and SCS?
- Does there exist a relationship between hardiness and SCS?
- Does there exist a relationship between resilience and SCS?
- Does there exist a relationship between grit and SCS?
- Does there exist a relationship between hardiness and resilience?
- Does there exist a relationship between grit and resilience?
- Does there exist a relationship between personality and resilience?
- Does there exist a relationship between hardiness and grit?
- Does there exist a relationship between personality and grit?
- Does there exist a relationship between personality and hardiness?
- Does there exist a mediating variable between the significantly correlated independent and dependent variables that are identified?

1.3 RESEARCH OBJECTIVES

The objectives of this study are threefold, and will be discussed separately as such.

1.3.1 Main Objective

The primary objective of this study is to conduct empirical research in order to ascertain the nature of influence that the psychological constructs personality, hardiness, resilience and grit have on SCS (Dolan & Adler, 2008; Duckworth, Peterson, Matthews & Kelly, 2007; Duckworth & Quinn, 2009; Park, 2010; Bartone, 1999b) among CDSD's. Scientific research methodology was utilised in determining the relationships of the specific independent variables as they related to SCS. Said independent variables for this study include personality, hardiness, resilience and grit, with SCS being the dependent variable. In addition, the researcher explores the interrelationships that exist between the independent variables and whether any such has a mediating effect on SCS.

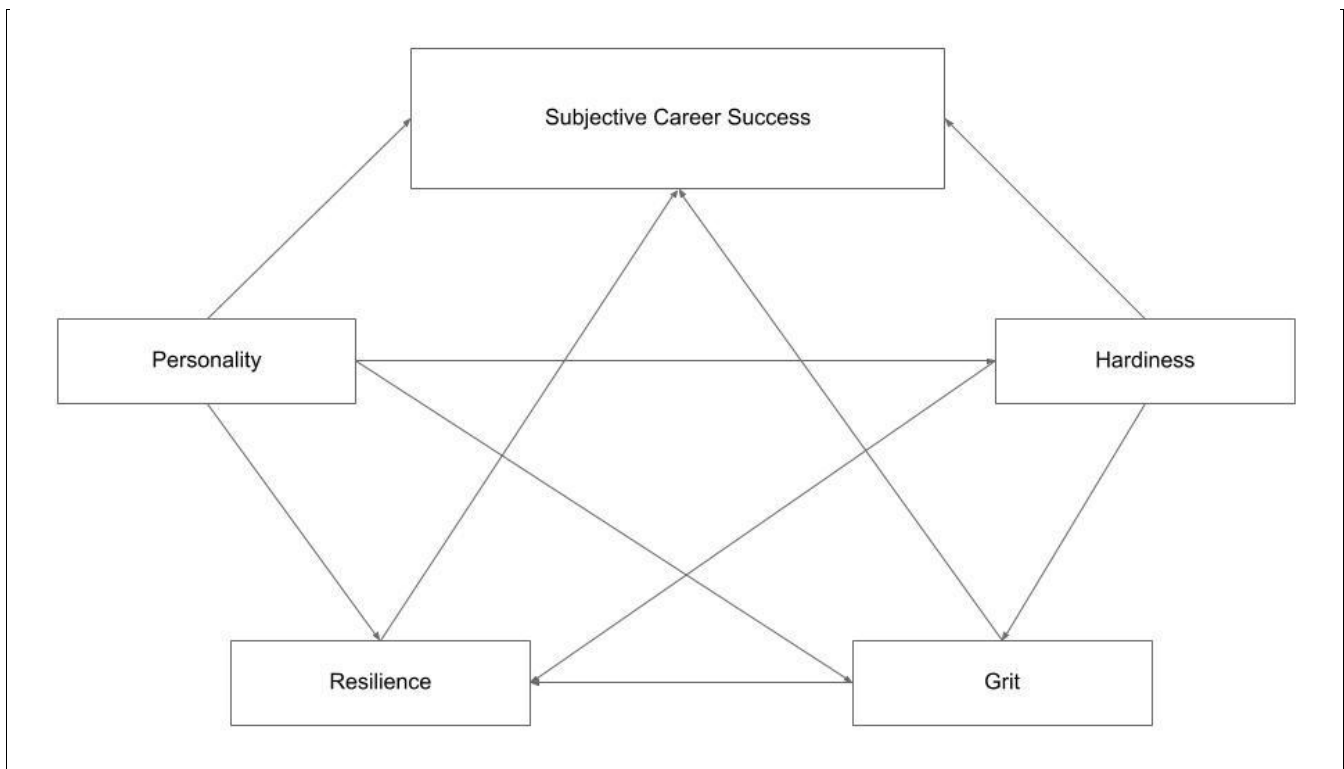


Figure 1.1: Determinants of subjective career success and interrelationships

1.3.2 Theoretical objectives

From a theoretical perspective, the objective of this study was to provide a broad and in-depth exploration of the literature pertaining to the constructs of personality, hardiness, resilience

and grit so as to later establish the influence that each may bear on the experiencing of SCS by CDSDs. The intention was to utilise this theoretical domain as a backdrop indicating how such constructs may logically bear a mediating effect on the experiencing of SCS by CDSDs.

1.3.3 Empirical objectives

The empirical objectives of this study are to test the relationships between the constructs of interest (Personality, Hardiness, Resilience and Grit) and their mediating effect on SCS through the use of exploratory research methodology. Said results (the relationship between independent and dependent variables) will thus be portrayed statistically (Babbie & Mouton, 2012).

1.4 RESEARCH PROCESS OVERVIEW

This research project was conducted through the implementation of seven progressive phases, which are outlined as follows:

1.4.1 Phase 1: Literature review

The primary focus of the literature review is to explicitly explore the intricacies of each psychological construct, including how they can be differentiated from one another, and how some constructs may be related to another. This review aims to serve as a foundation upon which these constructs can be applied to the occupation of Commercial Deep Sea Diving, investigating how the possession thereof may impact on the experiencing of Subjective Career Success within this occupational domain. The specific areas of review include:

- a. Different forms of diving as an occupation
- b. Specific challenges associated with commercial deep sea diving

- c. The role of personality
- d. Hardiness
- e. Resilience
- f. Grit
- g. Subjective Career Success

1.4.2 Phase 2: Empirical research

The empirical objectives of this study are to make use of exploratory research methodology to test, firstly, the relationship between each of the psychological constructs in question in order to ascertain their respective influences on SCS; and secondly, to examine the interrelatedness of these constructs as compared to one another. . A non-experimental research design will be used to explore the statistical correlations between Hardiness, Grit, Resilience, Personality and SCS. According to Babbie and Mouton (2012), non-experimental research involves the observation of the relationship between variables without the controlling or manipulation thereof. Each of the five different constructs will be measured separately through the implementation of specific paper-and-pencil evaluation tools, with the necessary statistical relationships being empirically explored through the use of various correlation and multiple regression statistical techniques. The researcher will utilise convenient sampling (n=37). It is a prerequisite that all subjects from the initial group be qualified CDSDs, with offshore experience – for the purposes of this study, this implies that participants have worked in rotation in an offshore capacity as a qualified CDSD.

The construct, hardiness (see par. 2.5), will be explored through the use of the adapted Military Hardiness scale (AMHS) (see par. 3.5.2), whose application is deemed relevant due to the established similarities between military environments and that of the CDSD industry in terms of their exposure to specific stressors. Said scale is considered adapted due to brief semantic alterations made to several items within the 18-item scale so as to reflect an application to the CDSD industry. The composite of items have been designed to reflect the

three components comprising psychological hardiness, which include *commitment* (7 items), *challenge* (5 items) and *control* (6 items). The *commitment* items represent a strong identity with the occupation and the fulfilment of one's job responsibilities. The five *challenge* items refer to the extent to which the incumbent exhibits the use of personal resources in response to the specific demands of the occupation. Finally, the *control* paradigm reflects perceptions of job control and personal influence on occupational outcomes. The 5-point Likert scale utilised for this scale (1 = strongly disagree; 5 = strongly agree) ultimately yielded a Cronbach's alpha of 0.90 for the original study from which it was sourced (Dolan & Adler, 2008).

The construct of Grit (see par. 2.7) will be measured through the use of Duckworth's Grit-S (Grit-S) (see par. 3.5.4) which is an 8-item, 2- factors structured measurement tool that makes use of a 5-point Likert rating scale (Duckworth et al., 2007). For items 2, 5, 7 and 8, the Likert scale assigns a value of 5 for an agreeable response ('Very much like me'), and 1 for a disagreeable response ('Not like me at all'). For items 1, 3, 4 and 6, the values have been reversed, so that the agreeable responses are assigned the progressively lower values. Then, the scores may be tallied and divided by the number of items (8), thereby yielding a maximum score of 5 (extremely gritty) and a minimum of 1 (not at all gritty). This measurement tool has a Cronbach's alpha of 0.82 (Duckworth & Quinn, 2009).

Resilience (see par. 2.6) will be measured as a construct complimentary yet distinct from the notion of hardiness - illustrating the distinction between the two paradigms. The Connor Davidson Resilience Scale (CD-RISC) (see par. 3.5.3) is the 25-item, 5-point Likert scale (0 = not true at all; 4 = true nearly all of the time. The scale is rated based on a timeframe of the past months' worth of the respective incumbent's experience. The score range of the 25 items yields a total figure of between 0-100, with higher scores reflecting a greater level of resilience. In the study conducted by Wang, Shi, Zhang and Zhang (2010), the internal consistency of the CD-RISC was considered sufficient at 0.91.

Personality (see par. 2.4) will be measured using the tried and tested Sixteen Personality Factor Questionnaire (16PF) (see par. 3.5.1), which has been adapted throughout the past few decades since its inception by Raymond Cattell in 1949, and remains one of the most commonly utilised personality measures, with an impressive resume of contributions towards

scientific research (Boyle, Matthews & Saklofske, 2008). The 16PF is a paper-and-pencil test that is designed to measure personality traits and inherent behavioural styles, and includes the exploration of sixteen personality dimensions that are assessed through the administration of the 185-item questionnaire, including Warmth, Reasoning, Emotional Stability, Dominance, Liveliness, Rule-Consciousness, Social Boldness, Sensitivity, Vigilance, Abstractedness, Privatness, Apprehension, Openness to Change, Self-Reliance, Perfectionism and Tension. Cattell, Cattell and Cattell (2006) produced Cronbach's alphas ranging from 0.53 to 0.83 in their baseline study of working adults drawn from the South African population. These numbers indicate a sufficient level of internal consistency reliability.

The Career Success Scale (see par. 3.5.5) is a tool utilised to measure the Subjective Career Success (see par. 2.8.1) of incumbents (Greenhaus, Parasuraman, & Wormley, 1990). The measurement tool is composed of 5 items, making use of a 5-point Likert scale with response categories ranging from 1 ('do not agree at all') to 5 ('agree completely'). Said scale has a reliability alpha of 0.88 (Park, 2010).

1.4.3 Phase 3: Reporting of results

Statistical techniques will be used to analyse the data gathered, and will therefore be elaborated upon in their own segment within the thesis. The derived results will be measured through descriptive statistics (i.e. minimums, maximums, means and standard deviations) and various correlations of the constructs being assessed, which include Hardiness, Grit, Resilience, Personality and SCS. The reliability analyses were conducted using Cronbach's alpha, with the Pearson correlation being used to measure the significance of the correlation between the variables within each hypothesis. The results for a multiple regression analysis of all variables within the study will be showcased in Chapter 3, where each of the four hypotheses will be outlined for investigation and form the basis for the remainder of the study.

1.4.4 Phase 4: Discussion of results

This phase will include an exploration of the results yielded from the data analysis. Ideally, such results would have been comparable to other similar studies, but as this is the first psychological study for said focus group (CDS), the accuracy of the results will be paramount in laying a foundation for further research in this field.

1.4.5 Phase 5: Conclusion

The concluding remarks will follow the discussion of the results, and may act as a prefix to the discussion of any possible limitations that were encountered.

1.4.6 Phase 6: Limitations

The general limitations for the research study will be discussed, as well as any specific limitations encountered with regards to the utilisation of the measurement instruments and any other extraneous variables.

1.4.7 Phase 7: Recommendations

This phase will include recommendations for directions of future research, how this current research may be utilised, and any further suggestions for the applicability of the information yielded.

1.5 CHAPTER OVERVIEW

The chapters for this thesis will be presented sequentially as follows:

- **Chapter 1: Introduction and orientation of the study**

- **Chapter 2: Theoretical framework**
- **Chapter 3: Research design and methodology**
- **Chapter 4: Presentation of results**
- **Chapter 5: Discussion of results**
- **Chapter 6: Conclusion, limitations and recommendations**

1.6 CHAPTER SUMMARY

The theory explored has revealed that there lies a very distinct gap in the psychological knowledge of CDSDs. There exists, in a considerable variety of specialised industries, an established acknowledgement of the value held in the use of psychometric measurements. Said industries have acted in accordance with the psychological theory advocating the predictive value that measuring various constructs may have, and through this recognition have made the implementation of psychometric tests a standard human resource practice in their selection and recruitment procedures for particular occupations. It can be said, however, that an emphasis has been placed on those specialised and high-risk occupations with regards to this so-called psychological screening - this is in part due to an obligation towards safety and safeguarding human life and equipment. Extensive interviews and research however, has revealed that the CDSD industry -though potentially hazardous and arduous by nature - makes no use of psychometric testing in selecting CDSDs to work offshore on various platforms.

The exploration of these keys constructs as they contribute towards the experiencing of subjective career success marks an exciting and pioneering exercise through which much can be learned about the psychological specifics of this multi-billion dollar industry, and may

potentially lead to a greater recognition of the need for further research into the implementation of an industry standardised psychometric measurement for CDSDs.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this study is to investigate the relationship between the psychological constructs of Personality, Hardiness, Resilience and Grit as they relate to the experiencing of Subjective Career Success among CDSDs. Chapter 2 addresses the literature required to explore said relationship by focussing on particular theoretical aspects. The various forms of diving as an occupation will be discussed to provide an operationalized perspective as to what constitutes a CDSD, drawing the parallels between other forms of diving, and perhaps more crucially, establishing what makes this occupation unique (Acott, 1999; Barker & Roberts, 2004). This will lead to a discussion on the specific challenges faced by CDSDs and how they may bear on their psychological functioning (Beyerstein, 2006). With this precursor having been established, the different psychological constructs in question will be elaborated upon, thereby illustrating the rationale behind the formation of the hypothesis that CDSDs will possess these attributes to a heightened degree. Said psychological constructs include personality, hardiness, resilience and grit. Finally, SCS will be addressed, showing its relevance in relation to this study (Pan & Zhou, 2015; Heslin, 2005).

2.2 A HISTORY OF DIVING

The interaction between man and the ocean in some form is an event that extends beyond our historical understanding, yet sub-aquatic interaction bears with it distinct historical roots. The phenomenon of sub-aquatic diving initially came about as a form of exploration, and for sustenance fishing purposes but eventually, commercial interests lead to the formation of diving as an occupation. With the rise in technological advancement, various engineering imperatives took to the oceans, joining landmasses with bridges, sub-aquatic tunnels and various pipelines that allowed for the transportation of an array of essentials including oil and gas. Said advancements necessitated the ability for manpower to be located where there was a need and work to be done: under the water. And thus the once purely sustenance and

recreational form of exploration became a commercial interest.

Acott (1999), through his extensive research on the history of diving, has revealed that archaeological evidence of humans involved in sub-aquatic exploration dates back to as early as 4500BC, with finds demonstrating the harvesting of sponges, foods, mother of pearl and coral by breath-hold divers. Further findings include evidence of breath-hold divers sabotaging ships during the Trojan wars, dated within the second century BC (Edmonds, Lowry & Pennefather, 1981). The British Museum displays a bas-relief from 900BC depicting a swimmer using an air-filled balloon to dive with, probably not as a breathing apparatus but as a buoyancy device (Davis, 1962). Historical scripture has indicated the presence of divers and diving from 460BC to 212BC. Herodotus wrote of the Greek diver Scyllus, and his salvaging of treasure whilst being held captive by the Persian King, Xerxes (Edmonds, 1999). A French manuscript from 1250AD recorded the use of underwater demolition divers by Alexander the Great during the Siege of Tyre, which included the use of a diving bell. Aristotle corroborated said story, as well as proclaiming the use of the snorkel, which evidence has shown to be used in battles such as World War 1, World War 2, and for hunting purposes by both the American Indians and the Australian Aborigines (Edmonds et al., 1981; Davis, 1962; Bachrach, Desiderati, & Matzen, 1988). From 168BC, 'Commercial diving' was operational in all Mediterranean harbours (Davis, 1962). Historical recordings such as these serve to illustrate the prevalence of diving within early society, and paved the way for developments that took place predominantly during the Renaissance period, impacting on the manner in which diving of all forms is conducted contemporarily.

Influential characters such as Leonardo Da Vinci created sketches and designs of diving platforms, although, as with many of his concepts, physical examples were not developed for practical use (Acott, 1999). The actual use of the diving bell came about in the 1600s, which aided in what may have been considered the first bell-operated salvage operation – raising the 42 cannon of the Swedish ship 'Vasa' which sank on its maiden voyage in 1640. The bell then allowed for the divers to work at an initial depth of 40m, with no reported cases of decompression sickness – this arguably paved the way for the large-scale use of the diving bell and its contemporary application in today's commercial diving sphere (Davis, 1995). The 1800s brought with it the era of compressed air diving and the use of the traditional diver's helmet with umbilical breathing apparatus that tethered the diver from the ocean floor to the

platform above where the air was pumped to him. It was also during this period that the first reported cases of decompression sickness were reported, and correlations were made between the vulnerability to become affected and the length of time spent under water. Perhaps one of the most important medical applications that were discovered during this age of enlightenment was the discovery of Helium, whose scientific properties would eventually pave the way for saturation diving in its contemporary form (Acott, 1999; Davis, 1995). The Brooklyn bridge project begun towards the end of the 1800s, solidifying the commercial need for CSDs within the engineering arena.

The 1900s saw a rapid increase in the amount of research being undertaken into decompression sickness and other dive-related ailments, with the recognition that diving in deeper waters would eventually become sought after. Various diving organisations around the world (including the Royal Navy, Swedish Navy and multiple German organisations) began developing their own tables regulating the air to nitrogen ratio required at different depths (Edmonds et al., 1981; Davis, 1995; Acott, 1999).

2.2.1 Recreational diving

Recreational diving has increased in recent years not only due to the technological advancements associated with diving equipment, but also due to an increased interest in the conservation and exploration of sub-aquatic nature and marine-life (Barker & Roberts, 2004). Recreational diving, for the purpose of this research is limited to SCUBA and free-diving or what is commonly referred to as 'snorkelling' (Edmunds, 1999). Whereas snorkelling or free-diving does require a particular skill-set, official certification by legislative bodies is not required. SCUBA, on the other hand, does indeed require certification through instruction and the fulfilment of requirements attached to various progressive course outcomes that dictate the extent (or depth) to which a SCUBA diver may exercise said recreation. Although there does exist a certain commercial aspect attached to the notion of these recreational activities (from a tourist, sporting and exploration aspect), said commerciality does not extend to the benefit of parental enterprises as is the case with CSDs (Bevan, 2011). In addition to the difference on the fiscal nature of recreational diving as opposed to CSD, fundamental differences lie in the nature of the requirements pertaining to each occupation. From this

perspective, the individual 'dive master' that holds his occupation within recreational diving is required to assist his fellow divers within the context of each dive, allowing for guidance to those less experienced divers, and essentially acting as a coach and a 'tour-guide' in order to make true the recreational aspect of the dive (Herman Wessels, personal communication, 15 August 2014; Bevan, 2011; Barker & Roberts, 2004). Comparatively, the occupational requirements of CDSs are far removed from what most would consider recreational, and therefore the psychological demands also differ greatly.

2.2.2 Diving in the military

According to the 16 personality factor questionnaire as administered to SA Navy divers, four distinct personality factors appeared to be dominant, being group orientation, enthusiasm, adventurousness and confidence (Van Wijk & Waters, 2001; Van Wijk, 2002a). Van Wijk (2002a) asserts that both Navy and recreational divers share a common thread of personality traits in that they are both less anxious, more aggressive in social situations and have a tendency to seek out adventure and thrills. Navy divers exhibit a greater internal locus of control and appear to have lower scores on levels of social contact. In a study conducted by Beckman and Lall (1996), the Millon Index of Personality Styles (MIPS) was used to measure the personality characteristics of 72 US Naval divers. The results indicated gravitation towards the personality traits of Individuating and Controlling. The researchers describe the former as a tendency to often negate the impact of their behaviour on others in seeking to fulfil themselves. Controlling can be described as a tendency to view gentleness as a sign of weakness, opting instead to see themselves as fearless – all while portraying a forceful, domineering demeanour (Van Wijk, 2002b). They go on to suggest that some of the common occupational demands include an environment that includes rapid and aggressive decision-making – including an element of selfishness in prioritising their own health and safety in order for the mission to be completed. It would appear that there exists congruence between these demands and the base personality characteristics.

The work environment that the military diver is exposed to can be considered harsher than that of the recreational diver, with exposure to challenging selection and training programs demanding a higher level of physical exertion and exposure to potentially life-threatening

circumstances (Van Wijk, 2002a; Beckman & Lall, 1996). Military divers, including SAN divers, form part of a larger organisation – their respective countries Defence Force, and as such generally enjoy a significant scope of support from support functions associated with the organisation. These include, but are not limited to comprehensive psychological screening and support in selection and training; pre-deployment preparation briefings designed to manage expectations of psychological, physical and emotional challenges resulting from the deployment; the support of the Chaplaincy and religious services; peer support from fellow sailors and crewmen (T. Skelton, personal communication, June 28, 2017).

SAN and military divers, as part of their everyday performance expectations, undergo physical training to ensure optimum physical functioning in the execution of their duties. This is supported and measured by regular physical fitness tests, which are used to determine their eligibility for deployment. These personnel are generally considered ‘permanent employees’, on long-term contracts and their remuneration is based on a monthly salary, regardless of the amount of time spent under water in the execution of their duties (T. Skelton, personal communication, June 28, 2017). The author suggests that this offers a greater sense of security and comfort in their financial stability. That said, this security does not preclude this group of divers from experiencing challenges associated with deployment such as family separation (Wiens, Boss, Andrew, Adler & Britt, 2006) and exposure to harsh and potentially dangerous environmental demands (Van Wijk, 2002a; Van Wijk, 2007; Beckman & Lall, 1996).

2.2.3 Commercial deep sea divers

Upon reviewing the relevant literature pertaining to CDSD, there appears to be a distinct lack of contemporary academic research, particularly pertaining to the field of psychology. With this in mind, the researcher sought to gain a first-hand perspective from individuals that currently work as CDSDs and Saturation System Technicians (responsible for the maintenance of all ventilation and decompression apparatus on board the offshore platform), so as to best illustrate the nature of the commercial diving industry (Beyerstein, 2006). R. Logan (personal communication, 7 October 2013) in conjunction with L. Thomson and L. Gerardo (personal communication, 5 October, 2013) and S. De Boer (personal

communication, 5 May 2014), among others, each with at least 10 years of commercial diving experience, assisted the researcher with pertinent information with regards to the occupational specifics of a CSDS.

Typically, the commercial diving industry is called upon to become involved in projects that require sub-aquatic expertise, and are situated 'offshore' – a term that has become akin to the divers explanation of their working terrain - meaning 'off the mainland, out at sea'. These projects range from salvage operations of sunken vessels, to routine maintenance on oil pipelines, to emergency situations involving chemical leakages. As such, these divers are required to have a diverse array of technical skills, owing to the specifics of the task at hand, which places an added emphasis on their cognitive abilities. Many of these skills stem from artisan trades, and include welding, hydraulic mechanics and an understanding of mechanical functioning, all to be performed in an environment that is often physically harsh – on the ocean floor at varying depths (L. Thomson, personal communication, July 26, 2016). The vessel that the divers work, and ultimately live on, during their offshore rotation is known as the dive 'platform'. CSDSs that manage to obtain 'permanent employment' (for a contract expending more than period of one's average deployment period) work on a rotation system, meaning that six weeks (as an average) are spent offshore, and six weeks are spent at home, in their countries of origin. This is an exception rather than a rule. The majority of CSDSs divers are employed on a contract basis where they are not guaranteed any work after their current contract has lapsed. They are only remunerated for the work done during said contract, which results in them having to seek further contracts thereafter, resulting in fluctuations in time spent offshore and at home. This leads to considerable stress as a result of financial concern (see par. 2.3.3). As a part of their occupational demands, these divers are required to submerge to depths of up to 300m (when diving on mixed gas, known as saturation diving) and up to 80m when diving on regular 'air' (non helium saturated air compound), where they will be required to follow the radio prompts of their dive supervisor (monitoring from the platform vessel via video attached to the diver or a Remote Underwater Vehicle) and execute the maintenance task at hand. Divers may be submerged for up to 10 hours a day (when air diving) and may be required to enter into the decompression chambers once the day's dive has been completed (effectively meaning that the diver's body is maintained under the same pressures as was exerted on him/her whilst submerged). The saturation divers are required to be maintained at the same barometric pressure as releasing

said pressure on their bodies too rapidly equates to emerging from the depths of the water too quickly, which has an effect on the mixed gasses that they have been inhaling into their lungs and has fatal consequences if not monitored properly (Brubakk & Neuman, 2003). It can be concluded that significant occupational risk to health is evident within their occupation (see par. 2.3.4.1)

The nature of the CDSD industry requires that divers deploy to various locations around the globe, depending on where their services are required by their employers (who are often sub-contracted by other larger conglomerates for the performance of a particular maintenance or emergency task), meaning that the job entails much time spent away from home, lots of travelling, and often working with different people, in various locations, within a variety of environmental settings, and in various climates. It would appear through the brief exploration of the industry that volatility and unpredictability are apt descriptions of the CDSD environment, and that divers would have to be flexible enough to adjust to their ever-changing surroundings.

This becomes an important factor that bears many similarities to the nature of military personnel exposed to deployments. Pincus et al. (2001) have outlined the experiences that are held by military families whilst their significant spousal partners are on deployment. It can be said, due to the often-erratic nature of the deployment timeframes experienced by many CDSDs, that the psychological processes experienced by the families left at home are akin to those experienced by the military families of deployed soldiers (see par. 2.3.1). Although the commercial diving industry does not bear with it the turmoil of war and extreme violence associated therewith, it remains that the environmental stressors placed on CDSDs are also harsh, unfamiliar and may amount to stressors (personal communication, R. Logan, 7 October 2013). Families that remain behind are often faced with having the breadwinner and typically the head of the household (as CDSD is predominantly a male dominated industry) absent from family decisions and possible dilemma's (see par 2.3.2 elaborating on family separation). Whereas military deployment is typically fixed to a particular timeframe (Bartone, 1999a), contractual diving work is not, leading to periods away from the home environment that are often unpredictable. These stressors may negatively impact the emotional, psychological and cognitive well-being of CDSDs. Stressors may manifest themselves in a lack of concentration whilst on the job (which is particularly hazardous in the commercial

diving environment where lives are at stake), concern over finances and family well-being may lead to elevated levels of anxiety, and the physical environment (often comprised of exposure to extreme temperature depending on the location) may lead to physical exhaustion, fatigue and illness, which have clear impacts on the mental performance of individuals (Pincus et al., 2001; Bartone, 1999a).

Personal communication with R. Logan (27 October, 2014) as an expert technician of the saturation diving systems for the past decade outlines the fundamental differences between compressed air and saturation diving thusly.

When an air diver makes a dive to 50 metres, he experiences the pressure of the water around him, which is approximately five times the pressure at sea level. At this pressure, the gasses that make up the air in his lungs dissolve into his blood and tissues. With the gasses in his blood and tissue, he can remain at that depth for a short period of time – about 20 minutes. If he stays down longer than that, he runs the risk of developing decompression sickness, also known as "the bends," when he surfaces, and he'll have to go through the decompression process to avoid getting sick. This is a lengthy process that uses the vast majority of the time in the water to decompress and requires many CSDs to rotate to allow maximum time on the job. Saturation diving is based on the principle that the pressure of the dissolved gas in the blood and tissues is the same as that of the gas in the lungs. Basically, a diver goes down to a depth, perhaps 100 metres, and remains there until no more gas can dissolve in the tissues -- the tissues are saturated with breathing gas. Once the saturation point has been reached, the time required for decompression will be the same no matter how much longer the diver stays at that depth, whether it be a minute, an hour, a day or a week. This principle is used for divers who live in pressurized habitats and work at depths up to 300m. As such the saturation diver is housed in a very confined habitat in close proximity with his fellow divers for extended periods of time (usually not exceeding 28 days) under constant video surveillance. They undergo a single decompression process that may last up to several days. These divers usually work no longer than an eight-hour shift with a 16-hour break. They have no control of their environment, which is monitored and controlled by experts on the surface.

2.3 SPECIFIC CHALLENGES OF COMMERCIAL DEEP SEA DIVING

Due to the profound lack of literature on the CDSD complex, the researcher has drawn on the similarities and differences between military diving and CDSD, creating a foundation for discussion.

2.3.1 Parallels between military diving and CDSD

When comparing the nature of SAN divers versus CDSDs, the following differences and similarities can be summarised thusly:

- CDSDs are deployed more often, more erratically, and typically only get paid for the work that they have done offshore, as opposed to a monthly salary received by SAN divers.
- CDSDs are selected by word-of-mouth, reputation and qualification. SAN divers are exposed to rigorous psychological and physical testing before having to complete a branch-specific course.
- Emphasis is placed on maintaining physical fitness for SAN divers as an occupational requirement. CDSDs do not have such an emphasis in their industry.
- SAN divers form part of an organisation (South African National Defence Force) that has access to medical services for themselves and their families should they be experiencing any needs, psychological, physical or otherwise. This includes a formal support measure provided by the Chaplaincy, and Divisional System. CDSDs do not have access to such a formal system, unless they have opted to attempt to create one.
- CDSDs are typically 'deployed' on dive platforms or oilrigs situated out at sea for the duration of their 'work days'. SAN divers are very seldom deployed *en masse* to offshore establishments, unless they have called upon to sail with an outgoing vessel as part of the maintenance crew. Their work typically is conducted nearer to shore, where they return once the workday has been completed.
- Both groups are exposed to harsh environments, potentially dangerous working conditions, and require specialist training in order to be competent in their roles.
- Both groups may have families that are left behind when they have to go and work, although it can be deduced that this is far more prevalent with CDSDs as working

offshore is their *only* form of work, whereas this is not the case with SAN divers.

- Finally, much research has been conducted on military divers, both within South Africa and abroad (Van Wijk & Waters, 2001; Van Wijk, 2002a; Van Wijk, 2002b; Van Wijk, 2007; Van Wijk, 2008). The same cannot be said for CDSs. The amount of psychological research that has been conducted on the group is minimal at best, and out-dated to say the least.

Both groups yield very similar challenges yet the SAN diver group appears to have more sound selection procedures, a greater emphasis on physical well being, better support structures, a more stable financial income, and a lesser obligation of having to part with their families in order to work. It would seem then that although the psychological research attention paid to the SAN divers is certainly warranted, more extensive research should be paid to the multi-billion dollar international industry that is commercial diving.

With the similarities and differences being outlined as above, the particular concerns as they pertain to the nature of this research will be elaborated upon as follows.

2.3.2 Family separation

Wiens et al. (2006) state that separation from ones family unit serves as one of the most widely recognised and documented stressors for both family and incumbent alike – based on their studies pertaining to military personnel. The nature of the separation experienced by CDSs is parallel to that experienced by military members in that they are required to be withdrawn from their families for elongated periods of time, in often hazardous working environments, with foreign personnel and similar means of communication lines (Bevan, 2011; S. De Boer, personal communication, 7 May 2014). Riggs and Riggs (2011) explore the role of the Family Attachment Network in mitigating the negative effects of family separation during military deployment. This said, however, the experiencing of such a separation from ones family unit could result in the increasing of resilience of the family unit as a whole (Bartone, 1999a; Wiens et al., 2006). The importance of noting such a concern when planning on making a psychological inquiry into CDSs is hinged on the fact that said separation from ones support structure has been proven to be a stressor within the military environment, and

through correlation of similarities in work environments, such a stressor should be just as applicable to the families and CDSDs themselves. It is the researcher's belief, corroborated by personal communication (R. Logan, 2014; S. De Boer, 2014) that the correlations between the deployment demands of CDSDs and that of the military practitioner are significant enough to apply research from one to another. As such, the stressors faced by CDSDs and their families may lead to similar coping mechanisms within their family unit. Wiens et al. (2006) noted that the experiencing of such a stressor could yield the incumbent distracted from his work and essentially ineffective in terms of his respective occupational demands. This may very well detract from their subjective perception of success within their careers – begging the question whether the trade-off of being separated from one's family is worth the benefits associated with one's career. The author posits that this is particularly apt with CDSDs who have to forfeit their parental duties as a result of their required absence from the household, potentially creating a feeling of guilt and a subsequent assignment of blame on occupational-specific demands and therefore the career itself – necessarily influencing their perception of work-life balance, which may effect perceptions of career success (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010).

Whilst offshore, the CDSDs families are forced to operate under a different household head (typically the mother) which may carry with it rebellion from the children and an application of a different set of rules and decision making, particularly when it comes to finances (Pincus, et al., 2001; LaGrone, 1978). Upon the husbands return from offshore, he must assume his role as the head of the household once more, with often brings with it challenges in discipline and enforcing rules, as well as re-establishing intimacy with his spousal partner. The fundamental tenets of this theory has been confirmed through interviews with existing CDSDs, confirming the assertion that the challenges experienced by deployed military families are similar to those of CDSDs.

In their study of merchant seafarers, Oldenburg and Jensen (2016) cite separation of family and the loss of the individual's home country as a being a major focus in research throughout the last three decades. They touch on the difficulty to establish meaningful social connections owing to multicultural crew compositions, which may add to their fear of a progressive loss of contact from families and social isolation from their country's of origin. Recent technological developments in communication present a mitigating factor in these circumstances, but do not

necessarily allow for the seafarer in question to fulfil their familial roles and obligations. This is cited as a considerable stressor that leads one to feel helpless in their lack of influence that they are able to bear on problems that may arise within their family context. The researcher believes that considerable transference can be established between seafarers and CDSDs in their similar occupational demands and therefore that similarities will exist in the challenges they face.

2.3.3 Financial concerns

Financial concerns have been cited as a considerable stressor prevalent in numerous fields, and CDSD is no different (Hakkio & Keeton, 2009). For the majority of CDSDs working offshore, their typical contractual employment agreement is hinged on the maxim: no work – no pay, which therefore implies that divers are only paid per day offshore, which typically includes travel time, or any amount of time forcibly spent away from ‘home’ in pursuit of occupational demands (T. Skelton, personal communication, June 13, 2017). Some divers, however, are kept on retainer by a specific organisation, and are therefore paid on a monthly salary basis, regardless of the amount of time worked offshore. The implication hereof, however, is that those divers earning money whilst offshore for more than 186 days of the year are exempt from paying taxes in terms of current South African legislation (at the time of writing this thesis), and divers kept on retainer may not fall within this bracket. These represent some of the financial complications attached to the diving industry (R. Logan, personal communication, October 7, 2013). The author personally noted sentiments of distaste towards CDSD as a career choice among certain incumbents during his personal communication, citing financial uncertainty and a lack of security as being a considerable influencing factor in the perception of the incumbent’s self-worth, which has been shown to influence their perception of career success (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010).

2.3.4 Environmental demands

Living conditions on board the platforms have been cited as a stressor. A typical platform provides a cabin (living space) designed for four CDSDs, often divided per shift, with two CDSDs occupying such at a time – this leads to a perception of a lack of privacy through shared ablution facilities and shared ‘common rooms’ (designed to be utilised for socialising with co-workers and recreational times) (R. Herbst, personal communication, July 31, 2017; T. Skelton, personal communication, June 28, 2017; R. Logan, personal communication, October 7, 2013). The spatial demands alone under which CDSDs are placed are enough to warrant concern in terms of their occupational well-being and personal psychological health. Saturation divers are required to remain within a small tubular compressed chamber for the duration of their time on board the platform, so that they are maintained under a particular pressure that allows them to seamlessly re-enter the water and resume work at the previous depth at which they were working. (L. Thomson, personal communication, October 20, 2013). The nature of CDSD is such that the occupation lends itself to work within the oil and gas industry, which brings CDSDs to platforms that are geographically based in almost unbearable climatic conditions. The living and working conditions in the Middle East are subject to some 50 degree Celsius weather, with CDSDs consistently being required to perform preparatory tasks on the upper deck of the platform (not sheltered from the elements), in full overalls and safety gear (in accordance with regulatory Health and Safety specifications). Exposure to the natural elements includes sharks, rays, subaquatic flora and snakes (R. Logan, personal communication, October 7, 2013). This exposure is often coupled with the need to work long (often more than 12 hours) shifts, which places an unusually elevated demand on the individuals in question – leading to fatigue and a general diminishing of cognitive functioning as the elements and time take their toll. It has been cited that the demands of the industry create a ‘cut-throat’ approach to interpersonal relationships on board – with co-workers attempting to curry favour through selfish means and a general feeling created that employees are all replaceable and indeed will be if they do not ‘tow the line’, in both a social and professional sense (R. Herbst, personal communication, July 31, 2017; T. Skelton, personal communication, June 28, 2017; R. Logan, personal communication, October 7, 2013). The author posits that enduring these harsh environmental circumstances may have an adverse effect on the CDSDs perception of career success, associating exposure to such undesirable conditions to a less unsuccessful career through fostering a

less than favourable appraisal of their self-worth and a lack of satisfaction (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010).

2.3.4.1 Occupational risks

Ross et al. (2007) made use of a postal survey exploring the lifestyle, occupation and health status of 2958 male professional divers that were registered with the UK Health and Safety Executive (HSE). This study served to inform the medical status of these divers, as opposed to the amount of incidents associated with the demands of the occupation. Key findings that resulted from this study were as follows: 1) divers were less likely than the control group to report asthma or hypertension; 2) divers were more likely to report a suffering of hearing impairment, cognitive issues and musculoskeletal symptoms (the latter being reported by 41% of the diver group).

To gain a more holistic understanding of the occupational risks, one must necessarily look past the health-related implications and include the safety related incidents related to the demand of the occupation. The medical risks associated with diving as a sport and as an industry in general have been well documented (Lynch & Bove, 2009; Aito, Andrea & Werhagen, 2005; "Project dive exploration", 2007; Wilmshurst, 1998; Germonpre, 2006). These potential ailments include Pulmonary barotrauma, which is a well-known complication of compressed air diving. The features manifest themselves clinically in pulmonary tissue damage and mediastinal emphysema, with the potential of leading to the second largest cause of death in underwater diving aside from drowning, known as an arterial gas embolism (Tetzlaff & Thorsen, 2005). Many of these medical risks may be derived from predisposed pulmonary abnormalities, but for those healthy divers, lung damage can be thwarted through following appropriate exhalation techniques – as revealed by medical examinations post injury (Tetzlaff, Reuter, Leplow, Heller & Bettinghausen, 1997). Understanding these risks, it is imperative that CSDs employ sound judgement and rational thinking when executing each and every one of their dives, regardless of what other pressures, (psychological, physiological, environmental) may be placed on them, if they wish to maintain their health and avoid serious injury or death. International Marine Contractors Association (IMCA), which serves as the civil regulating research covering the maritime industry, including CSDs,

released their safety and environment statistics in their 2014 summary (IMCA Safety and Environment Statistics, 2014). The statistics offered were derived from approximately 60% of the IMCA membership contingents, resulting in 264 companies releasing their stats for collation. Whereas the amount of Lost Time Injuries (LTI) have drastically decreased since their 2000 annual report (15% thereof), the calibre and nature of the injuries are categorised in a similar fashion. The breakdown of the categories for LTIs serve as a guideline to better understand the occupational risks of the job: 'No cause recorded' (18%); 'Contact with or exposure to hazardous substances' (2%); 'Contact with or exposure to heat or cold' (1%); 'Struck by moving or falling objects' (26%); 'Falls on the same level' (21%); 'Struck against' (9%); 'Entrapment' (8%); 'Falls from height' (8%); 'Muscle stress and repetitive movement' (7%). During 2014, a total of six Fatal Accident Rates (FAR) were reported. They are described in the report as such: 'Cardio/respiratory failure'; 'Crewman hit by a flange and died of injuries'; 'Vessel master swept overboard by a parting rope and drowned'; 'Crewman hit in the neck and fatally injured by snapping taut wire'; 'Man overboard – drowned'; 'Crewman killed when a nearby crane boom was struck by lightning'.

The inclusion of LTIs and the FARs in conjunction with the elaboration of the various longer-term health implications serve to illustrate the various risks associated with CDSD as an occupation. Perhaps the more overlooked resultant factors associated with the aforementioned incidents is the psychological effects that either experiencing such or bearing witness to such an event may have on crew members on the platform. This form of exposure to trauma has the potential to manifest itself in the onset of various psychological disorders, including post-traumatic stress disorder (PTSD), phobias, depression and other dissociative disorders (Elsesser, Sartory & Tackenberg, 2004; Steele, van der Hart & Nijenhuis, 2005).

The adverse psychological reactions to prolonged or even brief exposure to events that may be construed as traumatic by the individual has been well documented since the evolution from the coined term 'Gulf War Syndrome' to its contemporary recognition, PTSD (Edwards, 2005a). Although the recognition of these symptoms was initially correlated with exposure to combat situations within acts of war, it has been found that what amounts to the trauma experienced is not restricted to war-related violence or even to direct experiences therewith, but may include exposure to sexual assault, fear of death or injury, and a host of other stressors (Kessler, 2000). One of the requirements for the onset of PTSD to occur within an

individual is the exposure to an extremely traumatic stressor. This stressor must involve the person directly, and the event should involve actual or threatened death or serious injury to the physical integrity of the party concerned; witnessing the same misfortune being inflicted on another person; or even learning about unexpected similar situations that have been experienced by a family member or close associate. The second precursor for the formation of PTSD pertains to the subjective response of the individual concerned – which must involve an experiencing of intense fear, helplessness or sense of horror. This second antecedent manifests itself differently in children, who may appear to become disorganised or agitated. (Edwards, 2005b; DSM-V, 2013). Having elaborated on the potential sources of the stressors that are antecedents of PTSD, one must note that it has been specified that the response to these stressors is made all the more severe when the trauma experienced is by human design, which invariably places some of the stressors mentioned within the list (sexual assault or violent crime) above others (natural disasters, being diagnosed with a life-threatening illness) with regards to the magnitude of the effects that may yield on the party involved. The adverse psychological reaction to these stressors may manifest themselves shortly thereafter, in which case the individual may be suffering from what is known as Acute Stress Disorder, but this diagnosis bears with it the condition that the symptoms (similar to PTSD) are resolved within four weeks after exposure to the traumatic event. In the situation where the symptoms (resembling PTSD) persist for longer than four weeks, the individual concerned may be re-diagnosed, with PTSD (Edwards, 2005a; DSM-V, 2013). This may be considered an additional precursor to the onset of PTSD.

It may often be difficult, particularly in a work setting, to be aware of whether or not an employee has been exposed to a traumatic event that could potentially lead to him developing PTSD. This is due to the fact that the details of individuals' private lives outside the sphere of work may be kept discrete, where information regarding possible experiencing of trauma is not made known, particularly when the nature of this trauma may be a source of shame or humiliation to the employee (Kaminer, Grimsrud, Myer, Stein & Williams, 2008). Here, the emphasis will be on recognising the manifestations of these symptoms, which may prove to be the initial process in discovering that an individual may be suffering with PTSD. These symptoms may include a combination (two required) of the following that were not previously present:

- Irritable or aggressive behaviour
- Self-destructive and reckless behaviour
- Hypervigilance
- Exaggerated startle response
- Problems in concentration
- Sleep disturbance
- Dissociative symptoms

Psychological manifestations such as the above, and the persistent reliving of the traumatic event provide a safety risk to not only the individual CDSD but also the crew that relies on his sound performance for their safety.

In their exploration of phobias, Steele et al. (2005) discuss the traditional view that phobias are generally directed towards externally related phenomena and may possess a psychodynamic meaning – stemming from psychological or emotional forces that have been developed over time, usually beginning in childhood. This view was supplemented by the finding that phobias can also be directed toward elements that lie internally, such as thoughts, feelings, sensations and memories (Nijenhuis, 1004; Hart, Steele, Boon & Brown, 1993, as cited in Steele et al., 2005).

The risk of exposure to traumatic events among CDSDs is clear and well documented (“IMCA Safety and Environment Statistics”, 2014; R. Logan, personal communication, July 29, 2017; T. Skelton, personal communication, June 13, 2016; L. Thomson, personal communication, May 1, 2016), and the ramifications of such exposure have been illustrated by the above literature to include psychological disorders that bear with them certain behavioural consequences. These resultant behaviours place the CDSDs at risk through intrusive symptoms affecting concentration, sleep cycles, proper relationship functioning and the like (Kaminer et al., 2008). It is essential that CDSDs are protected against these manifestations, and the researcher will establish the safeguards provided against such throughout the literature review of hardiness, resilience, and grit.

2.3.4.2 Addressing cultural differences

Culture can be described as the shared values and norms that are held as the most important aspects of a social system (Aluko, 2003). Expanding on this, culture can include the general world life view of a group of people, including their norms, perceptions, attitude and general way of life. Earlier research on the influence that cultural differences has on performance is seen through the work of Cox, Lobel and McLeod (1991), where they posited that values, attitudes and norms differ from person to person as a result of their heritage. The nature of the contemporary workforce is such that work groups are becoming more diverse in demographic make up over the years and this trend will continue to escalate (Knippenberg, De Dreu & Homan, 2004). This trend is specifically evident in the CDSD environment, with CDSDs on a single platform hailing from several countries and cultures around the globe (B. Thomson, personal communication, July 29, 2017). Recent studies examining the relationship between cultural make-up of work groups and their subsequent work performance have suggested that when work members of the group share similar goal and values, their effectiveness will be escalated (Jehn, Northcraft & Neele, 1999). Ely and Thomas (2001) found that perspectives of cultural groups played a significant role in their effective functioning within the workplace. If traditionally underrepresented employees felt respected and valued by their colleagues, and felt they were able to adequately express themselves as members of their cultural identity groups, then their perception of self-efficacy and contributions towards the group functioning would be significantly enhanced. Their examinations concluded that cultural diversity could potentially become a valuable resource due to the configuration of alternative worldviews, knowledge and insights. This would only be true as a result of mutual respect and appreciation of different cultural identities – failing which learning and work performance would be inhibited. This is particularly important for CDSDs, as they do not undergo specific cultural sensitivity training aimed at fostering understanding or mutual respect on board the platform, often having to ‘feel their way’ through experience and fostering an understanding of the various norms and behaviours exhibited by their work colleagues on each different platform (R. Logan, personal communication, June 13, 2016; T. Skelton, personal communication, June 28, 2017). Chief among these observations was the collectivist-individualist alignment associated with different cultural backgrounds.

In individualistic cultures, the importance of developing ones own distinct potential and

preferences stems from a variety of informal and formal cultural mechanisms. This has led to establishing a cultural predisposition to promote one's own goals and self-worth separate from others. Individualistic peoples tend to have a more informed understanding of one's self (beliefs, attributes, interests) and tend to be more concerned with their own needs and interests than the larger cultural group to which they belong (Gelfand & Christakopoulou, 1999).

On the opposite end of the spectrum, those coming from collectivistic cultures tend to describe themselves as being members of a particular cultural group. They exhibit behaviour of placing the goals of the cultural group to which they belong before their personal needs, sacrificing personal interests for collective ones. Collectivists tend to pay more attention to establishing harmonious interrelationships between those within their in-group, often at the cost of goal accomplishment (Wang, Bishop, Cheng & Scott, 2002). Cross cultural studies have shown that individualistic cultures tend to prevail in those 'Anglo' countries (North Americans and northern and western Europeans) whereas Asians, West Africans and Latin's tend to subscribe to collectivistic cultural norms (Cox & Blake, 1991).

The nature of the diving industry is such that contractors from around the world are brought in to work on a particular job based on geographic location. Very often, the nature of the geographic location determines how much of the local populace will be involved in the dive. This results in the specific local influence from the country of origin in the makeup of the dive team.

Aluko (2003) complements this notion through the exploration of textile firms in Africa. It was noted that impact of cultural and societal norms had a significant effect on material aspects of work behaviour. Culture was suggested to be a universal phenomenon, and vary from society to society, predominantly aligned with Western and non-Western pillars. In support of this, the fundamental difference between the pragmatic individualistic approaches of Americans versus the cold objective approach of the Japanese was outlined. By way of example of the differences in work behaviour, it was suggested that the individualism held by the Americans would result in a strong work ethic and desire for success that would result in behaviour that may be considered ruthless and aggressive, with a strong emphasis on the self, segmented concern and formalised processes. The Japanese culture, on the other hand, embraced

consensual decision-making, collective responsibility, holistic concern and a more implicit sense of formal control. Within the CDS community, comprising of staff from multiple cultural background, the understanding of culture becomes particularly relevant (L. Thomson, personal communication, May 1, 2016).

Hofstede (as cited in Merkin, 2006) established five different dimensions that particular national cultures would be aligned to. Four of which supplement the individualism versus collectivism view as explored above. *Power distance* can be applied to either cultural or individual levels of orientation. This orientation deals with individual's beliefs about their status of power that they hold within organizations, on an individual level, and within their communities, on the cultural level. It can be described as the extent the people in a given society would accept the often-obvious inequalities in terms of power distribution within their ranks (Kirkman, Chen, Farh, Chen & Lowe, 2009). CDSs may, and indeed have (R. Logan, personal communication, June 13, 2016; L. Thomson, personal communication, July 27, 2017) experience issues akin to the *power distance* dynamic owing to the multi-cultural make-up of their dive platform. The staff complement will largely depend on where the dive site is located and the accessibility of skilled CDSs relative to that location. This uncertainty manifests itself in issues with perceptions of unfair treatment among the staff members, unequal senses of entitlement (especially by what may be considered the 'local divers', where they believe the rights to the dive job and the subsequent earning are inherently their by way of nationality and associated geographic location).

Uncertainty Avoidance describes the extent to which a society feels threatened or nervous by uncertain situations – ones they consider to be unstructured, unclear or unpredictable - and will make efforts to avoid them. These efforts may amount to the adoption of stricter guidelines of behaviour and a general hesitation of embracing new intercultural relationships (Merkin, 2006). The CDS industry is riddled with uncertainty, and as such one needs to be flexible and possess an innate or learned ability to adjust to changing circumstances in order to cope and succeed (L. Thomson, personal communication, July 27, 2017). *Long-term versus short-term orientation* is a cultural attribute that emphasizes either future focus and persistence or rather seeks to find meaning in the past and the present with a focus on tradition and fulfilling social obligations. According to Fang (2003), the reception of this cultural dimension has enjoyed an enthusiastic reception from the international research

community. Finally, *Quality of life versus quantity of life*, where quality emphasizes a concern for others and building of meaningful relationships whilst quality places value on the assertiveness and materialism (Blanton & Barbuto, 2005).

According to the orientations as described above, it is plain to see that when placing individuals hailing from various different cultural backgrounds on the same vessel and expecting them to work harmoniously, certain issues will invariably arise. The way in which they see the world, as prescribed by the cultural tapestry, will undoubtedly influence the manner in which they approach work, their relationships with fellow employees, their handling of conflict resolution, and the emphasis they place on the person standing next to them. Working in such an environment would require certain level of tolerance and sensitivity and collaboration to be possible. The ability to adjust to uncertain and changing circumstances, handle ambiguity, and tolerate cultural clashes based on inherent predispositions is aided by experience within the CDSD industry (R. Logan, personal communication, June 13, 2016). The researcher will illustrate through his exploration of the relevant literature, that the possession of certain psychological traits such as hardiness, resilience and grit will greatly benefit CDSDs in their ability to adjust to changing circumstances, bounce back from trying and difficult situations and endure harsh working environments – making them an essential part of the successful CDSDs psychological make-up, and invariably influencing their perception of career success in their industry.

2.3.5 International labour legislation

Although there is no one specific piece of legislation that governs CDSD as an industry, there appears to be a body of separate authoritative documentation that appears to apply as guidelines. Each of these will be explored separately in an attempt to illustrate their scope and content as considered relevant.

Although somewhat dated, Sutherland and Cooper (1996, p.2) contributed to the literature pertaining to the oil and gas industry (one that is commonly affiliated to CDSDs) through their exploration of stress prevention interventions. They highlight the importance of performance and productivity within what may be considered a potentially dangerous and hazardous

industry, citing numerous adverse impacts of mismanaged stress to both employee and organisation, including:

- “Physical and/or psychological ill-health
- Premature death
- Forced early retirement
- Absenteeism
- High labour-turnover
- Poor job performance
- Poor productivity
- Unsatisfactory employee relations
- Job dissatisfaction
- Increased rate of accidents
- Alcohol problems
- Drug abuse
- Marital disharmony and divorce
- Increase insurance premiums
- Cumulative stress trauma litigation”

Through utilisation of a stress audit and subsequent factor analysis, they were able to conclude that the following factors appeared to emerge as contributors to the participants’ experiencing of stress:

- Career prospects and reward
- Safety and insecurity at work
- A lack of home/work interface
- Understimulation within the work environment
- Adverse physical work and living conditions owing to environmental factors
- Unpredictability of work patterns
- Inadequate living conditions
- Uncertainty regarding the physical working environment
- Organisational structure and climate

- General physical well-being
- Work overload
- Perceptions of lack of safety regarding transportation to and from the platform

Although their research extends to providing guidelines for potential measures to be taken for the potential mitigation of the stressors and resultant responses, the author wishes to note that their exploration includes the mention of “psychological testing” (p. 24) as a form of preventing stress, but such is the extent of this mention.

A document created by the European Diving Technology Committee, “Diving Industry Personnel Competence Standards” (2003, p.1), aimed at “draw[ing] together all of the accumulated knowledge of the various member countries of EDTC in the area of competence requirements for the various grades of personnel” includes suggestions for individual countries or organisations to make use of in the development of their own specific standards. This denotes a lack of legislative authority and is thus considered a guideline for best practice. Included in their doctrine are ‘entry requirements’ for various categories of CDSs (see par 2.2.3) to join perform their duties, which essentially state that candidates in each category:

- Must be at least 18 years old (or 21 in some countries)
- Must be medically fit to work as a commercial diver
- Must have sufficient elementary education to be able to carry out the necessary calculations, communicate and understand written instructions
- Must have passed competence assessment associated with their specific category of diving (see par 2.2.3)

The author wishes to highlight that no specific mention is made of a passing of psychometric tests as a prerequisite to enter into the CDS profession according to these standards.

The International Oil and Gas Producers (OGP) sites numerous management practices affiliated with the oil and gas industry, with specific reference to diving. Their report (“Diving Recommended Practice”, 2008) rather comprehensively outlines various management

specific guidelines aimed at creating a regulation for the industry, which includes deconstructing pre-award activities to take place before contract attainment; compliance regulations to which they hold themselves accountable, including bodies featured within this research, such as IMCA; specific project planning activities; the subsequent execution thereof; and measurement and improvement interventions. In line with the afore-mentioned guidelines, the presence of suggestion for psychometric testing of potential CDSDs is distinctly lacking.

Widely considered as the leading authoritative figure in the Oil and Gas and CDSD industry, IMCA was formed in 1995 to serve as an international trade association representing offshore, marine and underwater engineering companies (“IMCA International Code of Practice for Offshore Diving”, 2014). Their mandate includes two core activities that relate to all members including competence and training; and safety, environment and legislation. Of particular interest to the author are the guidelines set out regarding training requirements and standards to be met for the recruitment and selection of offshore personnel, by inference including CDSDs. Although their code of practice can be considered comprehensive and covers numerous technical aspects related to the offshore industry, this code does not address any requirements for psychometric screening for personnel. The extent of this mention is featured under their guideline covering ‘Medical Checks’ (“IMCA International Code of Practice for Offshore Diving”, 2014, p. 38) which state that ensuring medical readiness is at the responsibility of the CDSD: “Divers who consider themselves unfit for any reason, e.g. fatigue, minor injury, recent medical treatment, lack of physical and/or *mental* fitness, etc., will need to inform their supervisor.”

In the author’s exploration of the relevant governing literature pertaining to CDSDs, the most prominent mention of screening for psychological conditions is featured in a single paragraph of the 254-page publication by the Association of Diving Contractors International:

The nature of diving duties requires a careful appraisal of the individual’s emotional and temperamental fitness. Personality disorders, psychosis, immaturity, instability and anti-social traits shall be disqualifying. Severe stammering or stuttering shall disqualify. Any past or present evidence of psychiatric illness shall be cause for rejection unless the examining doctor can be confident that it is of a minor nature and unlikely to occur.

Particular attention should be paid to any past or present evidence of alcohol or drug abuse. Any abnormalities should be noted in Block #52 of the physical examination form.” (“Consensus standards for commercial diving and underwater operations”, 2004, p. 38).

Although this mention does indeed highlight some form of recognition for the importance of having psychologically sound personnel operating within the industry, the lack of specification as to how this screening is to take place and to what standards CDSDs may be held is lacking – a recurring theme among the literature explored. The author is of the opinion that this apparent lack of attention to the importance of such testing in the selection criteria for CDSDs presents a significant vulnerability for ensuring safe and efficient operations, and forms the catalyst for this inquiry. As such, the various psychological elements to be explored through this research will be addressed, in an attempt to highlight their importance for application within the CDSD industry.

2.4 PERSONALITY AND CDSD SUCCESS

Personality hardiness (hitherto referred to as hardiness) as the name suggests, indicates a certain cluster of *personality* characteristics buffer against the adverse effects of exposure to stressors (Skomorovsky & Sudom, 2011). This justifies the author exploring the correlation between the two constructs. Similarly, research has shown a connection between personality and the constructs resilience and grit. Van Wijk (2008) in his exploration of Naval specialists (including SAN divers) concluded that there existed a positive correlation between certain of the 16 Personality Factor's (16PF) traits and resilience, which warrants investigation as to whether said results will be replicated in this study (see par. 5.3.7). Duckworth and Quinn's (2009) creation of the Grit-S yielded results that showed significant positive correlation of grit with the Big Five personality trait of conscientiousness, which is closely related to the 16PF's Global Factor of self-control (Duckworth, 2011), whose potential replication is also been to be explored within this study (See par. 5.3.9). Due to that fact that literature explored within this research has indicates correlations between certain personality traits and hardiness, resilience and grit (which subsequently impact on experiencing SCS - see par. 2.8.1), an exploration of personality is warranted.

There has been much research into the role of personality in predicting workplace performance (Anderson, Flynn & Spataro, 2008; Barrick, Mount & Li, 2013; Boyle, Matthews & Saklofske, 2008). Barry and Mount (2005), supported by Tett, Jackson and Rothstein (1991) illustrated that personality has a direct influence on our behaviour at work and may predict job performance across a variety of outcomes that a particular organisation may value. They suggest that recognising the role of personality in work performance should not necessitate a scientific enquiry but would essentially stem from a rational perspective: how we tend to think, feel and act would have a direct effect on the manner in which we conduct ourselves within the working environment. Behavioural scientists have been trying to explain the reasons why people do what they do at work for the past 100 years, and the answer to such a question is complex in nature, assessing a myriad of contributing factors that make up individual characteristics and situational factors. The former dimension includes an inquiry into personality and the latter explores contextual factors such as the characteristics of the work situation and the role of work redesign through job enrichment – in both instances the point of interest has been on the impact these have in motivation and behaviour at work (Barrick, Mount & Li, 2013).

Phares and Chaplin (1997) established that historically different schools of thought emerged as to the nature of personality (Freud, Adler, Jung, Rank) and its origins, but a common denominator exists: that personality is stable over time, and that it bears a significant influence on how people are motivated and ultimately guides their behaviour. Of particular importance, are the instances where certain personalities pose a risk for the efficiency of the organisation, and within the context of the offshore CDSD industry, this may prove to be a serious health and safety risk. Kets de Vries (1994, p146) distinguishes between five different dominant constellations of both personalities and organisations as they relate to the workplace. The *dramatic* constellation is characterised by “over-centralisation that obstructs the development of effective information systems” in the organisation, and individuals that experience a great need to impress and gain attention from others. The *suspicious* individual is hypersensitive and distrustful, and is vigilantly prepared to counter any attacks and personal threats. A predominantly *suspicious* organisation is characterised by elaborate information processing and a centralisation of power. *Detached* organisations have an internal focus that jeopardises their scanning of the internal environment, where *detached*

individuals may be withdrawn and uninvolved, lacking an interest in the present or future. *Depressive* individuals lack self-confidence and have become tolerant of mediocrity and failure, whereas the organisation is characterised by ritualism, bureaucracy inflexibility and an excessive emphasis on hierarchy. Finally, a *compulsive* organisation adopts rigid, formal codes and elaborate information systems that combine to result in excessive thoroughness and evaluative procedures. *Compulsive* individuals are typically dogmatic or obstinate, obsessed with perfectionism, routine and rituals.

This illustration of the variety of personality subsets juxtaposed with the characteristics present within their corresponding organisational cultures allows one to better comprehend the importance that personality may have in the functioning within a particular working environment. Within the world of CDSDs, the organisational culture that dominates the offshore arena is dependent on geographical location (with reference to the use of 'local' offshore staff sourced from the host-nation, posing potential cultural-specific challenges), inter-organisational cooperation, and task orientation. Therefore, a successful CDSD would ideally have a particular personality that allows for flexibility and a strong ability to adjust to the prevailing circumstances. In order to effectively define the personalities of the sample group, the author relied on the research of Cattell et al. (2006) and their subsequent formation of the 16PF questionnaire (see par. 3.5.1). They postulate that personality can be broken down into 16 different factors or 'primary traits', which serve as powerful tools in understanding and predicting actual behaviour. These traits were then factor analysed and were found to cluster at higher level, essentially leading to the creation of the 'second-order' traits, or the original 'Big Five', which serve to define personality at a higher, more theoretical level. The author will investigate the presence of the primary traits within the CDSD sample group in order to gain a better understanding of their personality profile and which traits, if any, are more prevalent among the sample to be discussed in the results (see par. 4.4).

2.5 HARDINESS

Hardiness as a construct was originally established by Kobasa, Maddi and colleagues in the 80's, referring to a constellation of personality characteristics that function as a buffer when encountering stressful life events. Hardiness is defined by Kobasa, Maddi and Kahn (as cited in Cole, Bruch & Vogel, 2006, p.467) as “a personality composite of beliefs about self and world involving the importance of sense of commitment, control and challenge”. Bartone, Kelly and Matthews (2013, p.201) define hardiness as “a constellation of personality qualities found to characterise people who remain healthy and continue to perform well under a range of stressful conditions”. Kobasa (as cited in Van Dyk, 2015) elaborates on this definition by stating that the possession of hardiness functions as a resistance source when encountering stressful life events.

Maddi (2004, p.286) suggests that “hardiness emerged as a set of attitudes or beliefs about yourself in interaction with the world around you that provides the courage and motivation to do the hard work of turning stressful changes from potential disasters into opportunities instead”. The researcher wishes to make use of this definition in the further exploration of the construct hardiness, with the aforementioned ‘attitudes and beliefs’ referring to the 3 Cs associated with hardiness – *commitment, control and challenge*. The fundamental tenets underpinning the construct of hardiness stipulate that 1) an individual exerts an intense involvement in whatever they may be doing (*commitment*), 2) they believe and indeed act as though they are able to influence the events that form part of their everyday lives (*control*), and 3) they consider change as being not only normal, but a stimulus to their development (*challenge*) (Kobasa, 1979; Kobasa, Maddi & Kahn, 1982; Maddi & Kobasa, 1984; Funk, 1992).

Operationalized, hardiness refers to an intra-psychoic ability to mitigate the negative effects of stress through embracing its onset as a personal challenge to the incumbent. McVicar, as cited in Abdollahi, Talib, Taacon, and Ismail (2015) points out that there exist distinct differences in how individuals perceive, respond to and cope with exposure to stressful conditions, citing hardiness as a protective factor, or buffer, mitigating the manifestation of said exposure. He describes hardiness as the existential courage that allows for one to accurately perceive stressful events and hence choose manners from one's inner self in

which to effectively deal or cope with said situations. This description can be read in line with that as outlined by Maddi et al. (2013), indicating that hardiness serves as an inner ability to assist an individual in adjust to or master stressful occurrences and change their perception thereof from potential disasters to opportunities for growth that may yield long-term health advantages and an elevated level of existential courage. Maddi (1999) suggested that hardy individuals make positive attempts to influence the outcomes of life events, even in the face of adversity, adopting a positive approach to psychology in viewing each opportunity as one to learn from. On the opposite end of the scale, he posited that those low in levels of hardiness tended to become threatened by adverse or difficult circumstances, choosing rather to withdraw and often succumb to the stress as opposed to learning from it. Hardiness is considered a stable intra psychic aspect that is deeply rooted in one's personality, with the majority of studies demonstrating a general positive relationship between the presence of hardiness and well-being. The effects of possessing such a trait have been shown to protect against the negative effects of stress and may serve as a predictor for healthy functioning - a notion that has been elaborated upon through the extensive research conducted on the military application of such psychological constructs (Bartone, 1999a; Bartone, 1999b).

Conceptually, hardiness is a variable that is relatively stable over time, although is amenable in certain situations, and is developed from childhood (Kobasa in Bartone, 1999b). Maddi (2004, p.9) describes hardiness as “a set of attitudes or beliefs about yourself in interaction with the world around you that provides the courage and motivation to do the hard work of turning stressful changes from potential disasters into opportunities instead”. He further supports the emergence of the “3 C's” as being acute measures of hardiness- these being commitment, control and challenge. *Commitment* refers to the ability and desire to become involved with, rather than withdrawing from, those things happening around you; people who are high on commitment perceive this as being the best means of learning from their experiences. *Control* refers to the belief that attempting to influence the outcomes of one's actions through making different decisions will be more beneficial in achieving desired outcomes than simply sitting back and doing nothing. Finally, people high in the *challenge* paradigm believe that stress is normal, and that lessons in life are not simply learnt in comfortable, easy environments but rather from the product of both positive and negative experiences that are a part of an enriched life (Maddi, 2010). To turn stresses to advantage, one must stay involved rather than pull out (commitment), strive to have an effect rather than

feel powerless (control), and learn all the while rather than bemoan one's fate (challenge) (Maddi, 1999). As a concept, Waysman, Schwarzwald and Solomon (2001) suggest that hardiness originates from the existential investigations on what may be termed the authentic person, suggesting that individuals consider finding the meaning of life among their fundamental goals, and are further defined by their subjective attitudes and secondary life goals. Even in the early work of Frankl (1960), was the role of existential courage in mediating reactions to stressful conditions recognised, essentially assisting in creating a meaning in life even in its most challenging troughs and peaks – this may be considered the fourth, supplementary factor when deconstructing hardiness. Hardiness reflects the manner in which an individual responds to both personal and professional life events – acting as a buffer. Individuals who possess hardiness are able to handle various personal stressors such as those related to work-family balance and work-related stressors including occupational roles and relationships better than their less hardy counterparts (Azeem, 2010). Maddi (2006) suggest that hardiness is comprised of multiple attitudes that combine to provide motivation and courage assisting in turning stressful circumstances into opportunities for growth as opposed to potential disasters. Studies supporting the power that hardiness has to thwart the negative effects of stressors include the suggestion that hardiness may serve as a greater mitigation than religiousness and optimism (Maddi, 2006; Waysman et al. 2001; Maddi, 2004).

Maddi (2007) proposes that hardiness, due to its definition, is an attribute that is particularly well suited for individuals in lines of work that may include elevated physical and psychological demands – which this researcher postulates is a characteristic of the CDSD occupational climate. Early studies of hardiness suggested that possessing this attribute could lead to not only increased performance in the workplace, but to increased health due to being more conscientious about dieting and exercise habits, as well as a better relationship with their significant others (Maddi & Khobasa, 1994). Maddi (2007) suggested that the higher an individual's level of Hardiness before actually departing for 'deployments', the less chance said individual will have of developing Post Traumatic Stress Disorder (PTSD) after being exposed to potentially traumatic events (Burbakk & Neuman, 2003). Applying this notion to the CDSD context, one can conclude that the possession of hardiness will allow CDSDs to possess an elevated level of psychological strength in the face of the numerous stressors faced offshore, including but not limited to the severe occupational risks and the cultural

challenges that form part of the CDS industry. Bartone (1999a) concurs with this finding in his study of reserve force military members and the influence of hardiness on their subjective combat experiences. He found that having personality hardiness was a contributing factor in maintaining sound health even after being exposed to a range of stressors associated with a wide range of missions. Ultimately it is suggested that possessing hardiness combats against some of the stressors associated with working offshore, such as feelings of powerlessness over one's situation, being separated from one's family and boredom.

A study conducted by Kobasa, et al. (1982), complemented by a subsequent inquiry by Bartone (1999a) suggested that individuals with elevated levels of hardiness may be less vulnerable to the negative effects derived from exposure to stress, with an emphasis on being beneficial in escalating coping behaviour after exposure to trauma. These assumptions were further supported in the study conducted by King, King, Fairbank, Keane and Adams (1998) in which Vietnam military veterans were assessed on their levels of hardiness in relation to their ability to effectively adjust after having been exposed to significant trauma. It was found that a negative correlation exists between hardiness and PTSD, and furthermore was noted that those hardy individuals were more likely to seek out for assistance and emotional support in their times of crisis, enabling them to build larger and more effective support networks that readily foster recovery from trauma and positively contribute to post traumatic growth. Research has indicated that the presence of hardiness acts as a protective factor against the harmful effects of being exposed to stressors, and simultaneously serves as an escalating factor in relation to the manifestation of positive outcomes (Britt, Adler & Bartone, 2001; Dolan & Adler, 2008; Maddi, 2006). The direct effect of hardiness as it applies to most people has been complemented by the moderating effects that it has on those exposed to traumatic events. Bartone, Roland, Picano and Williams (2008), in their study of candidates for special forces selection, found that hardiness was a particularly important psychological factor among candidates that had passed the course, stipulating that members with higher hardiness levels were better able to perform under the rigorous pressures that the course presented. The construct was found to be a buffer against stressor in studies conducted with US Army forces, Israeli officer candidates and Norwegian Navy cadets (Hystad, Eid, Laberg & Bartone, 2011).

Britt et al. (2001) explored various types of stressful events, including the respective impacts thereof, with an emphasis on how said events affected individuals and to what extent. Their

findings revealed that the manifestation in negative reactions when exposed to stressful events was mitigated by the presence of hardiness within study incumbents. It therefore follows that hardiness as a construct allows for a person to remain relatively healthy after being exposed to and experiencing high levels of stressful life events (Azeem, 2010). The presence of hardiness within an individual allows them to better manage stressful circumstances through manifesting them as growth inducing as opposed to debilitating experiences. Hardiness leads to an expression of mental health far more vigorous than with those individuals possessing lessened levels of the construct (Maddi et al., 2002). As existential courage, hardiness is a sign of mental health and has expanded the emphasis of positive psychology beyond mere happiness. Maddi (2006) suggests that hardiness contributes to post traumatic growth, the development of interrelationship closeness and the achievement of an elevated level of spirituality.

In a study conducted by Azeem (2010), it was found that teachers who possessed hardiness had a lesser chance of experiencing burnout. They generally felt that their actions were within their control and reacted to change as a natural result of their actions. Combined with their level of job involvement, healthy coping mechanisms have been formed and allowed them to deal with various stressors. This study provides an acute example of the effect of hardiness on daily working activities, showing that those educators possessing higher levels of hardiness and job involvement experience lower levels of burnout as a result. He assessed the impact of both hardiness and burnout on teachers and found that emotional exhaustion and personal accomplishment were significantly influenced by the presence of hardiness. Possessing hardiness has considerable mitigating effects on the experiencing of burnout itself, but does not however altogether prevent escalated levels of job stress from manifesting itself in burnout. Those less hardy individuals (minimal involvement in daily activities, sense of control over events and openness to change) conversely tend to display elevated burnout scores, particularly when it comes to the exhaustion dimension (Chan, 2003).

From an organisational perspective, retention of employees is influenced by their job embeddedness and commitment to the organization. Findings also suggest that, as predicted, hardiness positively contributes to mental health (Waysman et al., 2001; Wadey, Evans, Hanton & Neil, 2012; Maddi, 2004). For example, hardiness is negatively related to self-reported Anxiety, Depression, Somatization and interpersonal sensitivity. Building on this,

hardiness has also been found to be negatively related to the clinical syndromes of Alcohol Dependence, Dysthymic Disorder, Posttraumatic Stress Disorder and Drug Dependence. Hardiness, via activating problem-focused coping approaches in stressful situations, allows an individual to predict events with more optimistic views, causing the emergence of physical diseases in relation to stresses and psychological disorders to be reduced whilst the individual's well being is increased (Ferreira, Coetzee & Masenge, 2013). In addition to hardiness's negative relationships, it has been found to be associated with positive attitudes toward school, instructors, and one's own capabilities and standards, manifesting in an expressed satisfaction with life (Maddi et al., 2009). Hardy individuals maintain a high sense of commitment (vs. alienation) to their work and life in general, remains involved with others and activities, possess a high sense of control (vs. powerlessness) and continue their attempts to influence events and outcomes. They appraise difficult and trying new situations as a challenge to grow. People with hardiness are more likely to make a positive contribution towards influencing outcomes in the new work place than to feel threatened and withdraw. This is because work hardiness is a resource for work engagement, enabling workers to achieve productivity goals. Work hardiness also contributes to healthy work participation and adjustment (Van Dyk, 2015), and influences psychological coping resources and self-regulation capacities that include individuals' ability to adjust to and deal proactively with the changing and uncertain nature of their careers in the contemporary world of work (Van Dyk, 2015). If CDSs possess the intra-psychic set of beliefs stemming from the 3 Cs of hardiness, this will better prepare them to cope with the stressors associated with their working environment – allowing them to see potential stressors as opportunities to learn and grow. Without hardiness, they may not be able to adequately cope with the stressors associated with their occupation, and this carries with it potential hazardous consequences to their health and safety if they allow the psychological manifestations of those stressors to affect them negatively without the hardiness buffer.

Waysman et al. (2001) investigated the role that hardiness played in protecting prisoners of war (POW) from negative, long-term manifestations of psychological disorders, whilst simultaneously promoting long-term positive outcomes from exposure to adverse stressors, such as increased coping mechanisms. He concluded that somatic, cognitive, social and emotional problems might arise in POWs as a result from exposure to traumatic stress. Said exposure may lead to the manifestation of post-traumatic stress disorder (PTSD), depression

and anxiety, marital and family problems, poor functioning within the work environment and even difficulties in personal relationships. Wadey, Evans, Hanton and Neil's (2012) findings revealed that hardiness increased athletes' ability to positively deal with injury by moderating the relationship between negative major life events and injury occurrence. Post-injury hardiness positively correlated with desirable post-injury responses (e.g., reorganization, problem focused coping), and negatively correlated with undesirable post-injury responses (e.g., devastation, avoidance coping) over time. Athletes high in hardiness had addressed their psychological and behavioural responses by broadening their perspective; they were then all motivated to increase their understanding of their injury, which contributed to their post-trauma growth, allowing them to become emotionally stronger as compared to their competition. Understanding the factors of hardiness, one can postulate how each of the three will positively contribute to CDSD success (and therefore perceptions thereof) within their harsh working environment, especially related to potential exposure to injury by way of example. To illustrate: possessing *challenge* allows one to view stressors as an opportunity to learn and grow, which would allow CDSDs to view recovery from physical harm as an opportunity to test themselves and their resolve and likely aid in the recovery process. The *commitment* factor allows the CDSD to become fully involved in the daily encounters and activities, likely resulting in a hunger to engage meaningfully in treatment, and seeing it through to the end. Finally, *control* will allow the CDSD to believe that he bears considerable influence on the outcomes associated with various life events, and in an instance involving injury, this would allow him to assert a belief of control over his likelihood of successful recovery.

Abdollahi et al. (2015) suggest that hardiness plays an important role in mediating perceptions of stress, and therefore the likelihood of suicidal ideation. The findings of their research demonstrate that lower levels of hardiness when combined with greater perceptions of stress served as a significant predictor of suicidal ideation among undergraduate students. The foundation of this study was predicated on the inquiry into the reasons why certain individuals were able to effectively deal with the negative aspects associated with stressful conditions, and why, compositely, other individuals were unable to deal with problems even when confronted by what may be considered non-stressful conditions. Individuals that display elevated levels of hardiness tend to have a more optimistic viewpoint as compared to those that do not – they are more flexible in their approach to solving problems and rely heavily of

rational coping styles as opposed to more emotively fuelled ones when faced with having to manage stressful situations. (Erbes et al., 2011).

Although it may appear conceivable that individuals in individualistic cultures experience higher levels of stress than collectivistic cultures (Gelfand & Chrisakopoulou, 1999), hardiness seems to be a universal intra psychic ability when it comes to managing said stressors. Stress is experienced as a universal condition; although culture and race appear to create a context for the experiencing of stress, it appears that hardiness is beneficial globally (Maddi, Harvey, Khoshaba, Fazel & Resurreccion, 2009). The relevance of hardiness to health and performance has come to the fore since Kobasa (1979) introduced the concept (Delahajj, Gaillard & Van Dam, 2010). Because hardy individuals appraise stressful situations differently, they are more effective in stressful situations – believing they can control the situation and subsequently learn from it to mould reactions (Kobasa, 1979). This ability galvanises hardy people against threats associated with changing events and leads to a mastery of stressful situations over time (Maddi, 1999). This mastery helps build self-efficacy beliefs, which are task- and situation-specific beliefs about the capability for an individual to plan and execute an action that will lead to attaining a goal. These beliefs are important in determining goal selection, methods and perseverance in attainment. (Bandura as cited in Luthans, 2002)

The researcher believes that a strong case has been made for the benefits that hardiness yields in coping with stressors, as illustrated by the literature and multiple notable contributors including Maddi and Kobasa (1984), who are widely considered as the pioneers for the construct. The literature has shown that possessing hardiness not only presents a buffer to personal stressors, but acts in the same capacity to stressors related to the workplace, this associated with injury and other changing and unforeseen events. The CDSD industry is one that fosters stressors that are present in various aspects of the CDSDs life – absence from home and family, multicultural settings in the workplace, the hazardous nature of the occupation and risk of harm or injury. Possessing hardiness would serve as a key weapon in the CDSDs arsenal, buffering against the negative effects of these many and varying stressors and allow him to make use of his mastery of the 3 Cs to function optimally within his industry. With this literature in mind, application of the AMHS (see par. 3.5.2) is deemed relevant due to its delineation of *Challenge, Commitment and Control*.

2.6 RESILIENCE

The term resilience was originally coined in the field of engineering – used to describe the physical strength of material, defined by *Merriam-Webster* dictionary as the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress. This definition was extrapolated to fit the psychological field in various forms, honing on the notion of being able to recover or adjust after experiencing stress (Meredith et al., 2011; Wald, Taylor, Asmundson, Lang & Stepleton, 2006, Cossar, 2010; Kelley, 2005). Newman (2005, p. 227) defines resilience as the “human ability to adapt in the face of tragedy, trauma, adversity, hardship and on-going significant life stressors”. His research outlines the logic behind the American Psychological Association (APA) being identified as the group that would best be able to assist the public in becoming informed about and indeed building resilience in the wake of the terrorist attacks on the World Trade Centre in 2001. Connor and Davidson (2003, p. 76) describe resilience as “the personal qualities that enable one to thrive in the face of adversity”. The term resilience to be used rather interchangeably within the field of psychology, and therefore it has many conceptual overlaps with concepts such as self-efficacy and hardiness. For clarity sake, resilience can be seen as a fluid personal ability that is reactive rather than proactive, dependent on the situation at hand, and allows an individual the ability to employ their psychological, social and cultural resources in bouncing back from failure, conflict, uncertainty and adversity experienced during stressful situations (Luthans, 2002). Resilience is not an intra-psychic trait, but rather relies on leveraging interpersonal resources in finding means to adjust to stressors – this sets it apart from hardiness. Because of this, the prevalence of resilience within an individual is considerably less rare, and can be fostered and developed through specific training programs (Bandura, as cited in Luthans, 2002).

As a psychological construct, resilience has been around for some time (Clarke & Clarke, 1976), with research exploring the role of resilience in children (Masten, Best & Garmezy, 1990), adolescents (Born, Chevalier & Humblet, 1997), and adults in dealing with significant hardships through a variety of fields within their lives. Indeed, much of the research into resilience over the years has taken a developmental direction, exploring resilient factors in children and adolescents as they transition into adulthood through many of life’s challenges.

Meredith et al. (2011) outlines several fields that lead make up the core focus of research into resilience, claiming that the construct originated, chiefly, in the field of developmental psychology and childhood psychopathology – noting that children exposed to poverty-stricken environments had the ability to move along healthy developmental trajectories. Research conducted over the past two decades has demonstrated that resilience as a characteristic varies according to context, time, gender, age and cultural origin. There exists debate whether resilience can be defined by a single trait or characteristic within an individual, or rather as multidimensional. Luthar and Cicchetti (2000) suggest that resilience is a two-factor construct as opposed to a single personality trait. It is comprised of exposure to adversity and resulting in positive adjustment. Cowen (2001) suggests that because these two factors, adversity and adjustment, can be operationalized as separate entities and in different means, this lends itself to multiple issues in creating a universal conceptualisation.

This uncertainty reinforces Luthar's (2002) position that resilience is shrouded with misunderstanding of examples that could constitute one possessing resilience – being optimistic, possessing self-confidence, being able to set goals and take steps to reach them, and even maintain healthy familial and social relationships. Following the argument that resilience can be built upon and is not innate (Lioussis, Schochet, Millear & Biggs, 2009), one would consider that as an individual's life circumstances differ, so too does their means of building resilience – depending on their strengths, experience and skills. The ability to build resilience is further dampened by the presence of psychological disorders in individuals – the ability to build optimism and a positive goal orientation is less likely in an individual suffering from depression,

Rutter (1999) distinguishes resilience from self-efficacy and positive mental health in that it cannot be studied by focussing on sub-normal or unusually positive psychological functioning but rather on a range of possible psychological outcomes. He suggests that acquiring resilience is strongly influenced by patterns of interpersonal relationships, which is seen at perhaps its most vulnerable in children. Children are exposed to a variety of potential psychological risk factors that remain out of their control, from family separation, to begin exposed to poverty, abuse and living in sub-optimal environments. His findings show that children may display some form of resilience to certain stressors such as the loss of a parent through divorce, separation or death, family discord and conflict, and exposure to poverty,

depending on the level and sensitivity of these factors. This is important when bearing in mind the notion that children begin developing a self-concept that may or may not allow them to feel in control of their lives and therefore are able to effectively overcome obstacles that they may later face. Accepting that resilience may be built up over a period of time throughout the journey from childhood to adulthood lead to investigation into adult programs aimed at enhancing resilience (Liossis, Shochet, Millear & Biggs, 2009), with results showing that some form of resilience can be fostered through support and conditioning. Bonanno and Mancini (2008) support this notion, highlighting the important role that resilience has in mediating the effects of stress. They further state that cognitive faculties have been shown to be a protective resource against PTSD in both children and adults alike, concluding that a nexus between cognition and resilience is highly probable.

As a rather separate form of inquiry into resilience, and perhaps more suited in applicability to CDSDs, a large body of research has been dedicated to resilience as it pertains to harsher environments, in particular, soldiering and being exposed to combat and violence. In the absence of research on CDSD, the researcher has previously drawn environmental stressor similarities between the military and CDSD for the purpose of relative comparison (Lopes, 2010).

Having explored the general work requirements of a CDSD in a typical offshore rotation, one can certainly trace the similarities in the stressors that CDSDs are exposed to, as compared to military practitioners facing deployment rotations in various operations. Casey (2011) focuses on two key factors in describing the situational plight of soldiers within their realm of work: firstly, soldiers are rotated between deployments consistently, thereby exposing them to various stressors that impact on their personal, work and familial spheres. Secondly, they operate in areas of persistent conflict and threat of danger and/or death. Although CDSDs are not necessarily exposed to conflict in the sense of war, as such, they are indeed exposed to numerous dangers owing to the specific nature of their work, as explored above. In addition to this, it has been reported that certain offshore vessels have been exposed to a direct threat of piracy (as has become a growing pandemic for the international maritime society) and this provides for exposure to a unique stressor that they, unlike military soldiers, have not been exposed to or trained to handle (R. Logan, personal communication, 8 May 2014).

In terms of the rotation of deployment aspect, CDSDs share a commonality with soldiers, and although the duration of their rotations offshore may not compare to soldier deployments in combat zones, the frequency of the CDSDs deployments is greater, as from an occupational perspective, their work will always be required offshore for the duration of their careers (S. De Boer, personal communication, 20 May 2014). Armstrong, Galligan, and Critchley (2011) reinforce the importance of resilience in stressful occupational contexts by stating that individuals possessing resilience have a heightened ability to cope with situational stressors, avoiding the onset symptoms associated with clinical distress, including depression, anxiety and stress. Within the context of CDSD, resilience should form an integral part of the psychological make-up of the employees required to work offshore and therefore ideally be tested in incumbents as a form of their selection criteria. The interpersonal avenues at the CDSDs disposal will greatly influence the building of resilience to the stressors associated with the occupation. Being able to build off of family support through correspondence, friendly support from fellow culturally and socially similar colleagues may form part of their resilience formation.

Cornum, Matthews and Seligman (2011) reveal that the possession of certain characteristics appear to be mediating factors in determining success in unusual occupational environmental circumstance that pose significant physical, emotional and cognitive challenges. Among these, they cite courage, optimism, persistence, teamwork and self-regulation. Lee, Sudom and McReary (2011) reference resilience as a mitigating factor in the onset of negative reaction to exposure to stressors related to harsh environments akin to those experienced within the military context. Thompson and McCreary (2006) support this supposition in their statement outlining that in order to support operational readiness, training should necessarily illicit a response to cognitive and emotional stressors that would typically be involved in an operational situation. Ong, Bergeman, Bisconti, and Wallace (2006) have stated that emerging literature indicates individual differences in psychological resilience account for the manner in which life stressors are encountered, experienced, and transformed into obstacles thwarted. Meredith et al. (2011) explored at some length the importance of resilience for military members and their families, discussing the outcomes of resilience building programs, which imply that resilient soldiers are more likely to develop coping mechanisms that mitigate the potential psychological risk associated with exposure to trauma and the harshness of the operational environment. Wald et al. (2006) distinguishes between individual and

environmental factors as contributing to the formation of resiliency. Individual factors comprise of 10 contributing elements, possessing which, would lead to acquiring a heightened level of resilience: 1) certain personality traits (flexibility, agreeableness, extraversion, openness to experience and adaptability), 2) having an elevated self-esteem, 3) elevated intellectual functioning, 4) self-mastery, 5) a tendency to employ benefit-finding cognitive strategies, 6) internal locus of control, 7) being goal- and achievement-orientated, 8) possessing ego-control, 9) having coping strategies that are problem-focussed, and 10) having elevated intelligence. Environmental factors echo the suggestions from Bonanno and Mancini (2008) and Rutter (1999) in highlighting the importance of social support systems in influencing resiliency. Having a comprehensive social support system has been shown to assist in recovery from PTSD, reduces the likelihood of developing psychological disorders such as depression, and provides resources in the form of emotion-focussed coping mechanisms (having a sympathetic ear) and corrective information that may serve to strengthen beliefs that support positive adjustment to harsh circumstances (Wald et al., 2006; Lemay & Ghazal, 2001).

Van't Wout (2016) summarises the positive effect that resilience has on the capacity of an individual to adequately perform in challenging circumstances. She suggests that successful coping with adversity enhances resilience and therefore the ability to cope with future challenges. These people are better equipped to master new skills and acquire knowledge, with resilience acting as a buffer against mental and physical illness and showing a positive association with ego strength. The outcome of this research points to resilience being identified as a necessary quality allowing soldiers to cope with the harsh circumstances of their environments, and a similar argument could be applied to CDSDs. Van't Wout suggests the employment of psychometric testing to identify resilience in soldiers and proposes interventions to increase such. Recognising the parallels between the stressors present for both soldiers and CDSDs, and the need for resilience to be present among both groups in order to effectively cope with such, the author made use of the 25-item CD-RISC in the assessment of the sample group (see par. 3.5.3).

2.7 GRIT

Failure can pose an imminent threat to motivation, but certain individuals have a host of strategies and traits that can be put into action as barrier from allowing said failure to negatively impact their self-concepts (Gitter, 2008). Grit shares an element of courage with hardiness, and is defined by Maddi et al. (2013, p. 129) as the “sustained interest and persistent effort in the passionate pursuit of long term goals”. The courage associated with grit, however, involves an unchanging pursuit of a specific goal or goals with a concerted effort to reach said goals, often over many years and despite encountering obstacles or adversity. The marathon metaphor is often used to describe those that possess grit – requiring stamina to achieve their goals, which allows the conceptual courage associated with grit to pertain more so to the courage to stay the course without change, where the courage associated with hardiness refers to the adjustable element stemming from learning in the moment and is ultimately growth oriented. Duckworth et al. (2007) developed the hypothesis that grit, as a construct, was responsible for high achievement after interviews with professionals in investment banking, painting, journalism, academia, medicine and law yielded responses that were synonymous with grit. Their question?: ‘what quality distinguishes star performers in their respective fields?’. Grit, or a synonym thereof, was cited as much as talent was, and as such, lead to further investigation and the eventual formation of the Short Grit Scale. They suggested that Grit involves placing a strenuous effort in working towards challenges, and maintaining this effort and interest after years of pursuit, despite facing failure, plateaus, and adversity in the progress towards their goals. Through their studies, Duckworth et al. (2007) reasoned that Grit was as important as Intelligence Quotient (IQ) in terms of realising high achievements, suggesting that it is even more important than aspects such as self-control or the Big Five’s Conscientiousness. The results of their extensive studies ultimately showed that gritty incumbents tended to out perform their less gritty peers in the academic environment, and physical progress showed inclination towards the grittier incumbents at the United States Military Academy, West Point, where extensive research was conducted. Ultimately, people high in Grit do not swerve from their goals, even in the absence of positive feedback (Duckworth & Quinn, 2009). Because CDSDs often are required to work long hours, for weeks on end, on a particular project or task, the construct of grit appears to particularly applicable to their trade. Possessing such a trait is hypothesised by

the researcher to be of value when intrinsically assessing the extent to which one is successful in their careers. The ability to stay the course in the face of adversity and among many obstacles has been proven (through various Grit studies) to be advantageous in goal achievement, and the same notion should ring true when applied to the realm of CDSD.

Von Culin, Tsukayama and Duckworth (2014) suggest that as a personality trait, grit prescribes a behavioural tendency for people to feel, think and act in a relatively constant fashion over time. They further describe grit as being comprised of having two distinct related facets – *perseverance of effort*, measuring aspects such as diligence and the lack of discouragement, durable over time, and *consistency of interest*, which describes the tendency to display a similar set of interest for a pronounced period of time. Their reference of Duckworth et al. (2007) suggest that grit may persist regardless of the presence of latent or honed talent within the incumbent – essentially meaning that possessing talent alone does not necessarily give rise to grit. Van Dyk (2016) elaborates on this concept by positing that grit and motivation are complimentary in nature, that through this extreme form of passion, stamina and perseverance, grit may lead to an increase in personal motivation, which in turn may elevate the individual's grit.

Hochanadel and Dinamore (2015) applied the study of grit to university students, attempting to understand why some student persist in their efforts to attain academic goals and why others 'give up'. Through exploring the work of Duckworth et al. (2007), they posited that grit entails not only the possession of resilience in the face of failure or adversity, but extends to the loyalty to deeper commitments over a timeframe lasting many years. Duckworth et al. (2007) study of West Point candidates suggested that the ability of candidates to reach their goals was based on the presence of grit.

In an interesting study by Silvia, Eddington, Beaty, Nusbaum and Kwapil (2013), which extended beyond the scope of selective functioning and into the realm of autonomic activity, support was shown for an influence of the possession of grit in effort-related cardiac activity – meaning that those who had higher levels of grit would more likely to physically exert themselves to reach their goals. Their findings assert that possessing heightened levels of grit makes goals seem more valuable and therefore result in corresponding effort to achieve them. When revisiting the specific demands of the CDSD environment (see par. 2.3), the

ability to cope with physically threatening and exhausting conditions is considered a necessary trait for success, which illustrates a need for grit among CDSDs.

Datu, Valdez and King (2016) state that possessing grit allows individuals to pursue and accomplish goals that require a long period of time. Grit has been shown to have a positive correlation to the achievement to academic success, fewer career shifts, heightened commitment to marriage, school and work, the intensity of physical exercise and finding meaning from life. Studies conducted by Duckworth et al. (2010) elaborate on the benefits of grit showing that possession thereof results in a reduced suicidal ideation through the positive correlation between grit and gratitude and illustrated heightened success in the academic performance of children through increasing their exertion on more focussed and planned efforts.

Blalock, Young and Kleiman (2015) elaborate on the mediating effects of grit with specific reference to suicidal ideation. Their research makes clear the nexus between negative life events and suicidal ideation, although highlighting that engaging in the latter is not an automatic result of experiencing the former. With gritty individuals being defined by their ability to persevere through hardships in the pursuit of their maintained interest, this is definitive in serving as a buffer in dealing with difficult situations, life circumstances and harsh environments. They posit that grittier individuals are able to look past the immediate negative consequences of life events in their focus on the achievement of a long-term goal. This form of orientation towards future-focus is considered to be more aligned with optimism and hope that obstacles may be overcome, which is a direct relation to the *perseverance of effort* grit dimension. This becomes relevant for the CDSD, allowing one to harness grit in overcoming the myriad of challenges (see par 2.3) associated with their profession.

Datu et al. (2016) noted differences in grit across cultures, particularly along the dimensions of individualism versus collectivism. Most notably is the emphasis placed on autonomy in highly individualised cultures – where this leads to a heightened pursuit of self-set goals. Composite to this notion, collectivistic cultures view themselves as being more entwined within their respective social fabric, which is derived from their greater emphasis being placed on interpersonal harmony and the attainment of group goals. With this in mind, the *consistency of interest* dimension may not be as applicable to collectivistic cultures than to

individualistic ones – the former would be more disposed to striving to reach goals that are congruent with others within their cultural group as opposed to the latter, which would be more focussed on achieve goals that are more reflective of their own dispositions and aspirations. Research suggests that the quality of perseverance is one that is equally revered in both individualistic (Duckworth et al., 2007, 2009) and collectivistic cultures (Zhou, 2014), implying that the dimension *perseverance of effort* would be equally important in both cultural groups. This implication drawn from this cross-cultural exploration is that grit, as a psychological construct, may be more applicable and indeed prevalent in individualistic cultures as opposed to collectivistic ones – owing to the uneven applicability of the dimensions as applied to each. In the CDS community, which is inherently made up of a multiplicity of cultures (R. Logan, personal communication, 7 October 2013; B. Thomson, personal communication, 5 October, 2013), this bears particular relevance – creating an assumption that a portion of the make-up of the dive team on a platform would possibly be more predisposed to possessing grit than others. Duckworth and Quinn, (2009) posit that the prioritisation of long term goals may have an additional positive effect – causing the individual to actively seek out sound social support systems in anticipation of hardship, assisting them in persist through tasks requiring greater effort and that yield little enjoyment. These grittier individuals hold the perception that they themselves are less of a burden on said support system due to the positive correlation found between grit and conscientiousness. Conscientiousness implies elements of responsible and controlled behaviour, which results in a lesser tendency to elicit criticism from their peers, ultimately resulting in stronger social connections. This would bear considerable benefit in the formation of a harmonious living and working environment on board a diving platform. The relevance of grit as applied to the CDS industry being established, the author made use of the Grit-S (see par. 3.5.4) to measure the presence thereof within the sample group.

Table 3.1***Comparative summaries between hardiness, resilience and grit***

Construct	Summarised Description
Hardiness	<ul style="list-style-type: none"> • Derived from a constellation of personality characteristics • Intra-psychic ability to mitigate the negative effects of stress • Comprised of <i>Commitment, Challenge</i> and <i>Control</i>
Resilience	<ul style="list-style-type: none"> • Ability to bounce back from failure, conflict, uncertainty • Not an intra-psychic trait, but rather relies on leveraging interpersonal resources • Fluid concept which can be built over time, evidenced in research on children • May be bolstered by the presence of hardiness
Grit	<ul style="list-style-type: none"> • Passion, perseverance and stamina towards long-term goal • Comprised of <i>consistency of interest</i> and <i>perseverance of effort</i>, • Considered a narrow facet of conscientiousness

2.8 CAREER SUCCESS

The notion of Career Success (CS) has been explored from various vantage points, and the results have yielded somewhat different definitions of the concept. Callanan and Greenhaus (2006, p. 148) define CS as “the positive material and psychological outcomes resulting from ones work-related activities and experience”. Seibert, Crant and Kraimer (1999) suggest that CS is a cumulative outcome that is a product of behaviours that have collected over a significant period of time, and Kanye and Crous (2007) consider CS as a form of continued growth and self-renewing experiences. With these definitions on mind, it can be surmised that CS can be viewed from two different perspectives.

- *Traditional perspective*: this is hinged on the objective indicators defining CS, which include promotions, advancement in salary levels or hierarchical advancement. Such a perspective values that which is observable or tangible (Schreuder & Coetzee, 2011).

- *Contemporary perspective:* quite contrary to that which is outlined by the traditional perspective, this current perspective is more subjective in its focus on perspective-emphasising intrinsic meanings of careers such as feelings of accomplishment, achievement and fulfilment in terms of CS. Particularly in today's unpredictable employment climate, intrinsic value has become perhaps one of the most important indicators of CS (Schreuder & Coetzee, 2011).

The brief mention of the contemporary career make-up warrants further attention. In the flexible and often volatile employment environment that is prevalent today has paved the way for the emergence of what has become known as the boundaryless career, where employees are no longer bound by the hierarchical confines of just one organisation, but are free to shift across the boundaries created by different employers and even occupations (Schreuder & Coetzee, 2011; Pretorius & Morgan, 2010). It is for this very reason that perceptions of CS are hinged on intrinsic values (including personal motivation, job satisfaction), in conjunction with tangible or recognisable aspects commonly associated with the traditional perception of careers (such as remuneration, benefits). Schreuder and Coetzee (2011) contend that the contemporary career sees a major shift in the psychological contract between employee and employer – allowing for expectations from both parties to be modified. No longer do employees expect a 'job for life', and employer's expectations do not suggest lifelong employment either. The current nature of work includes contract-based employment, with incumbents being remunerated for the work done, and recognised for their efforts before their potential 'moving on' after completion of their contractual terms. This is typical of the CDSD industry. That said, however, it can be said that one of the primary allures of the CDSD industry is the pay attached to the job. Because these divers work 'offshore', or typically outside of their national waters, their remuneration packages are often tax-free, and they are paid in foreign currency: either US dollars or Euros, which could prove to be a formidable source of motivation and greatly contribute to their perceptions of CS. Fluctuations of international currency, the effect of oil prices on the industry and proposed legislative alterations are cited as concerns for many CDSDs due to their influence on their remuneration (T. Skelton, personal communication, June 28, 2017; R. Logan, personal communication, October 7, 2013).

In their exploration of CS, Seibert, Crant and Kraimer (1999) suggest that CS is comprised of individual and organisational variables. Comprehensive models of CS suggest that demographic, motivational and human capital variables may make up individual variables that contribute towards CS. Organisationally, specifics such as industry sector, geographic location and firm size relate to CS. As CS is a cumulative outcome, there exists a strong rationale for the inclusion of personality in models of CS – as it is more likely to determine cumulative outcomes than a single behavioural measure. CS can be viewed from two positively but moderately associated vantage points – *objective career success* and *subjective career success*. The former aligns with the traditional perspective of CS, where success is measured by observable career accomplishments such as promotion and salary. For the purpose of this inquiry into CSDs, the latter is of greater interest.

2.8.1 Subjective career success

The importance of subjective career success (SCS) has significant historic roots and can be traced back to the work of Super (1939), where he operationalized the notion of job satisfaction as playing a pivotal role in viewing one's job as being successful. As career success can be viewed by assessing past achievement as well as future orientated goals, this process is viewed as dynamic and can be subject to change (Pan & Zhou, 2015; Spurk, Kauffeld, Bathauer & Heinemann, 2015). Although established as an important aspect for study in the realm of occupational research, SCS has enjoyed a rather brief exploration and bears a rather distinct lack of consistent operationalization and measurement (Shockley, Ureksoy, Rodopman, Poteat & Dullaghan, 2015). Heslin (2005) supports the role that job satisfaction plays in SCS by referring to it as the most salient factor in considering one's career successful. He qualifies this, stating that the lack of immediate satisfaction in one's role does not necessarily result in a consideration that the individual is unsuccessful in his/her career – rather it results from an inclusion of actual and expected career-related achievements across timeframes, outcomes and work-life balance. SCS refers to an individual's feeling of achievement and satisfaction within their respective career (Pretorius & Morgan, 2010). Stumpf and Tymon (2012, p. 346) provide a broader definition that the author deems more encompassing for the purposes of this research: "Subjective career success reflects an individual's judgements about their career attainments including such assessments

as the value of their human capital, their appraisals of their self-worth and capabilities, and the satisfaction they experience in their career". This perception of success comprises elevated levels of competence, self-esteem, responsibility, work-life balance and skills and knowledge acquisition (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010). The perception of CS is driven by an individual's intrinsic career motives and thus represents a subjective evaluation of his/her work/life goals and expectations, thereby not only providing pertinent information on the individual's subjective views of their careers, but also creating an opportunity where this information can be utilised in the pursuit of career development goals (Schreuder & Coetzee, 2011; Seibert et al., 1999). Perceptions of CS are highly influenced by the individual's perception of the job characteristics and content, which may include workload, organisational support and safety concerns. This, in turn may have an impact in how the individual perceives his/her ability to perform adequately on the job (Riordan & Louw-Potgieter, 2011). This becomes pertinent within the realm of CDSD as the direct occupational environment may prove to be challenging for many to cope with – relatively small and cramped, typically stationed hundreds of miles offshore, with little creature comforts and combined with rigorous working schedules (Hanauer, 2003).

According to the theories of protean (Hall, 1977) and boundaryless careers (Arthur, 1994), individuals as opposed to organisations are responsible for driving their own careers paths through their personal preferences and psychological success – diverging from the practice of traditional career paths and career management systems set by organisations. Stumpf and Tymon (2012) propose that the concept of job mobility – the changing of jobs within an organisation – stems directly from these theories and may be beneficial in creating a broader array of experiences within an organisation, which in turn may lead to the development and diversification of new skills and job-related knowledge, all of which may promote SCS. This job mobility may also have certain additional advantages in that one is able to strengthen and grow professional networks through relationship building, which may lead to elevated status, jobs and a feeling of self-worth. Individuals who play a more proactive role in planning and managing their careers achieve a higher perception of career satisfaction, and therefore success than their more passive counterparts (Volmer & Spurk, 2011).

With the growth of globalisation and technological developments, the organisational context within which employees has changed, and indeed this is the only constant. The result of this

change is that employees are becoming less reliant on organisations to manage their professional careers and more prone to doing so themselves. There is a strong case for organisations to build policies that would stimulate SCS, which include offering positions with greater responsibility, awarding recognition for work well done, implementing training and development programs aimed at increasing job-related competence and cross-functionality and personal efficiency (Simo, Enachie, Sallan Leyes & Fernandez, 2010). Additional factors that can bolster SCS in employees include creating a sense of personal accomplishment, having work that one finds enjoyable, making a positive contribution to society, achieving recognition and being surrounded by stimulating people (Dyke & Duxbury, 2011). Career success bears significant influence on how employees perceive and respond to the development of their careers within an organisation. It can be seen as both a descriptive term, in that it reflects an individual's reaction to their respective occupational processes, as well as an evaluative term due to its assumed judgement as to an individual's career accomplishments (Pan & Zhou, 2015). Van Dyk and Ditsela (2013) proposed that a focus on the both general and specific personality factors pertaining to careers provides valuable insight for both the individual concerned as well as highlighting their potential for career success.

SCS bears a significant impact on the formation of career attitudes held by the employee. With this in mind, Dyke and Duxbury (2011) highlighted job satisfaction and organisational commitment as being two distinct contributors. Job satisfaction can be defined as "one's feelings or state of mind regarding the nature of their work" (Peng, et al., 2014, p. 3). Research has found a negative correlation to experiencing job burnout within the work environment, reflecting that satisfaction with ones work significantly increases with the decrease of job burnout. Organisational commitment refers to the bond established between the employee and the company (Dyke & Duxbury, 2011). It is suggested that this attitude mediates the manner in which the individual identifies with values and goals of the organisation and determines the degree to which they will exert effort to emulate them, combined with their desire to remain a part of the organisation (Peng et al., 2014).

Possessing an increased level of competence and ability to perform in one's role has been shown to positively contribute to SCS (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010). One of the key commonalities established between

hardiness, resilience and grit is the ability to endure hardship and show persistence in the face of adversity, often being able to bounce back from a difficult situation to rise above challenges (see Table 3.1) This is particularly apt when applying such to the training and development environment that is generally associated with developing levels of competence and the ability to perform within one's role. The author posits that possessing elevated levels of hardiness, resilience and grit would allow a CDSD to better develop their skills and abilities through being able to applying persistent effort and shielding against the negative stressors associated with training and execution of one's functions. Possessing these traits would also necessarily influence the CDSDs perceptions of adverse workloads by being more resistant to the stressors associated therewith, and possessing a greater ability to cope with increased demands. Having a more positive perception of these workloads and the support necessary to handle such is further cited as being a contributing factor to experiencing SCS (Riordan & Louw-Potgieter, 2011)

The author makes use of the Career Success Scale (see par 3.5.5) in order to measure the presence of SCS within the CDSD sample, with the results being discussed accordingly (see Ch. 4).

2.9 CONCEPTUALISATION OF RELATIONSHIP BETWEEN CONSTRUCTS

The author posits, in accordance with the hypotheses for the study (see par 3.2) that there will exist significant relationships between each of the dependent variables and the independent variable. The literature reviewed illustrates distinct similarities between the constructs of hardiness, resilience and grit, and their respective relationships with personality, and therefore it is further hypothesised that these inter-relationships will also bear significance, as suggested in Figure 2.1.

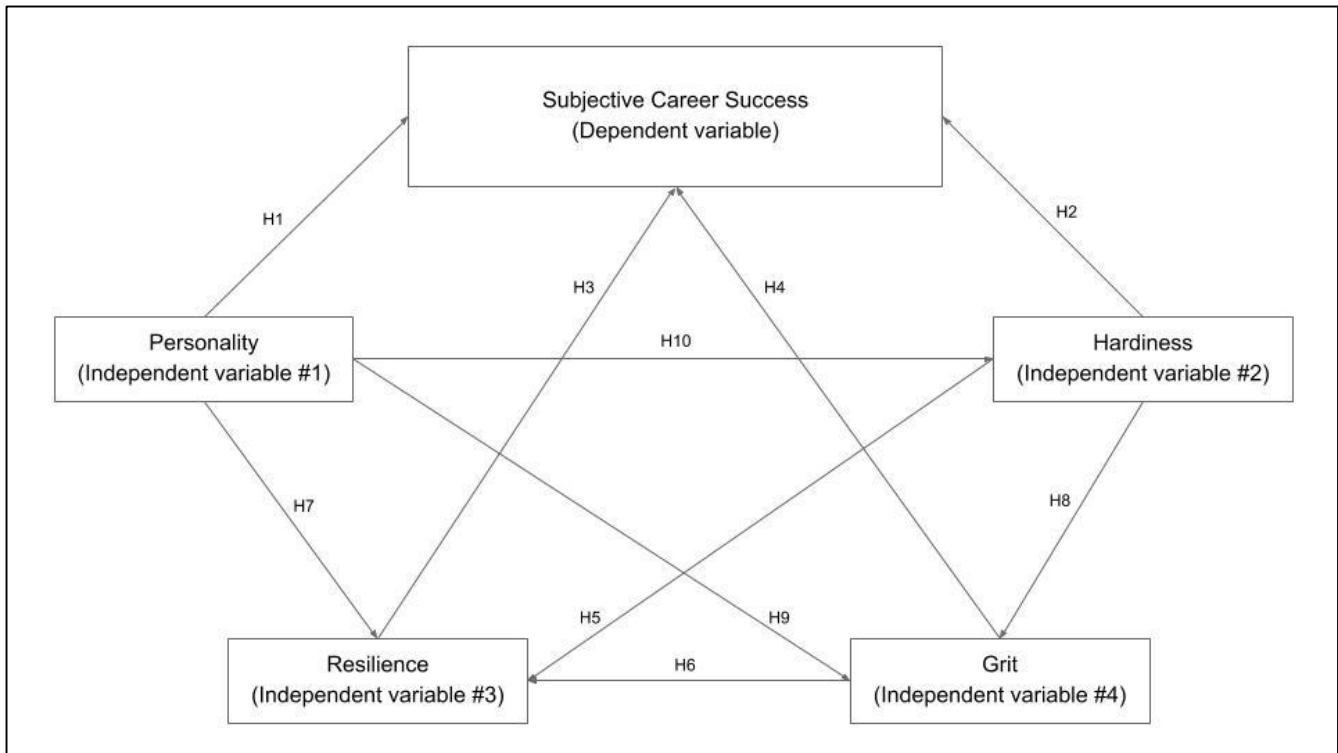


Figure 2.1: Conceptual model: Hypothesized determinants of Subjective Career Success

2.10 CHAPTER SUMMARY

The literature reviewed in this chapter was intended to set the foundation for the remainder of the study. Providing a theoretical understanding of CDSD as an occupation and tracing similarities between the stressors experienced by military personnel has provided a scope of application for the psychological constructs explored within this research (see par. 2.3.1). It was suggested that factors such as family separation (see par. 2.3.2), financial concern (see par. 2.3.3) and environmental demands (see par. 2.3.4) affect both soldiers and CDSDs alike, and therefore imply that those psychological traits allowing better coping and effective performance for soldiers would logically apply to CDSDs. Based on this assumption, the author explored each of these traits (personality, hardiness, resilience, grit) as well as SCS in order to establish a deeper understanding of their impact on behaviour and ability to cope and perform as a CDSD. Furthermore, the exploration of the relevant legislative constraints (see par. 2.3.5) was investigated to determine how, if at all, they would recognise the need for

psychological examination in CDSDs. The author concluded that little to no priority was given to this, and as such bolsters the need for this research, which is outlined in detail in the following chapter.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The literature reviewed in Chapter 2 will serve as the theoretical platform upon which the research hypothesis will be built. An explanation of the research design, sampling design, measurement instruments and statistical analysis will follow.

Such an explanation can only be elaborated upon once the fundamental purpose of research has been fully understood. Rosnow and Rosenthal (2008) suggest that empirical research implies a scientific method used to make sense of the world around us and to provide answers to various formulated questions. The majority of research questions are intended to examine the relationship between two or more variables (Gravetter & Wallnau, 2016). Babbie and Mouton (2012) describe a research design, as a planned or structured framework outlining what process the researcher intends to follow in order to answer their research question, be it through an empirical or non-empirical enquiry. Research methodology is described by Babbie and Mouton (1998, p. 647) as “the methods, techniques, and procedures that are employed in the process of implementing the research design or research plan, as well as the underlying principles and assumptions that underlie their use”. Said research can be qualitative, quantitative or a combination of both (Gravetter & Wallnau, 2016).

This particular study is quantitative in nature, with an emphasis being on quantifying the relationship between two or more variables based on the measurement of the underlying psychological constructs. As dependent variables, personality, hardiness, resilience and grit are assumed to have significant relationship with the dependent variable, namely SCS. This systematic approach focuses on the analysis of variables through the use of statistical analysis in order to identify correlations of significance, without any influence from the researcher.

In terms of the questionnaires that are to be administered to willing participants, their respective responses are to be coded, categorised and manipulated in order to be statistically

analysed. An exploratory study, such as this one, is typically used to gain insight into and indeed prove the existence of a causal nexus between various variables in question (Babbie & Mouton, 2012). In the case of this study, such insight amounts to the exploration of a relationship between hardiness, personality, resilience and grit as they influence subjective career success among CDSD's.

3.2 HYPOTHESES

The occupational environment within which CDSD's are called to perform their duties is one that has not been explored thoroughly through literature or academic research, and bears with it a plethora of challenges (see par 2.2). The nature of this environment warrants the exploration of the impact that the possession of particular psychological traits has on CDSD's and their experiencing of SCS. This study aims to present a theoretical and empirical proposition that the possession of particular traits (hardiness, resilience, and personality) will result in an increased perception of personal career success, which in turn impacts the manner in which CDSD's are able to perform their occupational functions. In order to satisfy the research objectives (see par 1.3) and provide answers to the research problems (see par 1.2), the following hypotheses have been proposed (see Figure 2.1):

- H₁: There exists a significant relationship between personality and SCS
- H₂: There exists a significant relationship between hardiness and SCS
- H₃: There exists a significant relationship between resilience and SCS
- H₄: There exists a significant relationship between grit and SCS
- H₅: There exists a significant relationship between hardiness and resilience
- H₆: There exists a significant relationship between grit and resilience
- H₇: There exists a significant relationship between personality and resilience

H₈: There exists a significant relationship between hardiness and grit

H₉: There exists a significant relationship between personality and grit

H₁₀: There exists a significant relationship between personality and hardiness

H₁₁: There exists a mediating variable between the significantly correlated independent and dependent variables

3.3 RESEARCH DESIGN

A non-experimental research design was used to measure the relationships between the variables in question. Said research entails the observation of relationships that exist between the variables in a manner that does not involve the control or manipulation thereof in any way. The lack of control and manipulation mentioned above allows for the relationship between the independent and dependent variables to be investigated in a manner known as an ex-post-facto correlation design study (Welman, Kruger & Mitchell, 2005). Babbie and Mouton (1998) describe the dependent variable as the factor that the researcher observes and measures in order to determine how it is affected by the relevant independent variable. In this study, the dependent variable refers to SCS, whereas the independent variables are the various aspects of personality, hardiness, resilience and grit. These variables are considered to be independent, as they have been selected due to the interest that the researcher has in determining the effect that these variables, tested individually, have on the dependent variable. To further the inquiry, the author wishes to explore the potential interrelationships between each of the dependent variables, as illustrated in figure 1.1. Each hypothesis represents an assumption of a cause and effect relationship between a singular independent variable and their respective influence on the experiencing of SCS, as well as those existing between the dependent variables.

3.4 SAMPLING DESIGN

When referring to a population in terms of research, it refers to the group of individuals being studied. In this case, the population refers to CDSD's (see par. 2.2.3), who can be described as a collection of subjects that are of interest to the researcher in that they share the same set of essential characteristics, in this research, meaning their occupational environment.

CDSDs are derived from many different nationalities, ethnicities and socio-economic backgrounds. Although their particular individual characteristics in terms of above may differ, they are all called to work within the same set of occupational demands and restrictions. Convenient sampling was used to select willing participants found around the country. Convenient sampling as described by Babbie and Mouton (1998) is a non-probability sampling technique where subjects are selected due to their ease of accessibility and close proximity to the researcher, which allows for it to have become the most common form of sampling. This said, however, not all participants are South African in nationality as many subjects were drawn from diving schools, where a variety of international divers participated in the research. The group of 37 divers from which the data was drawn serve as the sample for this study, which is in essence a smaller subset of the greater population that are measured and from which conclusions may be drawn based on the data yielded therefrom.

The sample for this research was drawn from various sources affiliated with the occupation of CDSD, including Salvage companies, Commercial Diving Schools, and willing individual participants. All divers that participated were in possession of their Class 2 diving qualification and have experience working offshore in the capacity of a CDSD (see par 2.2.3).

Ethical clearance from the Stellenbosch University Ethics Committee was obtained before embarking on this research study. Permission was obtained from the various institutions that were kind enough to avail their employees during working hours in order to answer the questionnaires. After permission for the study had been received, participants were approached and the purpose of the research was elaborated upon, stressing their right to confidentiality and the strict adherence to the guidelines as put forth by the Stellenbosch University Ethics Committee as well as stipulations according to Chapter 10 of the Health Professions Council of South Africa. Participation was strictly on a voluntary basis, and

withdrawal at any stage of the questionnaire was explained and accepted without recourse or coercion. Willingness to participate required the completion of a consent form that explicitly attested to the facts aforementioned.

Participants were gathered in conference rooms, classrooms or quiet, conducive office spaces where the researcher and participant gave the aforementioned explanations and consent respectively. Questionnaires were then distributed for completion with the specified average time of 90 minutes being explained, although no definite time frame was placed on the participants according to the specifications of the relevant measurements. A total of 37 questionnaires were administered to make up the sample, due to the scarcity of individuals within the CDSD industry, and their respective availability (see par 3.4). The response rate for this study cannot be readily ascertained as a number of potential participants were either unwilling to participate, or did not complete the questionnaire due to unforeseen time constraints. That said, each of the willing participants from which data was drawn for the purposes of this study completed the questionnaire fully and under the necessary conducive circumstances. Qualitative information was gathered through personal interviews with willing participants – conducted through various mediums including in-person and electronic communication. Participants gave consent to be referenced accordingly.

3.5 MEASURING INSTRUMENTS

The packet of research questionnaires briefly delineated among the ages and genders of the participants, according to the information required for informed consent. Biographic information was obtained as descriptive data, including age, gender, race, nationality and first language spoken. Implicit in the fact that the participant is a CDSD is that he/she has a class 2 diving qualification, as required by the relevant international diving authorities (“IMCA International Code of Practice for Offshore Diving”, 2014).

Personality was measured using the South African version of the 16-PF (Cattell et al., 2006). Hardiness was measured using the AMHS Military Hardiness Scale (Dolan & Adler, 2008). Resilience was measured through the administration of the Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003). Grit was measured using the Shirt Grit Scale

(Grit-S) designed by Duckworth and Quinn (2009). Finally, SCS was measured using the Career Success Scale (Greenhaus et al., 1990).

3.5.1 16 personality factors questionnaire (16PF)

Through measuring personality, the 16PF allows the researcher to gain a more insight into an individual, and has been adapted for use within the South African context. The 16PF is a paper-and-pencil test that is used to measure the basic traits that comprise a individual's personality, and is only suitable for use on individuals over the age of sixteen, with a reading or educational level equivalent to grade 5. The test itself consists of 185 items that are scored using a 3-point answer format. Said questionnaire provides scores on 16 primary scales, five secondary (or 'global') scales and distinguishes between three response bias scales. The 16 personality traits are structured around the following five global factors: extraversion, anxiety, tough-mindedness, independence and self-control. The aforementioned 16 personality traits are as follows: Warmth, Reasoning, Emotional Stability, Dominance, Liveliness, Rule-Consciousness, Social Boldness, Sensitivity, Vigilance, Abstractedness, Privatness, Apprehension, Openness to Change, Self-Reliance, Perfectionism and Tension. All of the factors are distinguishable by clear, meaningful definitions at both ends, making them bipolar; and are allocated ten (standardised-ten) scores ranging from 1 to 10, with a mean of 5.5 and a standard deviation of 2.0. The administration time for this latest version being utilized ranges on average from 35 to 50 minutes and can be administered in both individual and group settings. The 16PF has been translated into 35 different languages, and has been adapted for various cultural specificities (Boyle et al., 2008). Abrahams and Mauer (1999) report rather elevated test-retest reliability scores among the international editions of the 16PF, ranging from 0.80 to 0.86, and furthermore indicate a mean internal consistency figure of 0.75. The Cronbach's alpha for internal reliability yielded from a South African student sample ranges from .64 to .85 (with an average of .74 across all 16 factors) resulting in it being deemed satisfactory (Cattell et al., 2006).

Table 3.2 offers a succinct delineation of the descriptors underlying each of the primary and secondary traits measures by the 16PF, and should be perused for a greater understanding.

Table 3.2**16PF Scale names and descriptors**

<i>Descriptors of Low Range</i>	<i>Primary Scales</i>	<i>Descriptors of High Range</i>
Reserved, Impersonal, Distant	Warmth (A)	Warm-hearted, Caring, Attentive To Others
Concrete, Lower Mental Capacity	Reasoning (B)	Abstract, Bright, Fast-Learner
Reactive, Affected By Feelings	Emotional Stability (C)	Emotionally Stable, Adaptive, Mature
Deferential, Cooperative, Avoids Conflict	Dominance (E)	Dominant, Forceful, Assertive
Serious, Restrained, Careful	Liveliness (F)	Enthusiastic, Animated, Spontaneous
Expedient, Nonconforming	Rule-Consciousness (G)	Rule-Conscious, Dutiful
Shy, Timid, Threat-Sensitive	Social Boldness (H)	Socially Bold, Venturesome, Thick-Skinned
Tough, Objective, Unsentimental	Sensitivity (I)	Sensitive, Aesthetic, Tender-Minded
Trusting, Unsuspecting, Accepting	Vigilance (L)	Vigilant, Suspicious, Skeptical, Wary
Practical, Grounded, Down-To-Earth	Abstractedness (M)	Abstracted, Imaginative, Idea-Oriented
Forthright, Genuine, Artless	Privateness (N)	Private, Discreet, Non-Disclosing
Self-Assured, Unworried, Complacent	Apprehension (O)	Apprehensive, Self-Doubting, Worried
Traditional, Attached To Familiar	Openness to Change (Q1)	Open To Change, Experimenting
Group-Orientated, Affiliative	Self-Reliance (Q2)	Self-Reliant, Solitary, Individualistic
Tolerates Disorder, Unexacting, Flexible	Perfectionism (Q3)	Perfectionistic, Organized, Self-Disciplined
Relaxed, Placid, Patient	Tension (Q4)	Tense, High Energy, Driven
<i>Global Scales</i>		
Introverted, Socially Inhibited	Extraversion	Extraverted, Socially Participating
Low Anxiety, Unperturbable	Anxiety Neuroticism	High Anxiety, Perturbable
Receptive, Open-Minded, Intuitive	Tough-Mindedness	Tough-Minded, Resolute, Unempathic
Accommodating, Agreeable, Selfless	Independence	Independent, Persuasive, Willful
Unrestrained, Follows Urges	Self-Control	Self-Controlled, Inhibits Urges

Note: Retrieved from *The Sage book of personality assessment and measurement, Volume 2*" (p.136) by G. J. Boyle et al., 2008, London, Great Britain. Copyright (2008) by Sage Publications.

3.5.2 Adapted military hardiness scale (AMHS)

The AMHS is composed of 18 items reflecting the three components of psychological hardiness, which include commitment (seven items), challenge (five items) and control (six items) using a 5-point Likert scale. The scale was designed by combining items from several other scales including Job involvement, Military Self-Esteem Scale, Challenge, Work Intensity, the Job Diagnostic Survey General Satisfaction Scale and Task Significance. Certain items from the scale have been semantically adapted to suit the profession of CDSD as opposed to the military context. For example, item 1, which reads 'I am proud to be in the

U.S. Army will be adapted to read 'I am proud to be a CDSD'. This scale carries with it a Cronbach's alpha of .90 (Dolan & Adler, 2008).

3.5.3 Connor-Davidson resilience scale (CD-RISC)

The researchers and creators of this scale drew their information on the characteristics of resilient people from the historical works (1979-1985) of well-known researchers on the subject that include Kobasa, Rutter and Lyons. Said scale contains 25 items, all of which are measured through a 5-point range of responses (from 'not true at all' to 'true nearly all of the time') based on how the subject has felt over the last month. The total score ranges from 0-100 with the higher scores reflecting an elevated level of resilience. The Cronbach's alpha for the full scale is .89, representing a satisfactory level of reliability (Connor & Davidson, 2003).

3.5.4 Duckworth's short grit scale (Grit-S)

The construct of Grit will be measured through the use of the Grit-S, which is an 8-item, 2-factors structured measurement tool that makes use of a 5-point Likert rating scale (Duckworth et al., 2007). For items 2, 5, 7 and 8, the Likert scale assigns a value of 5 for an agreeable response ('Very much like me'), and 1 for a disagreeable response ('Not like me at all'). For items 1, 3, 4 and 6, the values have been reversed, so that the agreeable responses are assigned the progressively lower values. Then, the scores may be tallied and divided by the number of items (8), thereby yielding a maximum score of 5 (extremely gritty) and a minimum of 1 (not at all gritty). This measurement tool has a Cronbach's alpha of .82 (Duckworth & Quinn, 2009).

3.5.5 Career success scale (CSS)

The CSS is a tool utilised to measure the subjective career success of incumbents (Greenhaus et al., 1990). The measurement tool is composed of 5 items, making use of a 5-

point Likert scale with response categories ranging from 1 ('do not agree at all') to 5 ('agree completely'). Said scale has a reliability alpha of .88 (Park, 2010).

3.6 DATA COLLECTION

The sampling design process highlighted the standards of administration required for ensuring an ethical process, yielding as accurate results as possible (see par. 3.4). The collection of this data, however, proved to be far more challenging than originally expected. The process followed by the author, along with the specific challenges associated with each step can be described accordingly.

The author leveraged personal networks from within the CDS community in attempting to make contact with individuals considered eligible to form part of the sample group. Included in this network were various diving instruction facilities, offshore salvage organisations, ex work colleagues from the author's tenure in the SAN and various social affiliations through associated colleagues. The result of this outreach led to a sporadic and generally low interest in participating in the study. The author surmises, through multiple personal interactions with potential candidates, that this lack of interest stemmed from multiple contributing factors:

- As outlined in the literature (see par. 2.2.3), the rotational nature of CDS employment results in two key components to be considered. 1) The majority of contract CDSs only get paid for the work being executed whilst offshore, meaning whilst off their rotation (presumably spent back in the countries of origin), they receive no remuneration. 2) CDSs work in shifts whilst on rotation, in harsh and unforgiving environments and as such their quality of life from a social and familial sphere is diminished. This is crucial as it meant that the prevailing response to the request to take the time to participate in the study was met with expectations of being paid for their time, and a general unwillingness to sacrifice opportunity to rather tend to the social and familial obligations. The length of the battery to be employed appeared to only exacerbate this situation.

- The author noticed a trend within the potential participants to view such research inquiries as being fallacious in nature – presumably not possessing a sound understanding of the efficacy of psychological research, despite the author’s best attempts to explain such. There appeared to be a general discomfort in that many potential participants questioned the possible future application of such research, verbalising a fear and distaste that it may ultimately be employed to create ‘yet another barrier’ of entry that they may have to surpass | what is already considered a ‘cut-throat’ industry. In short, many viewed the participation as potentially contributing to their own exclusion from the job market.
- The battery of tests was administered according to strict ethical guidelines for delivery (see par. 3.4), and as such this took time and care, and a conducive environment. This often provided logistical challenges in that the author would in most cases not be able to simply request permission from a work superior and utilise their facilities. Those few that were willing to participate, fortunately were sourced from the aforementioned networks and as such were more amenable to accept the logistical arrangements employed by the author – utilising boardrooms in dive schools (Sea Dog Commercial Dive School, Saldanha Bay) and organisational hubs (Smit Marine South Africa, Paardeneiland, Cape Town; Subtech, Paardeneiland, Cape Town).
- The aforementioned rotation of CDSDs also meant that their availability was hinged on their rotational cycle, which meant that often batteries would be administered to small groups (two or three) participants at a time.

The collection of this data began in May 2014, and due to the considerable challenges highlighted above, culminated in late 2016. In summary, data collection was a long and arduous process, and was not without its limitations – resulting in the smaller than desirable sample group (n=37) for the study. These challenges will be used as the foundation of discussion in chapter 6, where limitations and recommendations for future research will be covered.

3.7 STATISTICAL ANALYSIS

Frequency tables (and percentages), means, minimums, maximums and standard deviations were used to report summary statistics. Reliability analyses were conducted using Cronbach's alpha, and Pearson correlations were calculated for univariate comparison of variables. The combined effect of predictor variables on the dependant variable was explored by using a multiple regression analysis. All analyses were done through the utilisation of SPSS, with a five per cent significant level ($p < 0.05$) being used as the guideline to determine significance of relationships (Vinzi, Trinchera & Amato, 2010; M. Kidd, personal communication, May 17, 2017).

3.8 CHAPTER SUMMARY

The crux of this chapter offered detailed descriptions of the various theoretical hypotheses, the research methodology that was employed, the particular research design, sample and various measurement instruments that were used, and finally the statistical analysis techniques that were employed, leading us to the following chapter that begins a reporting of the statistical analysis for the study.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

This chapter will present the various statistical analyses of the data collected. The presentation will begin with an exploration of the descriptive statistics of the sample, outlining the measures of central tendency of the constructs hardiness, grit, resilience and SCS. Thereafter, a discussion on the reliability (item analysis) of the various measures (subscales) used will follow. Next, inferential statistics correlations through the use of Pearson's correlation coefficient outline the relationships between the different variables tested, and allow us to compare such to the hypotheses made. Any mediating effects between the various variables will be explored through the use of the Sobel test (see Appendix A). Finally, conclusions will be drawn based on the obtained results.

4.2 DESCRIPTIVE STATISTICS

Gravetter and Wallnau (2016, p. 5) define descriptive statistics as the “statistical procedures used to summarise organise and simplify data”. In terms of applied statistics, descriptive statistics are only concerned with summarising the set of data that has been collected by the researcher, without making inferences (Cohen, 2008). Hinton, McMurray and Brownlow (2014, p. 38) suggest that descriptive statistics “give us a way of accurately describing and summarising large datasets quickly and easily”. They further state that the most common descriptive statistics employed relate to measures of *central tendency* and measures of *dispersion*. When investigating measures of *central tendency* this refers to the mean, median and the mode of the data set, usually computing a minimum of two, with the mean being the typically preferred measure when working with numerical values (Cohen, 2008). The mean is defined by Hinton, et al. (2014, p. 17) as “a measure of the ‘average’ score in a set of data. The mean is found by adding up all the cores and dividing by the number of scores”. The inclusion of *dispersion* refers to the range, standard deviation, standard error and variance of the dataset. Hinton, et al. (2014, p.27) define this concept as “a measure of standard

(‘average’) difference (deviation) of a score from the mean of a set of scores”. Howell (2013, p. 42) simplifies the definition by claiming that standard deviation is “basically the average of the deviations of each score from the mean”. This statistic is used to measure the variability of scores in a distribution – illustrating the average amount that the scores in this distribution deviate from the mean. The principle is that the larger the standard deviation, the greater the scores are spread out. It is an important statistic because it forms the basis of other statistics such as standard errors and correlations, the latter being applicable to this study (Vogt & Johnson, 2011). The sample of this study comprised 37 active (meaning currently in employment rotation on and off-shore) CDSDs, of varying ages and demographics. These details will be represented by means of relevant histograms.

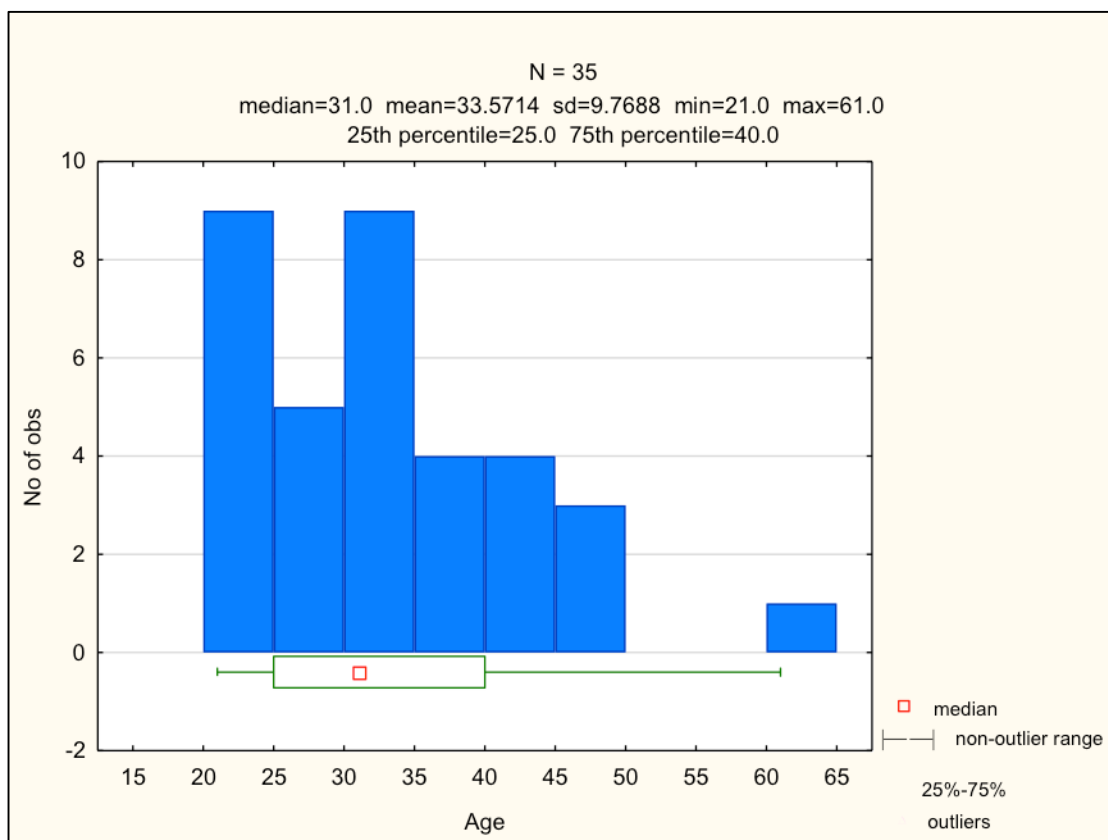


Figure 4.1 Histogram of Age

The participants in this study varied in age, with a range spanning 40 years, from 21 years as the youngest to 61 years as the eldest participant (see Fig. 4.1). Not surprisingly, the significant age range results in the smallest category by volume being the 60-61 years (3%) with only a single participant in the sample. By contrast, the largest age category was 30-39

years (38%) with 14 participants in the study. In the age group 20-29 years there were 12 participants (32%) and the 40-49 category yielded six participants. The 50-59 age group consisted of 2 participants (5%), and a further 2 participants neglected to offer their age (listed as 'none given'). When exploring the distribution of gender among the sample group, one is forced to keep in mind the nature of the occupation as has been explored by the literature. CDS is by and large a male-dominated industry, with the researcher not having come into contact with any active, female CDSs during the considerable course of his research. Thus, the sample group of comprised entirely of males.

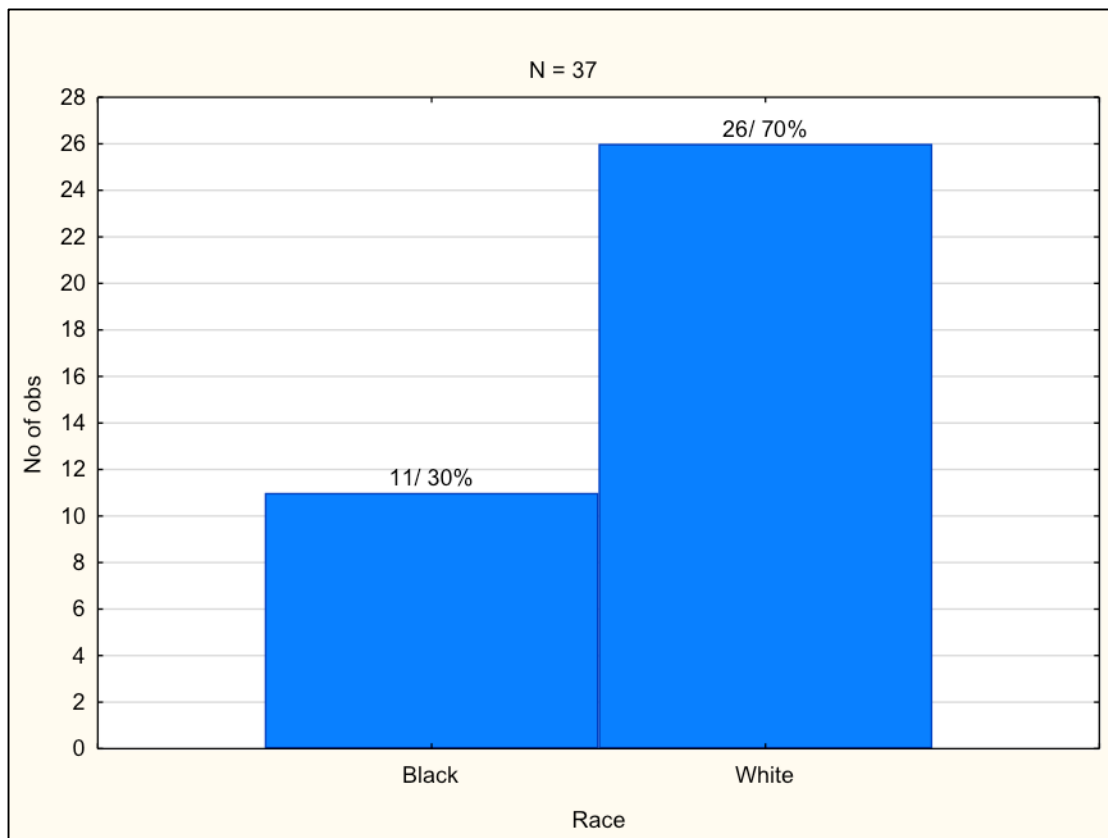


Figure 4.2 Histogram of Race

The demographic of the sample group was delineated according to both race and nationality, allowing for additional descriptive measures to be presented (see Fig. 4.2). Of the sample group, two races were represented, being black (30%) and white (70%).

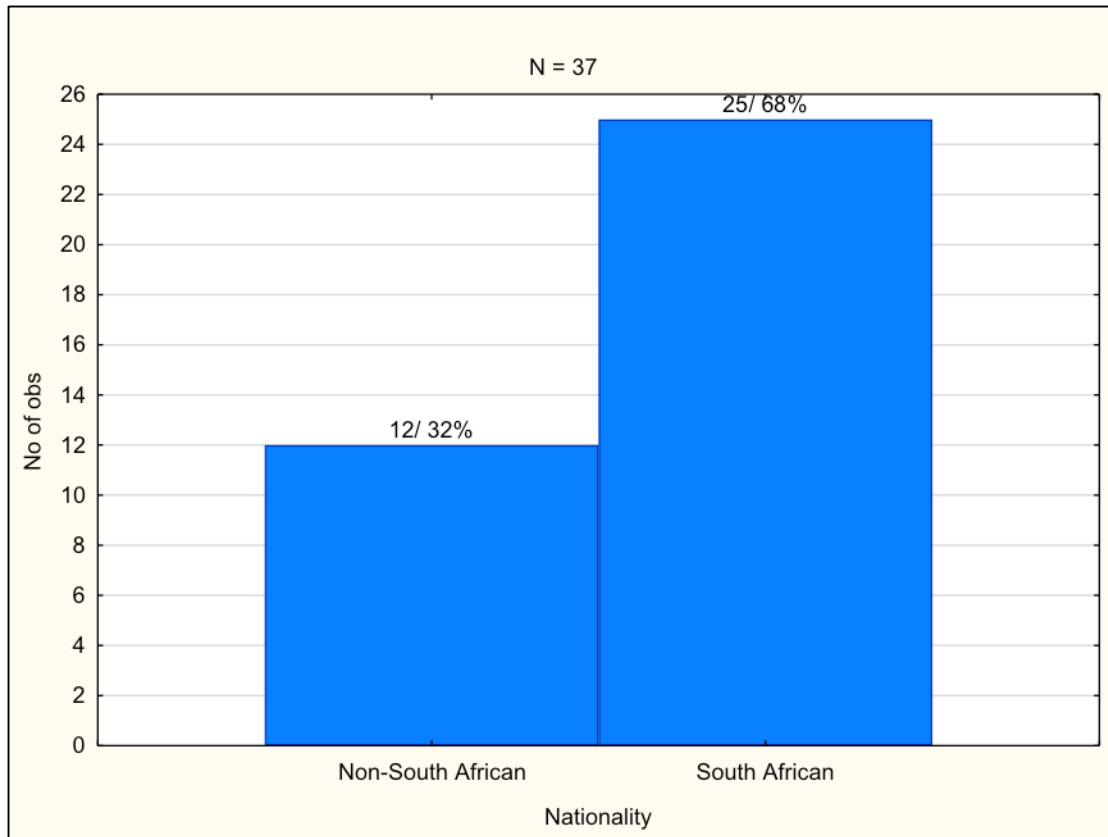


Figure 4.3 Histogram of Nationality

The method of sampling only allowed for an investigation into CDSs available and willing to participate locally, leading to a limited cross section of international (32%) versus South African (68%) participants (see Fig. 4.3).

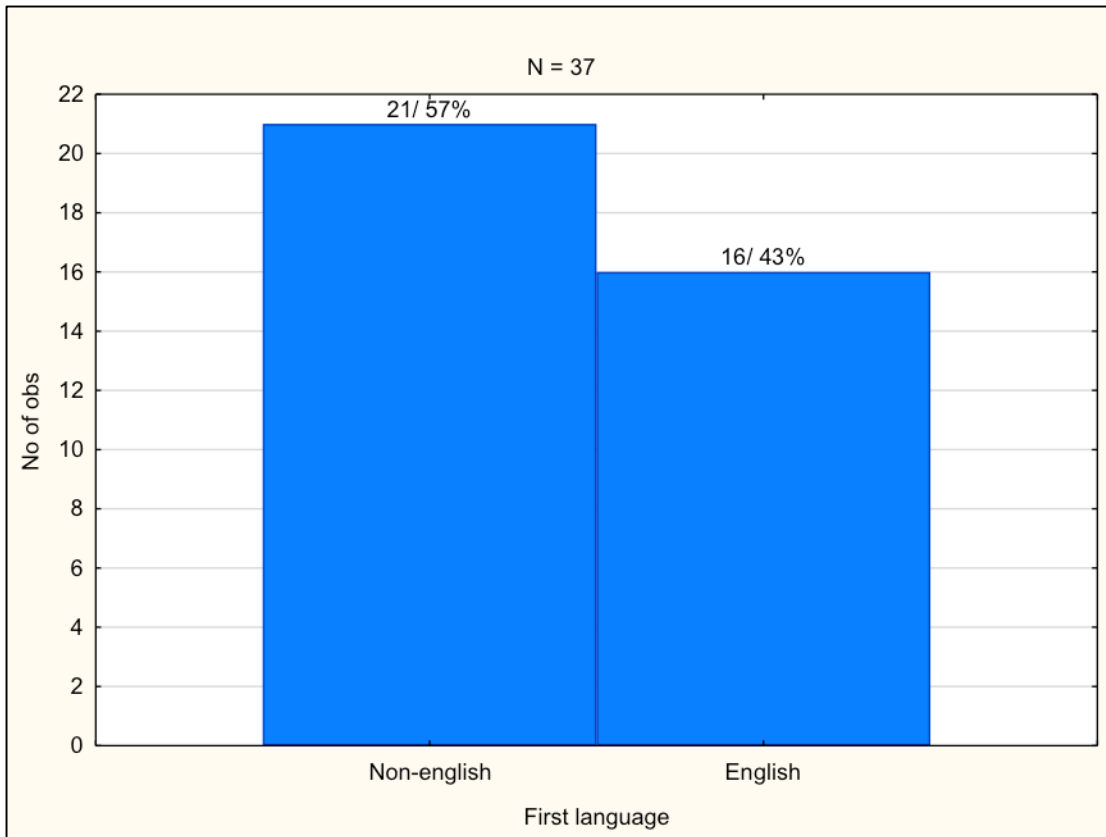


Figure 4.4 Histogram of first languages

The proportion of the non-South African sample combined with the cross-section of languages available to the South African sample as their 'mother-tongue' or first language (see Fig. 4.4), the results show that the majority of the sample group (57%) did not list English as their first language. This will be particularly important in the discussion of the results yielded for the study.

Measures of central tendency were employed in order to offer a statistical summary of the variable in question as it pertains to the sample group. The *median* (a score at or below which half of the sample group has attained once the data are arranged in numerical order) and the *mean* (the sum of all of the scored divided by the number of scores, commonly referred to as the average) are displayed, along with the *minimum* and *maximum* scores (Howell, 2013). From a dispersion perspective, the standard deviation for each of the variables will also be illustrated and subsequently discussed.

Table 4.1***Measures of central tendency: Variables***

Variables	N	Minimum	Maximum	Median	Mean	Std. Dev
Hardiness	37	3.80	5.00	4.36	4.43	0.35
Grit	37	1.88	4.63	2.75	3.64	0.68
Resilience	37	65	99	80	81.03	8.71
SCS	37	40	100	76	75.57	13.29

The results in Table 4.1 above illustrate that hardiness carries a minimum of 3.80, maximum of 5.00 and a median of 4.36. The mean of 4.43 combined with the low standard deviation of 0.35 illustrates that the average responses of the sample group do not vary greatly from the mean - allowing an assumption that all participants possess an elevated level of hardiness and that the dispersion of their scores clustered closely around the mean (or the expected value). Grit shows a minimum of 1.88 and a maximum of 4.63. This broader range indicates the presence of outliers within the participants, which would necessarily have an influence on the much higher mean value of 3.64. The median (2.75), which is resistant to outliers, is therefore preferred, and indicates a very slight presence of elevated grit among the sample group. The standard deviation of 0.68 represents a greater dispersion from the mean among the sample group's responses, reinforcing the conclusion of a slight presence of and elevated possession of the construct. Resilience yielded a minimum of 65 and a maximum of 99 with a median of 80. The mean for the sample is 81.03, which does not differ from the median to a significant extent and allows one to conclude that there exists no significant outliers and that the sample group possesses an elevated level of resilience. The standard deviation of 8.71 is considered low considering the scale is weighed out of 100, and indicates a general clustering of the sample group's responses closely around the mean. SCS produced a significant range, with a minimum of 40 and a maximum of 100. This clearly shows outliers in the response set, but so the median is preferred over the mean. The standard deviation of 13.29 indicates a relatively wide spread of respondent around the mean, and as such the author concludes that the sample group does indeed possess an elevated level of SCS, but that the consistency of said the strength of the possession is scattered and rather erratic.

Table 4.2***Measures of central tendency: Personality factors***

Factors	N	Minimum	Maximum	Median	Mean	Std. Dev
A: Warmth	37	1	7	4	3.68	1.63
B: Reasoning	37	1	10	6	5.35	2.18
C: Emotional Stability	37	1	9	6	5.57	2.19
E: Dominance	37	2	8	6	5.57	1.39
F: Liveliness	37	1	8	5	4.70	1.88
G: Rule- Consciousness	37	1	9	6	5.38	1.80
H: Social- Boldness	37	2	8	5	5.30	1.76
I: Sensitivity	37	1	7	4	3.54	1.66
L: Vigilance	37	2	10	5	5.51	1.68
M: Abstractedness	37	3	9	5	4.95	1.41
N: Privatness	37	1	9	5	5.51	1.97
O: Apprehension	37	1	9	5	5.00	2.05
Q1: Openness to change	37	1	9	5	4.62	1.96
Q2: Self-reliance	37	2	10	5	5.30	2.11
Q3: Perfectionism	37	2	9	5	5.57	2.18
Q4: Tension	37	1	9	6	5.49	1.97

The 16PF produces a framework for understanding individual personalities through charting the incumbents respective measure of said trait along a 10 point bipolar scale – where the higher the number, the more likely the incumbent is to embody the traits associated with the factor in question. A lower rating indicates a likelihood to fall on the opposite end of the factor spectrum, thus resembling traits that would essentially amount to being composite to the factor described (see Table 4.2).

4.3 RELIABILITY ANALYSIS

Reliability refers to how stable or consistent a measurement is, asserting that a highly reliable measure will produce consistently similar results under the same conditions (Gravetter & Forzano, 2009). When measuring reliability, Vogt and Johnson (2011) suggest that lower measures of reliability imply a greater attenuation and subsequent correction, whereas higher levels of reliability imply an increased value in what the measure purports to measure. Of particular importance when measuring reliability is the evaluation of internal consistency, which is defined by Wasserman and Bracken (2013, p. 51) as “a psychometric function of random measurement error, equal to the ratio of the true score variance to the observed score variance.” One of the most widely used measures of reliability is the Cronbach’s alpha, which is based on the consistency of responses between the various items in a scale (Streiner, 2003). Measuring the internal consistency of the items will determine how much each contributes to overall reliability and will allow the researcher to increase or improve such by deleting problematic items that have been identified by the coefficient (Gerber & Finn, 2005; Hinton, et al., 2014).

Reliability of each of the scales employed (CD-RISC, AMHS, Girt-S, CSS) was measured through item-analysis utilising the SPSS, in pursuit of enforcing the general validity of the study. The reliability of the 16PF was investigated by analysing the relevant items contributing to each of the 16 personality subscales. This allows the researcher to discuss those factors obtaining sufficient Cronbach’s alphas whilst discarding those that do not. As a measure of internal consistency, item analysis indicates the extent to which the items within a scale measure the same construct (Field, 2009; Hinton, et al., 2014). The literary review of each of the scales established acceptable levels of internal consistency (see par. 3.5). Reliability as pertaining to this particular study will be discussed accordingly.

When determining acceptable values for Cronbach’s alpha, research has shown that a value of (>.70) is acceptable (Gravetter & Wallnau, 2016; Gerber & Finn, 2005). That said, Streiner (2003) suggests that the alpha value is affected by the length of the scale in question, with scales containing 10 or so items and measuring narrower characteristics often yielding results of between .40 and .50. The researcher will discuss any scores deemed negligibly below the acceptable threshold (.70) that are nonetheless to be considered acceptable, for the purposes

of this study, owing to the specific challenges faced with the size of the sample group and the length of the scales. Problematic items are discussed as follows:

- Item 15 of the AMHS falls within the subscale measuring one of the three factors that make up hardiness – *control* (“I am allowed to do my job without constant supervision from others”), and was flagged as being somewhat problematic. The issue could be routed in the ambiguity of the phrase, owing to the fact that CDSDs are consistently supervised as a means of ensuring check-and-balances whilst performing tasks below the surface. The item had a low inter-item correlation with the remainder in the set (0.25), but it was retained as there was deemed not to be a significant change to the Cronbach alpha if it were to be removed.
- Item 1 of the Grit-S (“New ideas and projects sometimes distract me from previous ones”) was positively (as opposed to inversely) scored, and had the lowest inter-item correlation as compared to the remainder of the items (-0.12). This may have become an outlier due to the project-based nature of the tasking within the industry, with each ‘job’ (contracted time on the platform) essentially forming a project in and of itself. Removal of this item from the set would not a yielded a change to the Cronbach’s alpha significant enough to warrant deletion.

Personality, measured by the 16PF, was broken down into the 16 different factors for internal reliability analysis on the items that contribute to each factor. Those factors that are to be discarded completely in the continuation of this study will be listed in table 4.3.

- Factor A (Warmth) yielded unacceptable Cronbach’s alpha’s across all of its items, with item-total correlations, measuring how an individual item clusters with the remaining, ranging from -0.09 on item 161 to 0.44 on item 31. As such, none of the items within this factor were utilised, and the factor will be discarded for the purposes of discussion.
- Factor E (Dominance) yielded an alpha of 0.27, which is considered too low to justify inclusion. Likewise, the item-total correlations for items contributing to this factor ranged from -0.02 (item 38) to 0.36 (item 163).

- Factor G (Rule-Consciousness) produced an alpha of .50, considered unreliable and consequently discarded from this discussion. The least clustering item being item 69 (-.42) and the greatest being item 40 (0.44).
- Factor I (Sensitivity) produced an alpha of 0.47, with none of its items showing considerable strength. The least clustering item was item 42 (-0.09) and the greatest being item 10 (0.46).
- Factor L (Vigilance), with an alpha of 0.53 was too considered unreliable and therefore discarded from discussion. Item 45 showed an item-total correlation of 0.07, and item 112, on the upper end showing 0.46.
- Factor M (Abstractedness) has an unacceptable alpha of 0.36. Item 79 (0.20) and item 81 (0.45) represent the range of item-total correlations.
- Factor Q1 (Openness to Change), with an alpha of 0.32 is too unacceptable. The range of the item-total correlations for the set range from 0.15 (item 83) to 0.51 (item 118).

The reliability of the various subscales was estimated through the use of Cronbach's alpha, as elaborated upon by Hinton, et al. (2014). Table 4.3 below outlines the internal reliability of each of the subscales through representation and discussion of the Cronbach's alpha for each.

Table 4.3***Subscales Internal Reliability***

Scale	N	α
AMHS:		
Commitment	37	0.72
Challenge	37	0.73
Control	37	0.67
16PF:		
A: Warmth	37	0.33
B: Reasoning	37	0.78
C: Emotional Stability	37	0.77
E: Dominance	37	0.27
F: Liveliness	37	0.74
G: Rule-Consciousness	37	0.50
H: Social-Boldness	37	0.79
I: Sensitivity	37	0.47
L: Vigilance	37	0.53
M: Abstractedness	37	0.36
N: Privatness	37	0.69
O: Apprehension	37	0.74
Q1: Openness to change	37	0.32
Q2: Self-reliance	37	0.75
Q3: Perfectionism	37	0.66
Q4: Tension	37	0.72

In accordance with the presented results above, it can be seen that the reliability coefficient yielded for the AMHS as a whole ($\alpha=0.69$), although on the threshold of the generally accepted benchmark (>0.70), is acceptable. The subscales of the AMHS, *commitment* ($\alpha=0.72$), *challenge* ($\alpha=0.73$) and *control* ($\alpha=0.67$) all presented alphas deemed acceptable. The latter subscale, though presenting the lowest reliability coefficient, was presumed so due to the somewhat problematic item 15, as discussed above. However, the alpha was considered acceptable. The Grit-S ($\alpha=0.66$) presented an acceptable reliability coefficient. As the scale was comprised of eight items, a slightly lower reliability coefficient than what would

be generally acceptable (>0.70) could be expected (Streiner, 2003). The 25-item CD-RISC produced a significant Cronbach's alpha ($\alpha=0.85$), as did the 5 item CSS ($\alpha=0.77$). Although indicated that the Grit-S may be expected to yield a slightly lower reliability coefficient due to its brevity, it would appear that the same notion does not apply to the even shorter CSS (5 item). The author posits that the difference in reliability could be due to the semantic composition of the items within each measure – with internal reliability of the Grit-S being skewed by the reverse-scored items and an intention of the participants to offer desirably answers without knowledge of the scoring.

The 16PF measures participants' personality across multiple (16) subscales, each measuring a different aspect of the participant's personality and bearing with it implications about expected behaviour. Each of the subscales (factors) was tested for internal reliability and produced subsequent Cronbach's alphas. Unfortunately, despite the scale receiving acceptable Cronbach's Alpha's in its application to the South African sample groups, as explored in the literature (see par. 3.5.1), the application of this measure to the present sample group yielded unfavourable reliability results across the board. The researcher posits that there are numerous possible contributing factors to this:

- Taking into account the language demographics as presented in the descriptive statistics (see figure 4.4), 57% of the participants listed English as being not being a first language. Although none indicated a preference to make use of a translator, this ratio cannot be ignored when considering the lack of internal consistency within the various subscales.

Item-total correlations are used to determine which questions, if any, did not cluster with the others. Those presenting mentionable results are to be discussed the chapter that follows (see par. 5.2), with factors certain factors A, E, G, I, L, M and Q1 being discarded.

Table 4.4
Scales reliability coefficients results

Variables (Scale)	Cronbach's alpha (α)
Adapted Military Hardiness Scale (AMHS):	0.69
Short Grit Scale (Grit-S):	0.66
Connor Davidson Resilience Scale (CD-RISC):	0.85
Subjective Career Success Scale (CSS):	0.77

Each of the scales utilised, representing the variables measured in the study, were subjected to a reliability analysis – the results are intended to indicate how well the scales measured the variables being researched. As described in Table 4.4, the analysis resulted in significant and acceptable Cronbach's alpha scores, ranging from 0.66 to 0.85. For the purposes of this study, the 16PF was not calculated for total reliability as it was broken down into its subscales for application and subsequent discussion of factors with acceptable alpha's (see Table 4.3).

4.4 INFERENCE STATISTICS

Inferential statistics refers to the deductions that can be made about a population based on the data produced by a sample group (Howell, 2013). The objective of analysing this data is to allow the researcher to draw conclusions, make predictions and validate assumptions about the population, making use of statistical methods to determine when it is appropriate to do so (Gravetter & Wallnau, 2016; Gravetter & Forzano, 2009). These statistics can then be used as a basis upon which to reject or accept the hypotheses that have been put forth, as is the case with this particular study (see par. 3.2), making use of the Pearson correlation.

4.4.1 Correlational analysis between constructs and subjective career success

Hauke and Kossowski (2011, p. 88) describe the Pearson correlation as the “measure of the strength of the linear relationship between two variables”, stating that this could only be applied for quantitative variables. They distinguish between the use of the Spearman and the Pearson correlation coefficient by stating that the former is better suited for “assessing how well an arbitrary monotonic function can describe the relationship between two variables, without making any assumptions about the frequency distribution of the variables” (Hauke & Kossowski, 2011, p. 89). In their findings, they suggest that the Spearman rank correlation coefficient should not be over-interpreted as a representation of the associative strength between two variables. In interpreting the strength of the correlation through the use of the Pearson coefficient, scores may range from -1.00 to +1.00. A perfectly positive correlation is represented by +1.00, whereas a perfectly negative correlation is represented by -1.00, with 0.00 indicating a lack of a consistent relationship between the variables. In light of the above, the preferred correlation is considered high and strong if above ± 0.50 , with those between ± 0.30 and ± 0.50 considered moderate but acceptable. Low correlations are between ± 0.10 and ± 0.30 and anything below ± 0.10 represents a negligible correlation and will be discussed as such (M. Kidd, personal communication, May 17, 2017). The results of the correlational analysis for the sample data set are displayed as follows. An analysis of the p-value (<0.05) indicates the significance of the correlation (Gravetter & Wallnau, 2016).

Table 4.5
Correlation analysis: personality and SCS

Factors	r-value	p-value
B: Reasoning	0.11	0.50
C: Emotional Stability	0.00	0.98
F: Liveliness	0.26	0.12
H: Social-Boldness	0.21	0.20
N: Privateness	0.02	0.90
O: Apprehension	0.14	0.41
Q2: Self-Reliance	0.20	0.23
Q3: Perfectionism	0.02	0.92
Q4: Tension	0.03	0.88

Hypothesis 1: There exists a significant relationship between personality and SCS

As established in the reliability analysis (see Table 4.3), certain factors (A, E, G, I, L, M, Q1) have been discarded for discussion due to a lack of reliability established. The researcher will elucidate on the potential reasoning in the discussion of the results (see par 5.3.1). Each of the factors with established reliability will be analysed for their potential correlation with SCS (see Table 4.5).

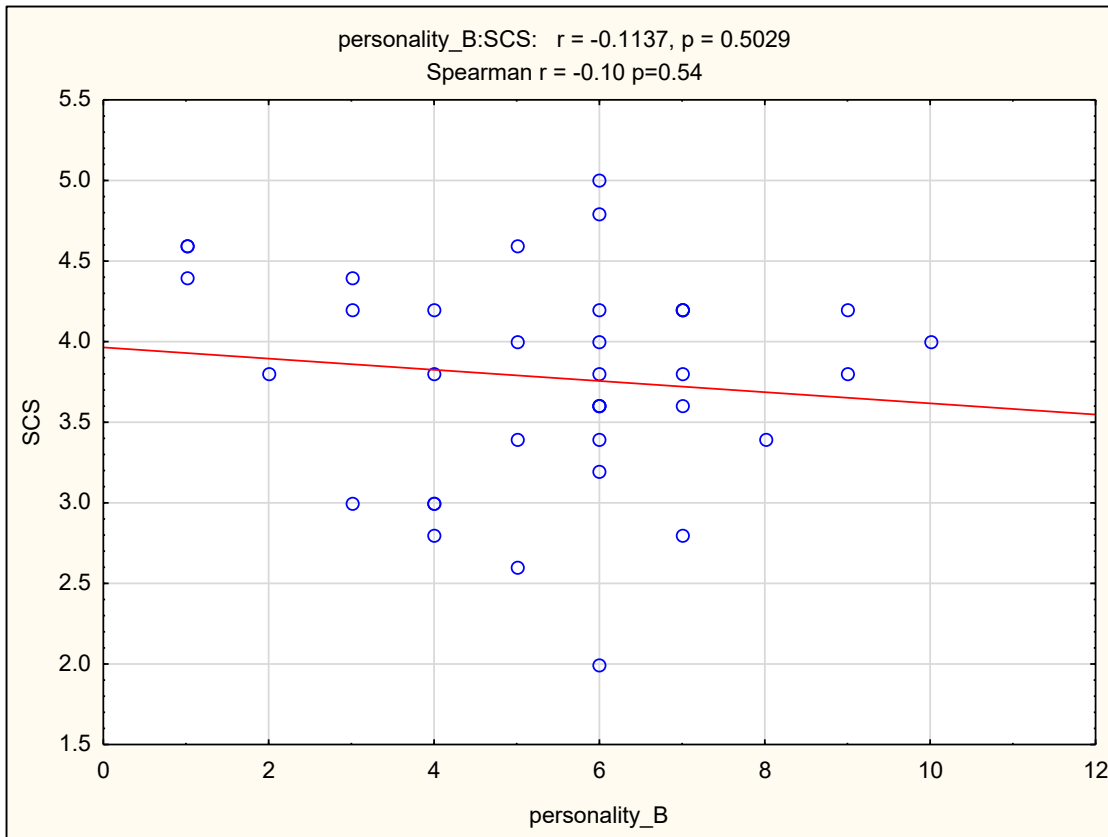


Figure 4.5 Scatterplot of personality Factor B (Reasoning) and SCS

The results in figure 4.5, illustrating the correlational analysis between Factor B (Reasoning) of the 16PF and SCS, show a low negative correlation ($r = -0.1137$) that is also deemed insignificant by the p-value (>0.05). In light of this, it can be held that this factor is not correlated to experiencing SCS in CDSDs and therefore H_1 is partly rejected.

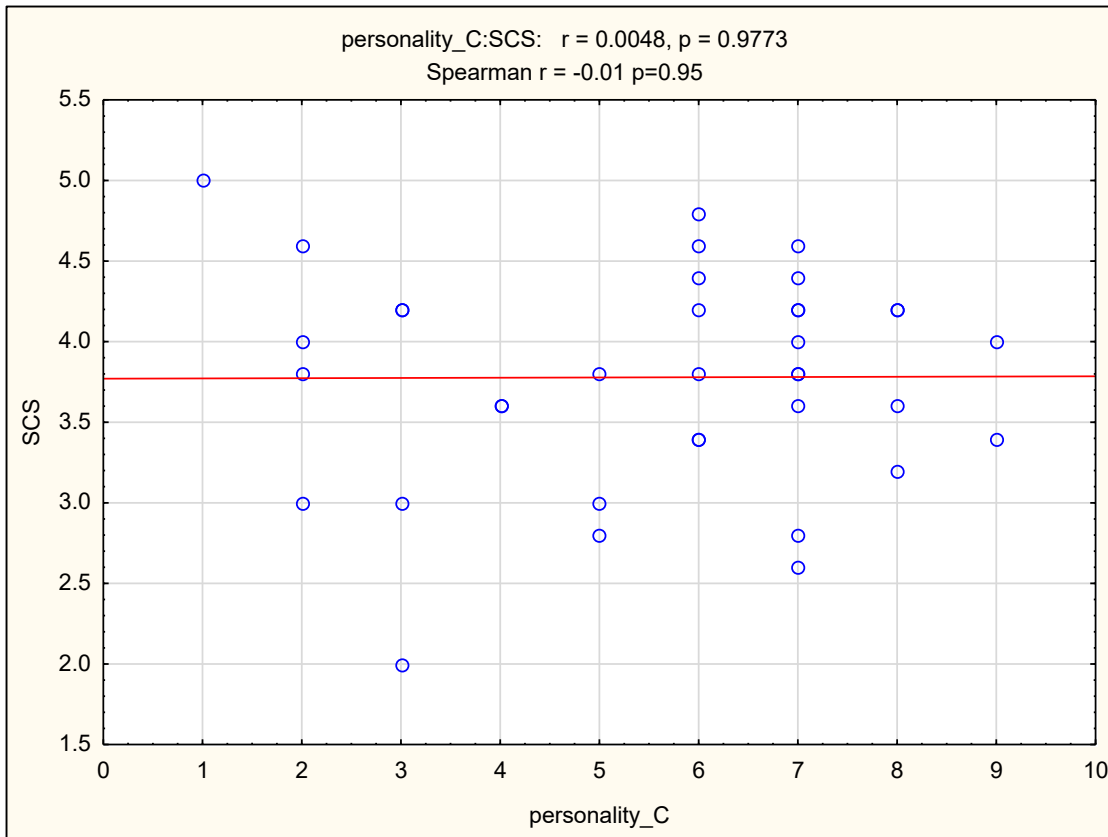


Figure 4.6 Scatterplot of personality Factor C (Emotional Stability) and SCS

Figure 4.6 depicts the correlational analysis of Factor C (Emotional Stability) against SCS. The results show a negligible correlation ($r=0.0048$) and are deemed insignificant ($p > 0.05$). This indicates that there does not exist a correlation between this factor and SCS, and as such this contributes to the hypothesis (H_1) being partly rejected.

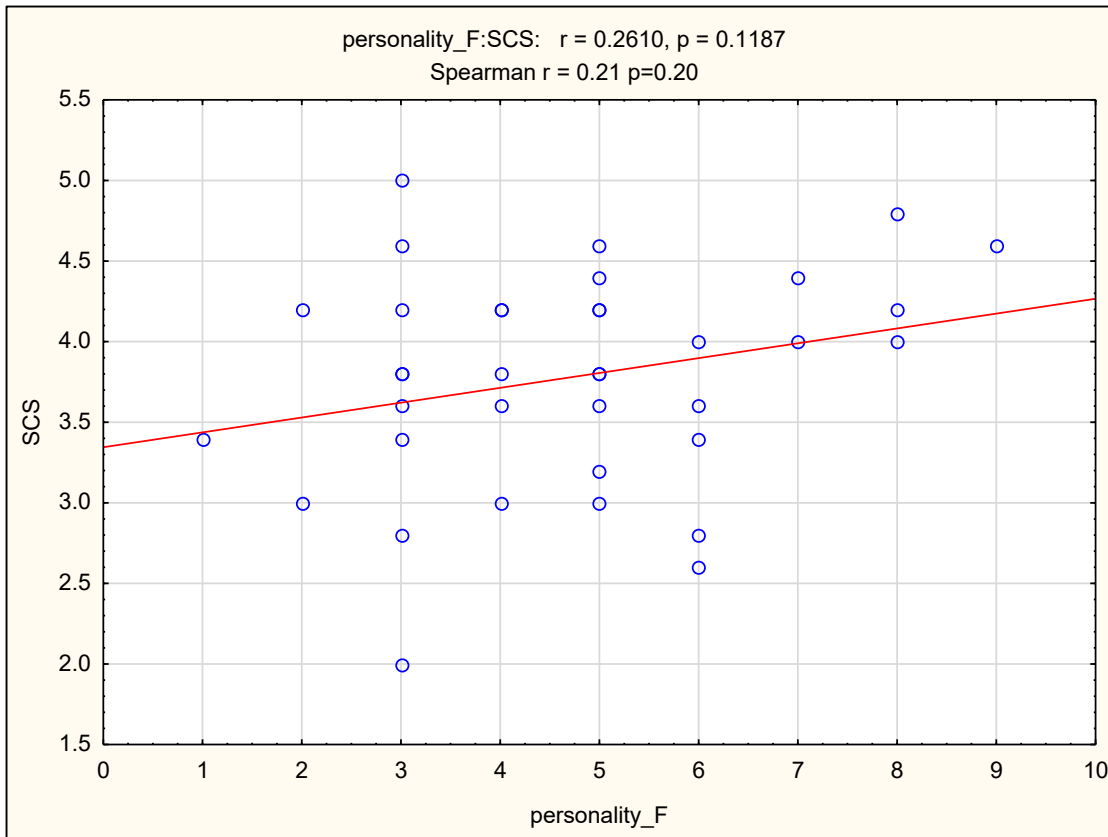


Figure 4.7 Scatterplot of personality Factor F (Liveliness) and SCS

The figure above shows a low ($r=0.2610$) and insignificant ($p>0.05$) correlation between the factor Liveliness and SCS. This adds to the conclusion of H_1 being partly rejected.

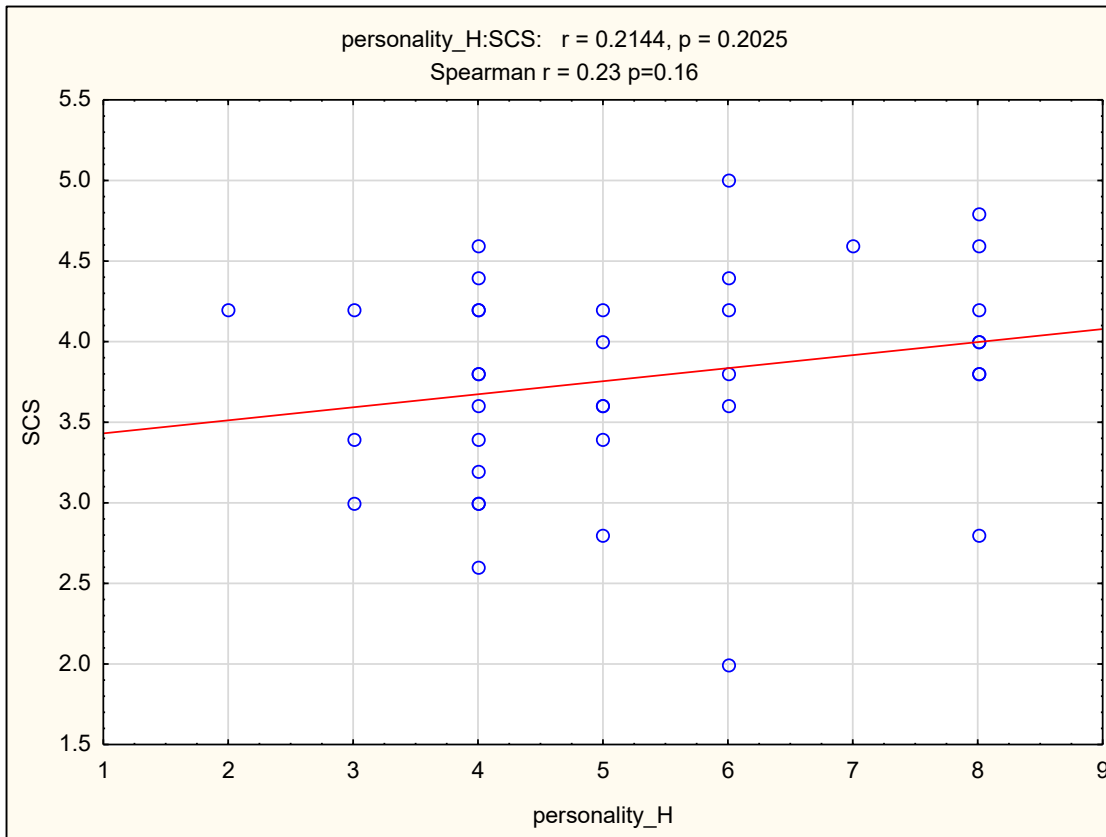


Figure 4.8 Scatterplot of personality Factor H (Social Boldness) and SCS

With a low (0.2144) and insignificant ($p > 0.05$) correlation indicated by the analysis in Figure 4.8, one can conclude CSDs possessing a heightened level of social boldness within their personality profile will not lead to their experiencing of subjective career success. This strengthens the conclusion of partly rejecting H_1

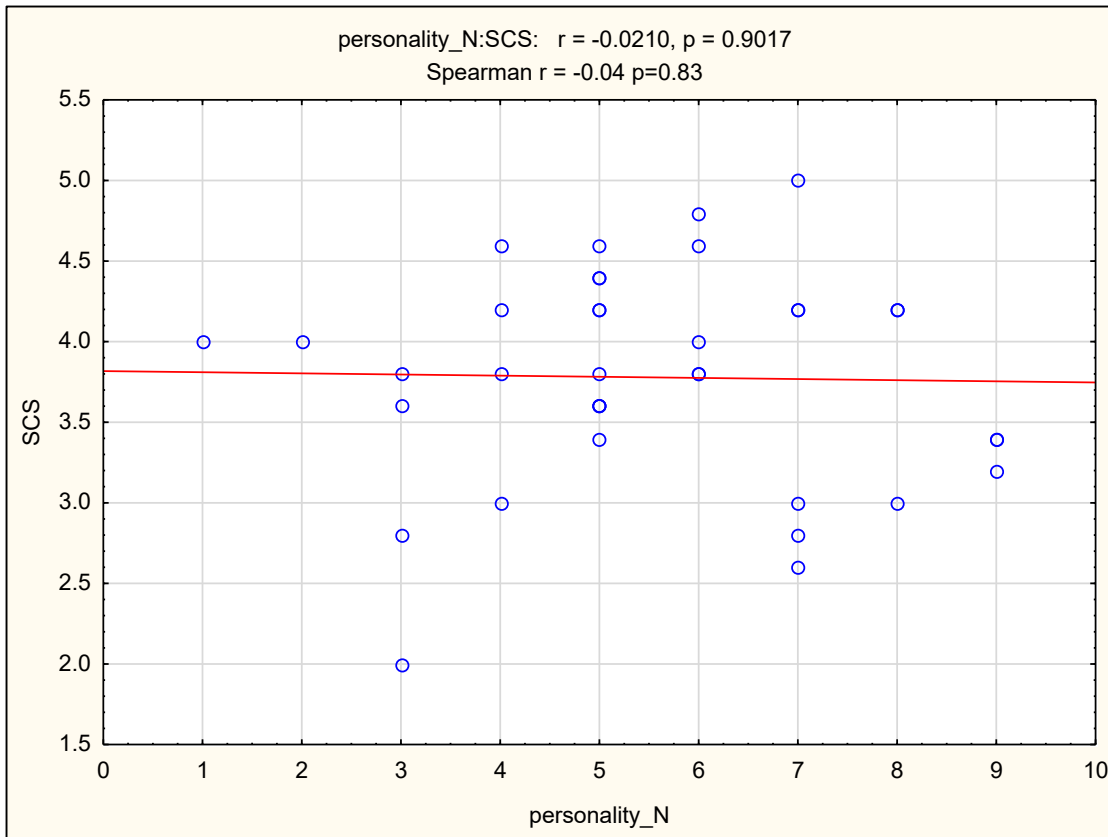


Figure 4.9 Scatterplot of personality Factor N (Privateness) and SCS

The results in Figure 4.9 show a negative negligible correlation ($r=-0.021$), with an insignificant p-value. From this analysis it can be concluded that an elevated level of this factor, as possessed by a CDSD within the sample group, will not have a significant influence on their experiencing of SCS. This contributes to partly rejecting H_1 .

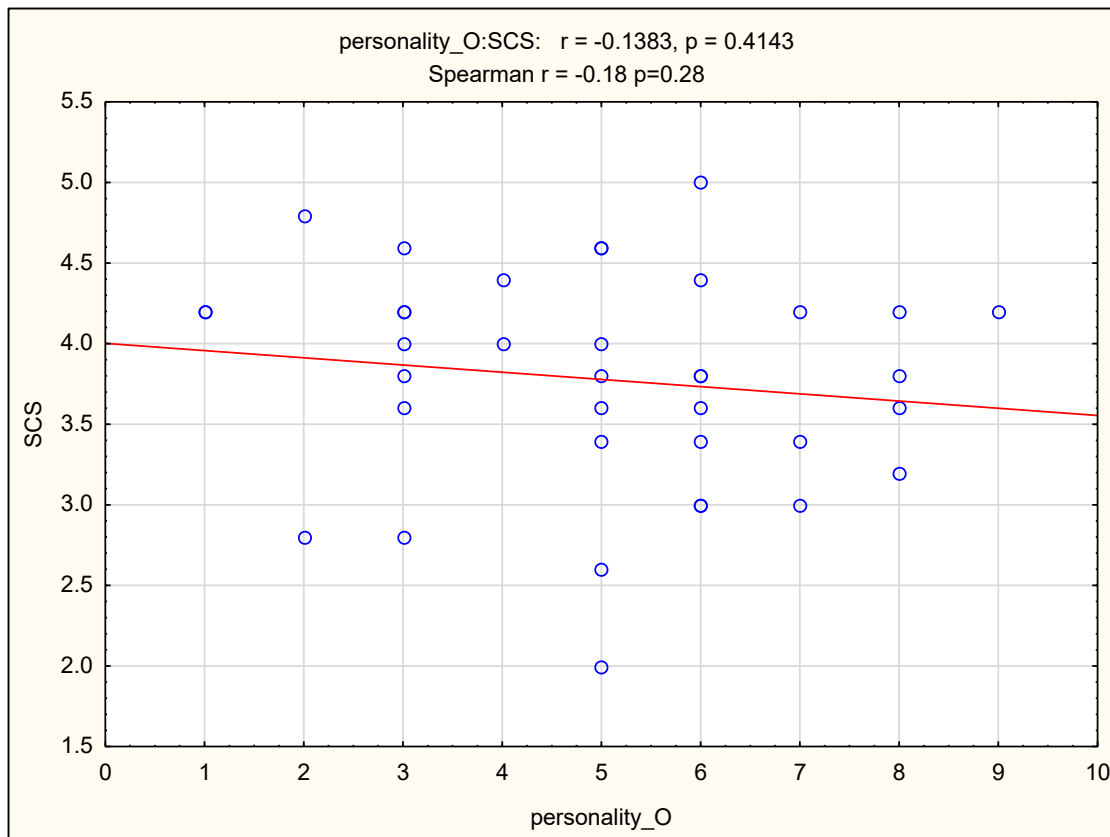


Figure 4.10 Scatterplot of personality Factor O (Apprehension) and SCS

Figure 4.10 shows that the factor analysed does not correlate with SCS within the sample group, illustrated by the low negative correlation ($r=-0.1383$) and insignificant ($p>0.4143$) results obtained, further strengthening the conclusion that H_1 should be partly rejected.

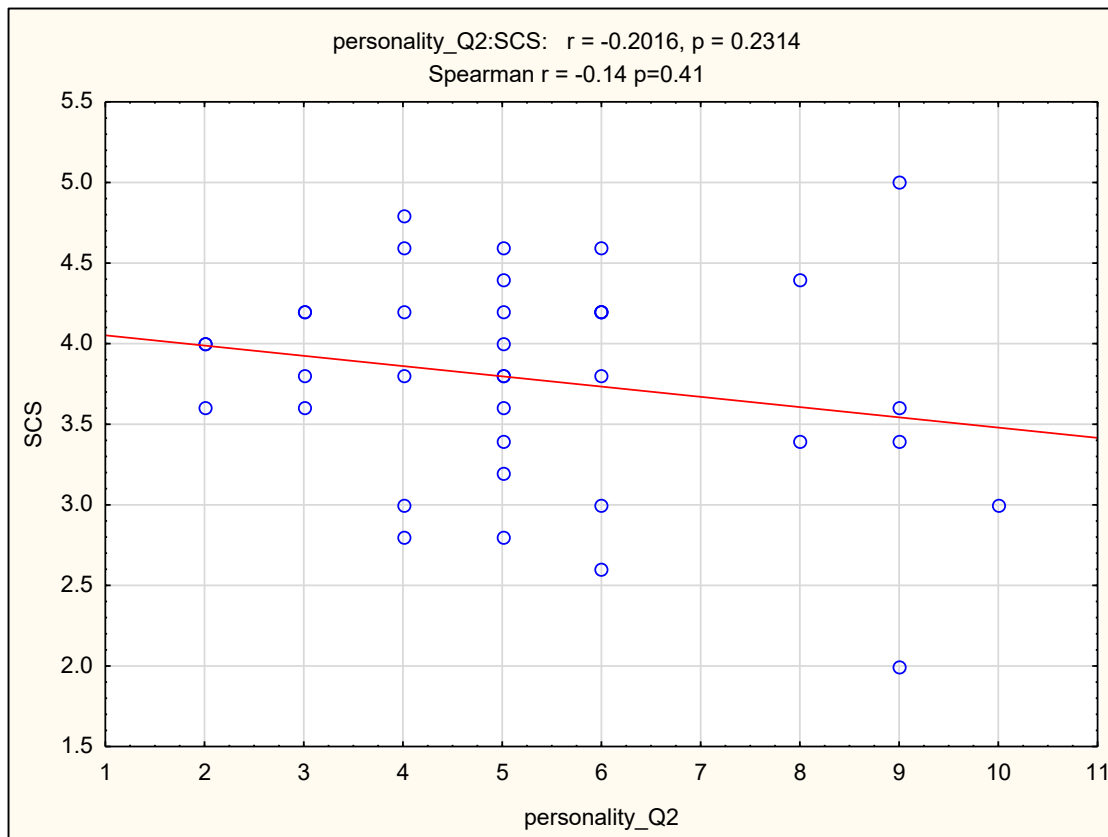


Figure 4.11 Scatterplot of personality Factor Q2 (Self-Reliance) and SCS

With insignificance being established through the provision of a p-value above the 0.05 threshold, the low negative correlation represented by the analysis ($r = -0.2016$) (Fig. 4.11) allows the researcher to conclude that the self-reliance factor does not bear a correlation to SCS for the sample group, and as such contributes to the partial rejection of H_1 .

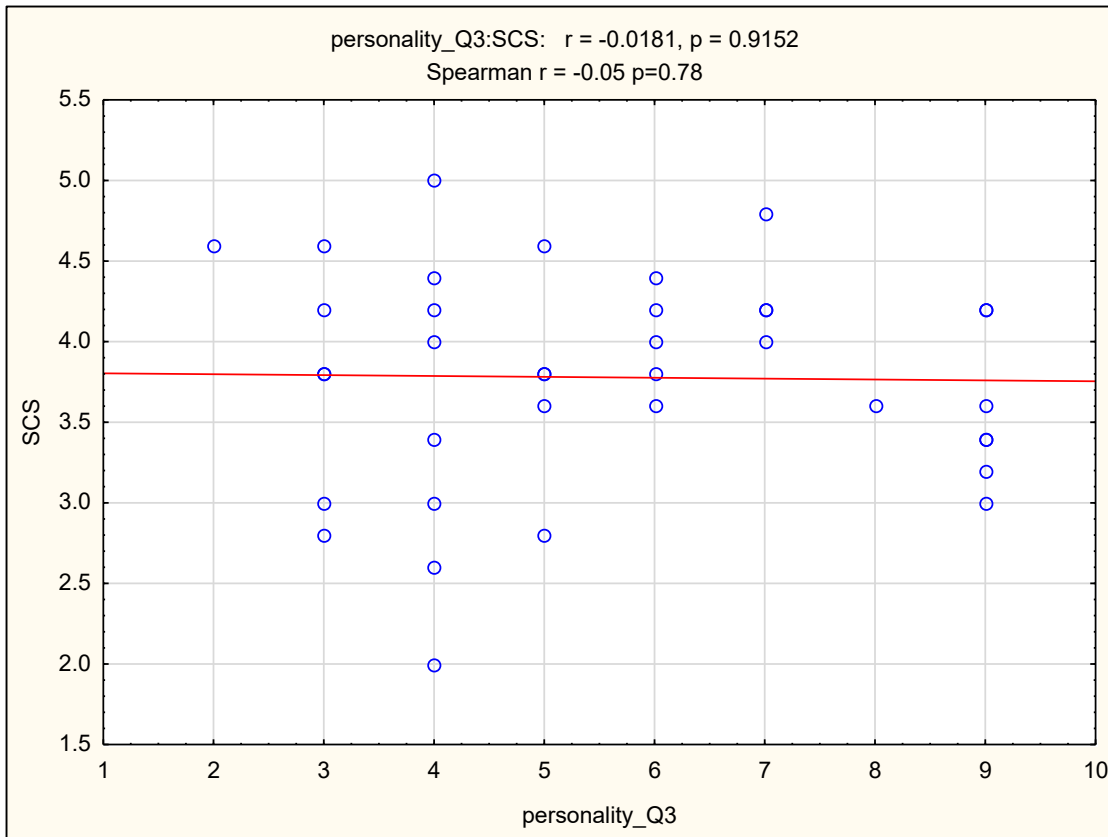


Figure 4.12 Scatterplot of personality Factor Q3 (Perfectionism) and SCS

Through examining the results of the analysis represented in Figure 4.12 (low correlation shown by $r = -0.0181$ and insignificant correlation shown by $p > 0.05$) the researcher is able to assert that possessing the characteristics associated with perfectionism does not bear a significant impact on experiencing SCS for the sample group. This result furthers the trend of partly rejecting H_1 .

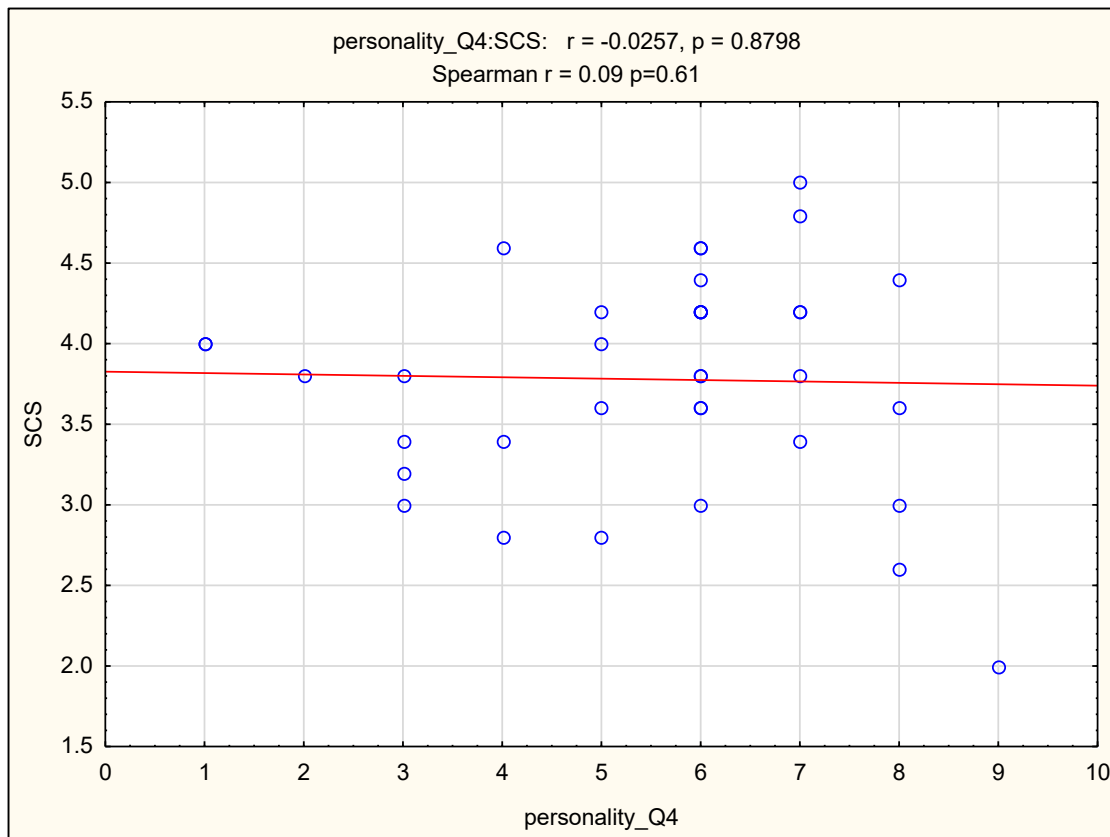


Figure 4.13 Scatterplot of personality Factor Q4 (Tension) and SCS

The results from the analysis of the final personality factor (Tension) deemed to display suitable reliability through its acceptable Cronbach's alpha score as displayed (see Table 4.3). With the results displayed in figure 4.13 indicating a low negative ($r=-0.0257$), insignificant ($p>0.05$) correlation, this indicates that, along with each of the other reliable factors, there is no influence on SCS for the sample group.

In setting hypothesis that there exists a significant relationship between personality as measure by the 16PF and SCS among CDSDs, the researcher aimed to draw a sound conclusion after conducting a correlation analysis of each of the personality factors against SCS as the dependent variable. After discarding the previously discussed factors due to a lack of acceptable reliability, those that remained were analysed as discussed above, with the results of each factor analysis establishing that partially significant relationships exists between certain factors and SCS. This allows the researcher to conclude that H_1 is to be partially rejected.

Hypothesis 2: There exists a significant relationship between hardiness and SCS

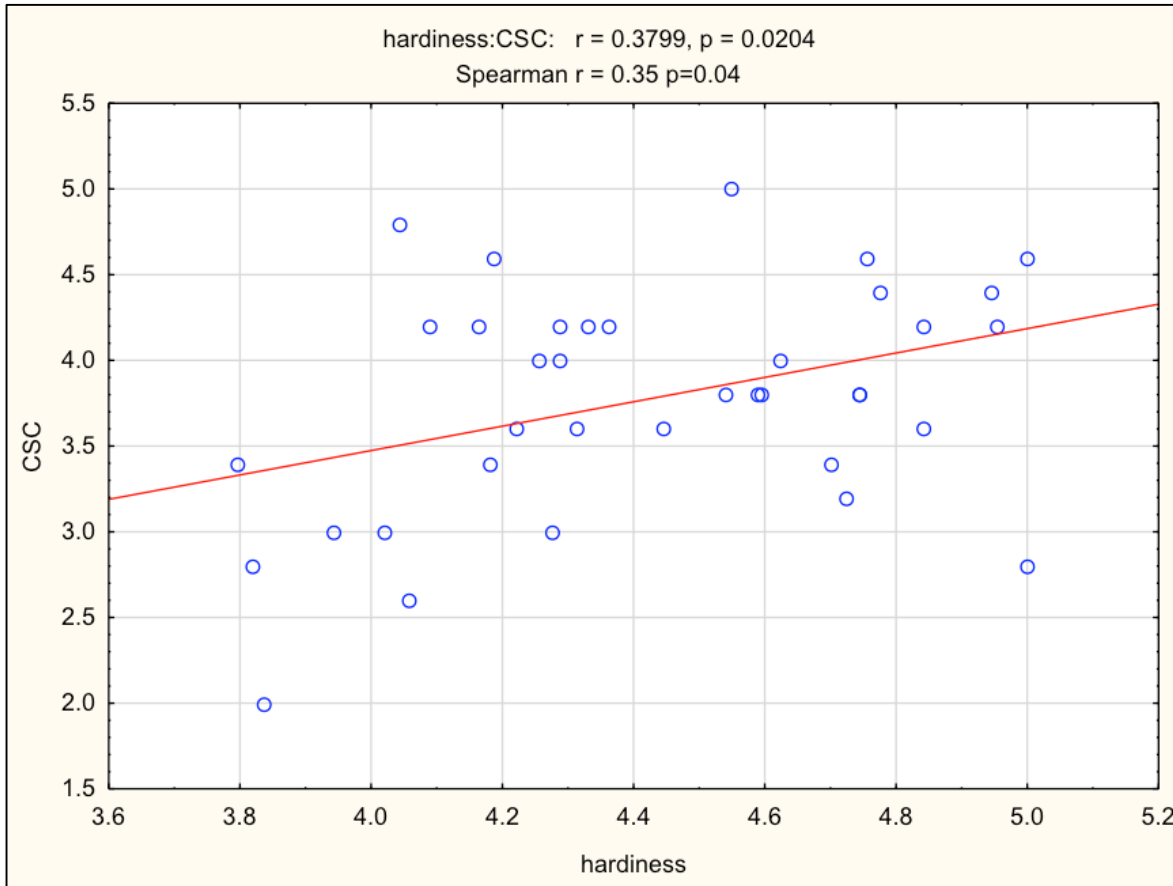


Figure 4.14 Scatterplot of hardiness and SCS

The results in Figure 4.14 illustrate a moderate linear but significant correlation between hardiness and SCS ($r=0.3799$; $p<0.05$), allowing the researcher to reject the null hypothesis and conclude that H_2 is to be accepted – as one's level of hardiness increases, so too does their level of SCS.

Hypothesis 3: There exists a significant relationship between resilience and SCS

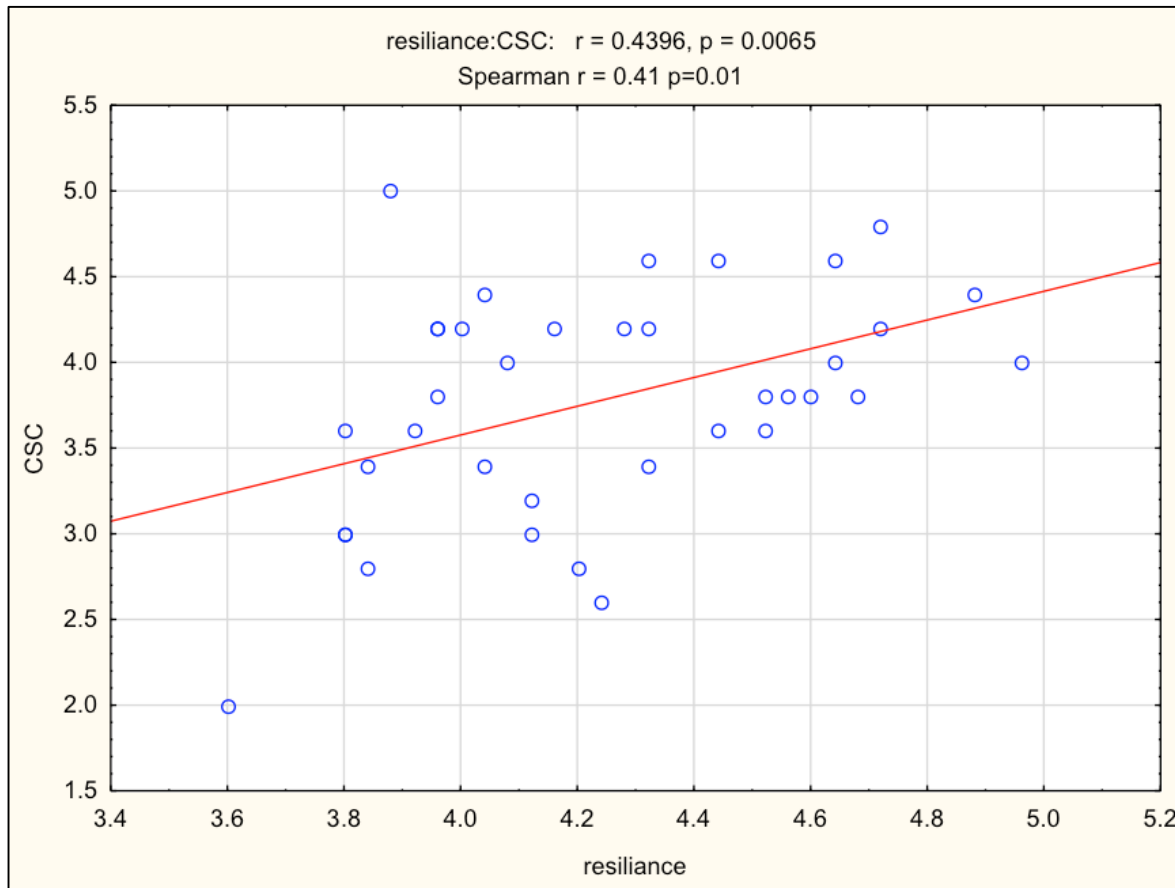


Figure 4.15 Scatterplot of resilience and SCS

The figure above (Fig. 4.15) indicates a moderate and significant correlation between resilience and SCS ($r=0.4396$; $p<0.05$). This allows the researcher to conclude that the increase in the level of resilience held by the CDSD will result in an increase in SCS. H_3 was therefore accepted.

Hypothesis 4: There exists a significant relationship between Grit and SCS

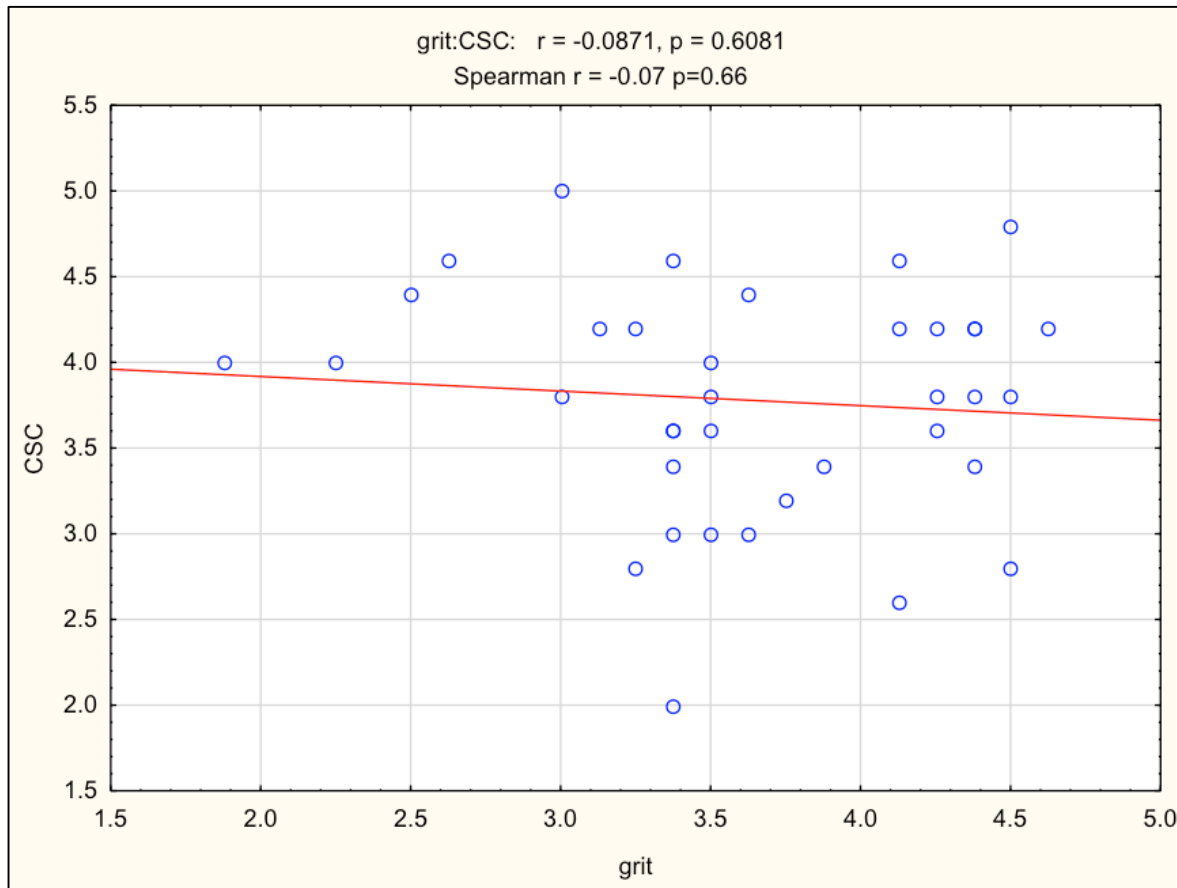


Figure 4.16 Scatterplot of grit and SCS

Figure 4.16 depicts a negligible negative and insignificant correlation between Grit and SCS ($r=-0.0871$; $p>0.05$). Due to the insignificance of the correlation, H_4 was rejected, meaning that there does not exist a significant relationship between grit and SCS among the sample group.

4.4.2 Inter-correlation analysis between constructs

Following the above investigation of the relationships between each independent variable and the dependent variable, SCS, the researcher wishes to further explore the remaining research questions posed in the introduction to the study (see par. 1.2). Hypotheses were formulated as to the inter-correlations of the independent variables. Each will be discussed accordingly.

Hypothesis 5: There exists a significant relationship between hardiness and resilience

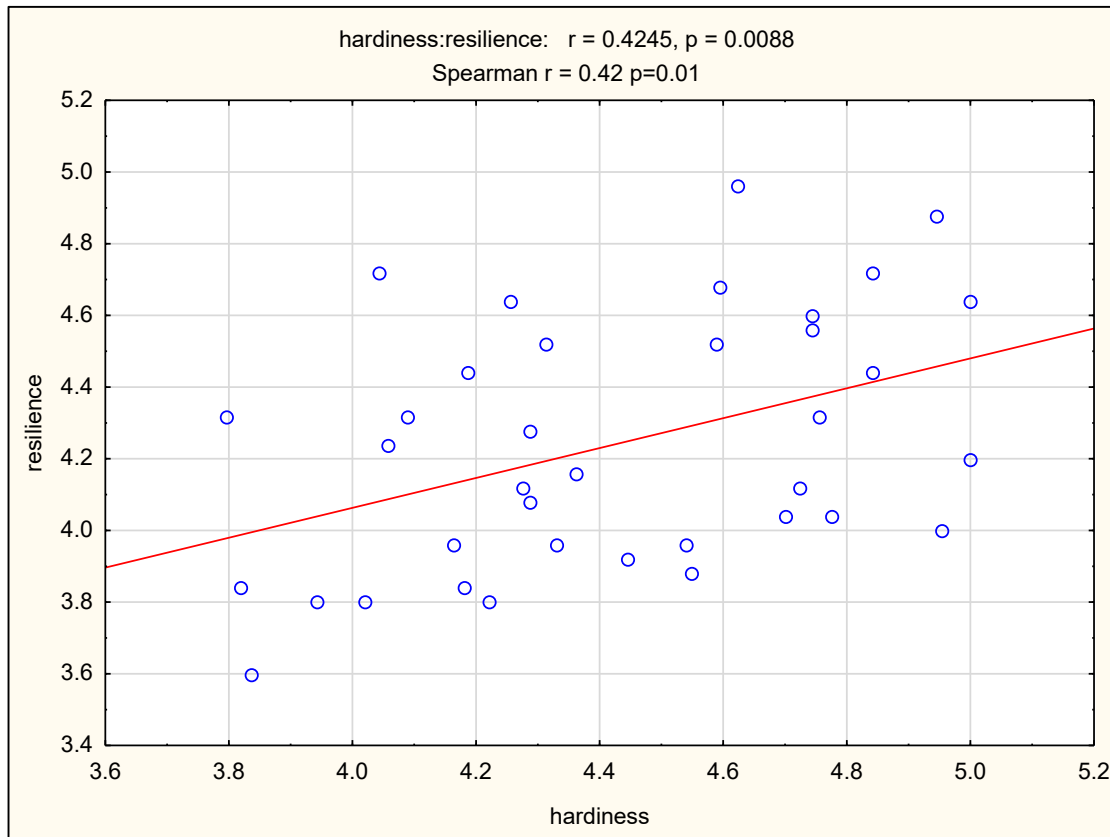


Figure 4.17 Scatterplot of hardiness and resilience

The correlation analysis above (Fig. 4.17) indicates that there exists a moderate ($r=0.4245$), significant ($p<0.05$) positive correlation between hardiness and resilience. This allows the researcher to conclude that as one's level of hardiness increases, so too does their level of resilience. Thus, H_5 is accepted.

Hypothesis 6: There exists a significant relationship between grit and resilience

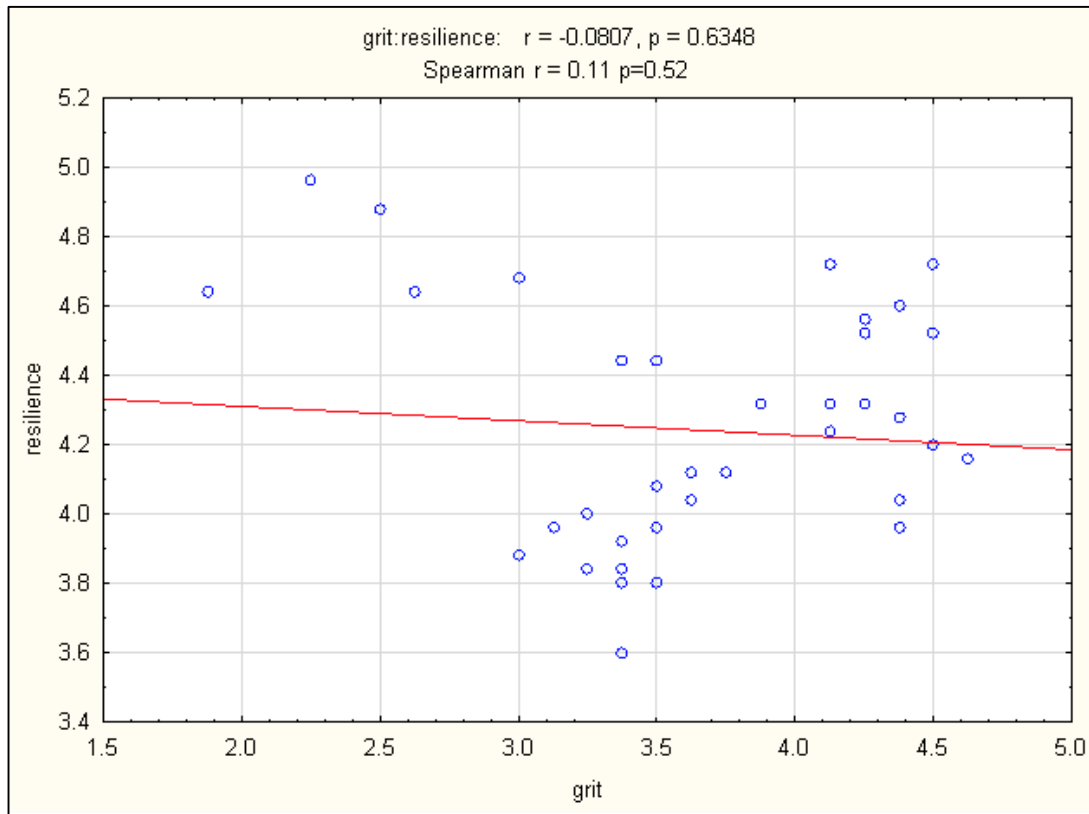


Figure 4.18 Scatterplot of grit and resilience

The results in Figure 4.18 illustrate a moderate but insignificant relationship between grit and resilience ($r=0.0607$; $p>0.6348$), meaning that the researcher is forced to reject the hypothesis (H_6) and state that there exists no significant relationship between grit and resilience.

Hypothesis 7: There exists a significant relationship between personality and resilience

Each of the established reliable factors contained in the 16PF were analysed for correlations with resilience. For ease of display, the results have been captured in Table 4.6.

Table 4.6

Correlation analysis: personality and resilience

Factors	r-value	p-value
B: Reasoning	0.05	0.75
C: Emotional Stability	0.27	0.10
F: Liveliness	0.36	0.03
H: Social-Boldness	0.36	0.03
N: Privatness	0.16	0.33
O: Apprehension	0.13	0.44
Q2: Self-Reliance	0.25	0.13
Q3: Perfectionism	0.04	0.83
Q4: Tension	0.15	0.37

In exploring the results of the analysis, it can be surmised that there exists one such results that warrant discussion. With a moderate correlation ($r=0.3633$) and an indication of significance ($p<0.05$), Factor F (Liveliness) can be accepted as having a positive, significant relationship with resilience. Similarly, Factor H (Social-Boldness) can be said to positively, moderately correlate with resilience based on the results obtained ($r=0.3633$; $p=0.0271$). Taking into consideration that significant correlations were found between resilience and only two of the 16 variables, the researcher is of the opinion that there does not exist sufficient data to conclude that personality as a whole has been found to correlate with resilience, though the two aforementioned factors do indeed show a positive significant relationship. Therefore the hypothesis is partly rejected, indicating no relationship exists as applied to the sample group in 14 of the 16 factors.

Hypothesis 8: There exists a significant relationship between hardiness and grit

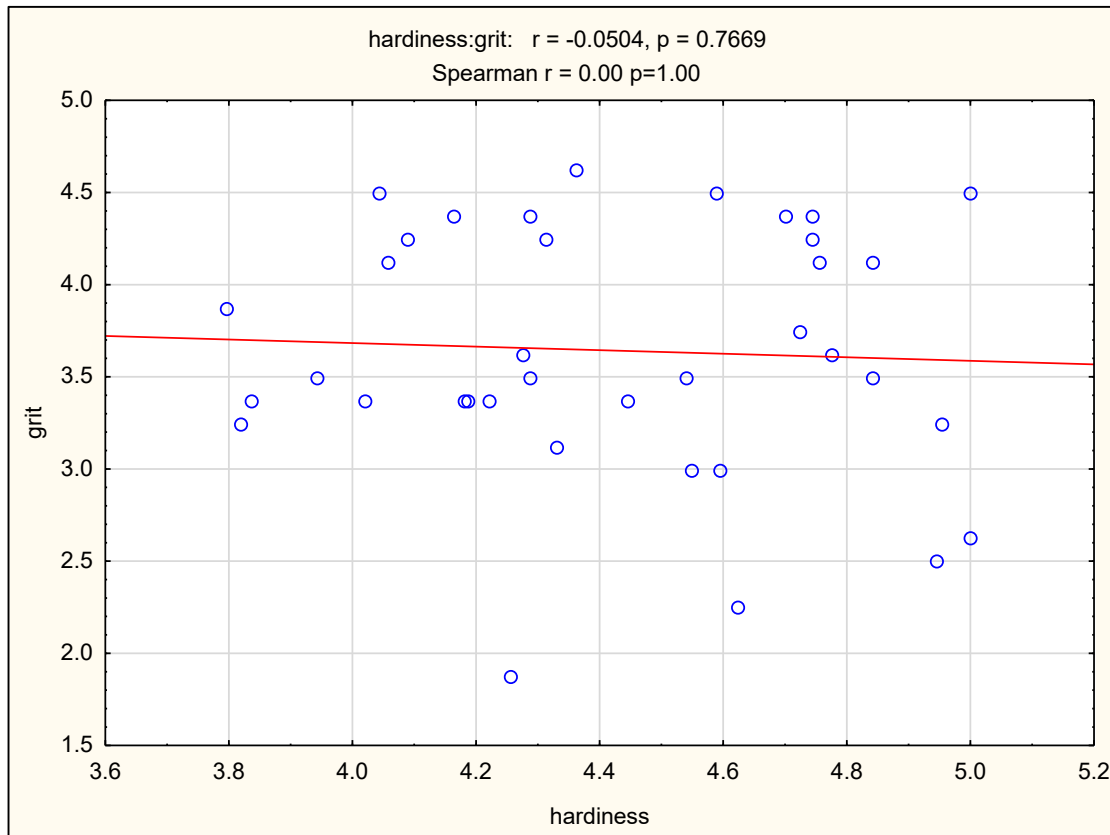


Figure 4.19 Scatterplot of hardiness and grit

The results as presented above (Fig. 4.19) indicate that there exists a negative negligible ($r = -0.0504$) and insignificant ($p > 0.05$) correlation between hardiness and grit. This indicates that no significant relationship exists, and as such H_8 is rejected.

Hypothesis 9: There exists a significant relationship between personality and grit

Table 4.7

Correlation analysis: personality and grit

Factors	r-value	p-value
B: Reasoning	0.38	0.02
C: Emotional Stability	0.01	0.98
F: Liveliness	0.21	0.20
H: Social-Boldness	0.19	0.25
N: Privateness	0.38	0.02
O: Apprehension	0.27	0.11
Q2: Self-Reliance	0.02	0.90
Q3: Perfectionism	0.15	0.37
Q4: Tension	0.26	0.11

The results in Table 4.7 indicate that there exist two significant correlations from among the factors tested against grit. Factor B (Reasoning) is shown to be moderately, positively correlated to grit, with significance established through the p-value obtained ($p < 0.05$). Factor N (Privateness) represents the only other relationship warranting discussion, with significance established ($p < 0.05$) and moderate correlation indicated by the results (0.38). The researcher therefore concludes that the two aforementioned factors are accepted and the remaining rejected, resulting in a partial rejection of H_9 .

Hypothesis 10: There exists a significant relationship between personality and hardiness

Table 4.8

Correlation analysis: personality and hardiness

Factors	r-value	p-value
B: Reasoning	0.12	0.50
C: Emotional Stability	0.10	0.55
F: Liveliness	0.02	0.91
H: Social-Boldness	0.02	0.93
N: Privatness	0.11	0.52
O: Apprehension	0.25	0.14
Q2: Self-Reliance	0.00	0.98
Q3: Perfectionism	0.07	0.69
Q4: Tension	0.01	0.96

As evidenced by the results shown in Table 4.8, none of the personality factors yielded significant ($p < 0.05$) correlations with hardiness. It can therefore be established that no significant relationship exists between personality and hardiness and as such, H_{10} is rejected.

4.4.3 Investigation of mediating effect

The researcher employed the Sobel Test to investigate whether any of the combination of independent variables that had acceptable Cronbach's alphas presented a mediating effect on SCS, as the dependent variable. This notion was explored as the final hypothesis for the study, and included testing 21 different combinations, as shown in Appendix A. The results are thus discussed with reference to the hypothesis accordingly.

Hypothesis 11: There exists a mediating variable between the significantly correlated independent and dependent variables (see appendix A).

Each of the combinations investigated are represented as above, with column's 1 and 2 illustrating the combinations employed. Of particular importance in this examination is the p-values for the combinations, represented in column 6. In order for any form of significant mediation to be concluded, this p-value should be less than 0.05. Perhaps the only combination warranting mention is shown in line 10, which analyses the specific subscale (*commitment*) of the AMHS scale as the independent variable, and resilience as the potential mediator on SCS. This analysis yielded a p-value of 0.1, which approaches the threshold deemed acceptable ($p < 0.05$). That said, said value does not indicate significance of the mediator's effect, and as such it can be concluded that there exists no mediating relationship affecting the dependent variable. The hypothesis is therefore rejected. The vulnerability created by the smaller sample size will be explored as a possible explanatory note for this finding (see par. 6.2).

4.5 CHAPTER SUMMARY

The purpose of this chapter was to present the results of this inquiry, beginning with descriptive statistics of the sample as well as presenting the measures of central tendency for the variables in question. The scales and subscales were subjected to a reliability analysis and presented accordingly, followed by correlational analysis stemming from the primary use of the Pearson correlation coefficient. Inter-correlations between the various independent variables were explored and those bearing significance highlighted. This allowed the

researcher to evaluate the hypotheses as presented, resulting in moderately significant correlations being found between hardiness and SCS, hardiness and resilience, personality factor B (Reasoning) and grit, personality factor F (Liveliness) and resilience, personality factor H (Social Boldness) and resilience, and personality factor N (Privateness) and grit. The implications to be drawn based on the results obtained from this chapter will be discussed in detail in the following chapter, distinguishing between the measures of central tendency and the inferential statistical results. The researcher will include in this discussion an exploration of the posited limitations and vulnerabilities associated with the study, as a means of offering a deeper insight into the results.

CHAPTER 5

DISCUSSION OF RESULTS

5.1 INTRODUCTION

The results that were presented in Chapter 4 will be discussed in this chapter, mirroring the manner in which said results were presented so as to maintain a logical flow. The discussion begins with descriptive statistics, including the minimums values, maximums values, means and standard deviations for each of the scales and subscales shown to have acceptable Cronbach's Alpha's (see Table 4.3). Finally, inferential statistics will be examined taking into account the correlation coefficients as they pertain to the data set, applying such to the each of the 11 hypotheses (see par. 3.2) in question.

5.2 DISCUSSION OF MEASURES OF CENTRAL TENDENCY

Considering the scoring metric for hardiness totalling out of 5, the minimum value of 3.8 and maximum value of 5 (see Table 4.1) indicate that even the lowest scoring individual in the data set still possessed an indication of hardiness. The very low standard deviation of 0.35 illustrates a very slight dispersion of the possession of hardiness among the CDSDs, and the mean score of 4.43 further allows the researcher to conclude that all of the sample group possess a heightened level of hardiness, and that the average CDSD is a significantly hardy individual.

This conclusion supports the literature (see par. 2.5) suggesting that person's adept at handling situations that are considered stressful possess a higher level of hardiness – allowing them to better handle personal stressors (Azeem, 2010). These include but are not limited to those associated with work-family balance, better understanding and handling occupational roles and stressors and dealing with issues relating to motivation in a their specific work environment. This supports the supposition that CDSDs are hardy in their make-up, and allows them to better handle the somewhat unique elements of their occupation,

buffering them against feelings of powerlessness, being separated from one's family, and boredom (Bartone, 1999a).

The Grit-S scale with a minimum value of 1.88, a maximum of 4.63 and a mean of 3.64 illustrates a few outliers on the lower end of the spectrum - deviating considerably from the mean value. The standard deviation for the scale measures at 0.68, which is relatively low for the scale, and shows that the average CDS scored within this range either below or above the mean. The mean value itself, at 3.64, indicates an elevated level of grit among the sample group.

The literature (see par. 2.7) indicates that possessing grit is positively associated with the ability to unflinchingly pursue specific goals with a concerted effort to attain them, even in the face of considerable obstacles and over a course of many years (Maddi et al., 2013). Gritty CDSs are able to endure the considerable demands of their work environment (see par 2.3) through possessing the ability to 'stay the course', even in the absence of positive feedback (Duckworth & Quinn, 2009) and regardless of the presence of latent or honed talent (Duckworth et al., 2007). These higher levels of grit allow the CDS to endure the often physically demanding work through viewing work related goals as being more valuable and therefore will be more prone to elevated physical exertion and tolerance in achieving them (Silvia et al., 2013). The persistence of grit cross-culturally, and the emphasis on maintaining focus and zeal through long-term goal orientation makes this attribute a useful tool in the CDSs arsenal, setting him apart from the less gritty in a field that is riddled with immense and varying demands and volatility.

The CD-RISC scale yields a result out of 100 (see par. 3.5.3), with the higher score indicating a greater presence of resilience. The mean value of 81.03 shows that the sample group possess a significant heightened level of resilience. Even the lowest scoring incumbent, represented by the minimum of 65 shows the possession of resilience, and the maximum value of 99 illustrates a significant representation of the characteristic within the sample. The low standard deviation of 8.71 bolsters the supposition of the sample possessing high levels of resilience.

CDSs, through being resilient, are able to leverage their interpersonal resources to adjust to stressors. As a proactive source, resilience allows CDSs the ability to employ their cultural, social and psychological resources to address failure through bouncing back from adversity, conflict and uncertainty faced in their occupation (Luthans, 2002). They are able to selectively utilise their interpersonal relationships to allow them the support necessary to positively adjust to their family separation and threats of danger associated with their work environment. Having the ability to cope with these situational stressors assists in avoiding the onset of symptoms associated with clinical distress, including depression, anxiety and stress (Armstrong et al., 2011).

Subjective career success, also measured by a score out of 100, was experienced by CDSs, as represented by the mean value of 75.57. The standard deviation of 13.29 suggest that the minimum score of 40 represents an exception to the rule, with the maximum of 100 illustrating an extreme representation.

CDSs have a positive view of their career attainments, positively assessing their value as an employee, their self-worth, capacity to perform within their roles and a general satisfaction with their career (Stumpf & Tymon, 2012). They have heightened levels of competence, self-esteem, responsibility and the skills and knowledge associated with CDS (Schreuder & Coetzee, 2011). They exhibit a more proactive role in planning and managing their careers, which is particularly crucial within the CDS industry, owing to the occupational challenges associated with retaining employment during tumultuous economic conditions affecting the oil and gas industry (see par. 2.3) (Spurk et al., 2015). They are less likely to experience job burnout (Dyke & Duxbury, 2011) and possess an attitude that more closely assimilates with the goals and values of the organisation, as well as an increased effort to emulate them.

Seven of the 16 personality subscales yielded Cronbach's alpha's deemed unacceptable (see Table 4.3) and therefore the results derived therefrom unreliable. The researcher proposes that there are numerous possible reasons for the yielding of these unreliable results. As is explored in the literature (see par. 2.3), CDSs face many and varying challenges in their occupation, affecting them physically, mentally and emotionally. Theirs is an occupation predicated on demand derived from the fluctuations of, predominantly, the oil and gas industry, and as such the lack of job security proves to be a considerable stressor (R. Herbst,

personal communication, July 31, 2017; T. Skelton, personal communication, June 28, 2017; R. Logan, personal communication, October 7, 2013). This results in several implications that will be explored in order to explain the anomalies in the results yielded within the personality test (see par 5.4.1). Each of those subscales considered reliable will be discussed accordingly. The first of the reliable subscales within the 16PF to be discussed is Factor B: Reasoning. A mean score of 5.35 (out of 10) represents a relatively negligible lean towards the concrete versus abstract reasoning, and indicating that the sample marked little over half of the reasoning questions correct. The range between the minimum value (1) and maximum value (10) illustrates a large variety in reasoning skills. Cattell et al. (2006) suggest lower scores than expected may be a result of numerous factors, including a lack of motivation to spend the requisite time on figuring out the correct answers, and a lack of understanding of the items, instruction and interpretations for non first language English speakers (see Fig. 4.4).

Factor C: Emotional Stability yielded a mean score of 5.57, a minimum of 1 and maximum of 9. CDSDs showed a tendency to take life in their stride and to adopt a balanced and adaptive means of coping with their emotions. As opposed to reacting to the incidents faced in one's life, CDSDs tend to make more proactive choices in managing their lives subsequently bolstering emotional well-being, which is complemented by the discussion of SCS with regards to proactive management of ones career (Cattell et al., 2006).

Liveliness, as represented by Factor F, with a mean score of 4.7 indicates a tendency towards the lower end of the pole, associated with being more serious as opposed to lively. This shows that CDSDs tend to inhibit their spontaneous reactions to various occupational circumstances, being more cautious and less playful and generally tending to take life more seriously and being regarded as more mature. This resonates closely with the serious nature of their work environment, allowing caution to guide their behaviour in a manner suitable to avoiding potentially harmful and negligent behaviour whilst on board the dive platform (Cattell et al., 2006).

Factor H: Social Boldness, with a mean score of 5.3 leans towards the higher end of the spectrum characterised by little fear in social situations and a tendency to being more adventurous in interpersonal interactions, even tending towards dominance (Cattell et al.,

2006). This supports not only the researchers personal experience with members of the sample group, but the various personal correspondence (R. Herbst, personal communication, July 31, 2017; T. Skelton, personal communication, June 28, 2017; R. Logan, personal communication, October 7, 2013) with the members thereof.

Higher scores of Privatness (Factor N), are described by Cattell et al. (2006) as the tendency to less readily disclose personal details about themselves to others, being seen as more personally guarded. The mean value of 5.51 indicates a more private orientation of CDSDs, with the reluctance of potential candidates to become involved in the study (see par. 3.6) supporting this finding. The volatile nature of job security within this profession (see par. 2.3) may contribute towards this tendency, manifesting a fear of being ousted for revealing disdain with their work situation as a threat to their security within the organisation (Cattell et al., 2006).

Factor O: Apprehension, with a mean score of 5, results in a negligible slant towards the negative side of the spectrum, characterised by being more self-assured as opposed to feeling inadequate and apprehensive. Whereas extremely high scores may be detrimental to opportunities for self-evaluation and therefore improvement, the lower negative affiliation illustrates a healthy balance between being confident and having the necessary awareness to anticipate dangers and recognise how their actions may have certain consequences (Cattell, et al., 2006).

Factor Q2: Self-Reliance, yielded a positive mean score of 5.3. This indicates a general enjoyment of time alone and self-reliance when it comes to decision-making. This would be considered a rather apt characteristic for CDSD within their typically isolated work environment, including a diverse cultural make-up often resulting in a lack of kinship and communication among peers (see par. 2.3).

Higher scores of Perfectionism (Factor Q3) indicate that the participants tend to be more organised and wish to plan ahead, feeling more comfortable in more structured and predictable environments. The mean score of 5.57 could explain why the CDSDs find challenge in their work environment – with the lack of stability and presence of ambiguity within their work environment (see par. 2.3). Extremely high scores may be construed as

individuals being inflexible, which would only lead to a more pronounced dissatisfaction within the work environment.

Finally, Factor Q4: Tension yielded a mean score of 5.49, meaning that CDSDs are able to focus their tension effectively and may motivate them to act. Extremely high scores, although not illustrated here, may be problematic in leading to irritability and impatience, which may lead to ineffective coping with the many stressors associated with the CDSD working environment (Cattell et al., 2006),

5.3 DISCUSSION OF CORRELATION RESULTS

This discussion is aimed at interpreting the results of the correlations drawn through the correlation analysis conducted.

5.3.1 Relationship between personality and SCS

To initiate the discussion of these results, the researcher wishes to suggest potential reasons for the lack of reliability yielded with certain subscales.

- With the largely unregulated labour laws within the industry (see par. 2.3.5), many CDSDs see themselves working up to 12 hours a shift (a day), 7 days a week whilst on board the dive platform (R. Logan, personal communication, 7 October, 2013). Thankfully, their possession of resilience, grit and hardiness allow them to function as optimally as can be expected within these conditions, but this results in the fact that the only break they have from the workplace is when they are off the platform, or 'out of rotation' as such. The researcher understood that the 'free time' enjoyed by the CDSD is extremely valuable to them, with many refusing participants indicating that an hourly wage in line with their CDSD rates would be the only acceptable exchange of value for the involvement in this study, essentially *buying* their time. The CDSDs within the sample group bear no exception, and their presence and willingness to complete the battery of measures utilised in this study was done so through leveraging personal

favours, networks and attempting to employ considerable influence. This may have resulted in a general lack of attentiveness and thorough application to the questionnaires, with particular reference to the 185 item 16PF – proving to be lengthy and somewhat tedious for the sample group. The researcher believes that, although best practices were employed in administering the battery, the sample may have neglected to give the necessary attention and thought into their responses over time, and as such may have resulted in anomalies affecting the subscales in question.

- The sample group exhibited a majority composition (see Figure 4.4) of non first language English speakers (57%). The 16PF, being delivered in the English version, may have proved problematic in the understanding of certain items – possibly leading to an incorrect representation and subsequent understanding of the sample's intended response and therefore affecting the inter-item reliability within the subscales affected.
- The version of the 16PF administered was designed and applied for a South African audience. This has implications on the grammatical nuances included in the items, as well as idiomatic expressions and adaptations of whole words (Cattell et al., 2006). With 32% of the sample being non South African (see Figure 4.3), it is possible that the semantic referencing contained in certain items was not applicable or suitable for the cultural composition of these members.

The resultant seven unreliable factors, due to the reasoning offered above, forces the researcher to reject the ability to test personality as a construct in its entirety (an amalgamation of the 16 factors) against any of the other constructs, as no valuable conclusions can thus be made about the correlation, if any existed. Of the 9 subscales that yielded reliable Cronbach's Alpha's, not a single factor exhibited a significant relationship with the experiencing of SCS among the sample group. This is illustrated in the results by the insignificant ($p > 0.05$) p-value's derived from the correlation analysis (see table 4.5).

5.3.2 Relationship between hardiness and SCS

Figure 4.14 shows a significant, moderate relationship between hardiness and SCS, allowing the researcher to accept the hypothesis that the experiencing of SCS will increase as hardiness increases. The exploration of hardiness in the literature (see par. 2.5) includes the

observation by Maddi et al. (2012) that as an intra-psychic ability, possessing hardiness allows the CDSD an inner ability to appropriately adjust to their stressful circumstances, allowing them to turn potential stressors into opportunities for growth. Being able to effectively navigate the obstacles associated with their career, resulting from elevated hardiness, leads to an increased perception of achievement and satisfaction among CDSDs, which is cited as a significant contributor to SCS (Pretorius & Morgan, 2010). Through mastering the three subscales making up hardiness (challenge, commitment and control), CDSDs are able to directly influence their personal outlook on their careers. Overcoming the *challenges* associated with their career can be associated with a positive appraisal of their self-worth and capabilities, which is cited by Stumpf and Tymon (2012) as a measure of SCS. *Commitment* associated with possessing hardiness allows the CDSDs to become more actively involved in positively changing and adjusting to their occupational circumstances as opposed to withdrawing from them (Maddi, 2010). This allows CDSDs an opportunity to more positively understand and perceive their job characteristics, support structures and expectations placed on them, which all contribute to heightened SCS through establishing a greater bond between the CDSD and their organisation (Dyke & Duxbury, 2011). The *control* dimension of hardiness refers to the perceived influence that one is able to exert over their circumstances (Kobasa, 1979; Kobasa, Maddi & Kahn, 1982; Maddi & Kobasa, 1984). This is particularly relevant when considering Volmer and Spurk's (2011) assertion that individuals who play a more proactive role in planning and managing their careers achieve a higher perception of career satisfaction and, therefore, success than their more passive counterparts. This feeling of control may also result in the belief that the CDSD has a greater influence over their capacity to pursue behaviours that will contribute to personal development, which directly contributes to SCS (Schreuder & Coetzee, 2011; Callanan & Greenhaus, 2006; Pretorius & Morgan, 2010).

5.3.3 Relationship between resilience and SCS

In exhibiting a significant relationship between resilience and SCS (Figure 4.15) the results allow the researcher to accept the H₃. Resilience is seen as being reactive as opposed to proactive in that allows an individual the ability to employ their psychological, social and cultural resources in bouncing back from failure, conflict, uncertainty and adversity

experienced during stressful situations (Luthans, 2002). The literature (see par. 2.6) sets it apart from hardiness by suggesting that this trait is not intra-psychic but rather more interpersonal in nature. This bears relevance to the importance of the ability of the CDSD to make use of their support structures (through leveraging family systems for example) in coping with their work-related stressors. Resilient CDSDs are better able to strengthen and grow professional networks through relationship building, which in turn may influence their job mobility and sense of self-worth – both important perceptions that contribute to SCS. Resilience allows CDSDs to respond and adjust to adversity in a positive manner (Cowen, 2001), and would increase their personal perception of achievement, competence and self-esteem, leading to SCS (Stumpf & Tymon, 2012). Riordan and Louw-Potgieter (2011) suggest that SCS is significantly influenced by the CDSDs perception of the job characteristics and content, which may include workload, organisational support and safety concerns. Taking this into account, the ability to leverage interpersonal avenues in establishing better support structures, which is a cornerstone of resilience, is particularly relevant. Bandura (as cited in Luthans, 2002) suggests that training programs can be instituted to foster resilience within individuals, and the correlation between resilience and SCS illustrated through this study bolster the relevance of instituting such within the CDSD occupation.

5.3.4 Relationship between grit and SCS

Figure 4.16 shows insignificant results in the correlation analysis between grit and SCS, and therefore H₄ was rejected. Although the results illustrated a prevalence of grit within the sample group (see par. 5.2), the size of the sample group (n=37) can be cited as a potential vulnerability, leading to a lack of correlation in this measure between grit and SCS. The researcher elaborated upon the challenges surrounding the attraction of a larger sample group at length (see par. 3.6), which the researcher asserts is a contributing factor in the lack of a suitable correlation being found.

5.3.5 Relationship between hardiness and resilience

The results displayed in Figure 4.17 show an acceptance of H₅, indicating that a significant relationship exists between hardiness and resilience. The literature review (see par. 2.6) illustrates the distinguishable characteristics of both constructs being an intra-psychic (hardiness) versus interpersonal (resilience) orientation within the incumbent. CDSDs, being shown to possess both traits through this study (see par. 5.2), have the ability to harness both their innate predisposition as well as their ability to leverage personal networks to suitably adjust to challenging circumstances and bounce back from adversity. In Rutter's (2009) exploration of resilience, he found that the possession of an innate intra-psychic ability within children would heighten the potential to result in the formation of hardiness, which would better allow them to develop resilience later on in life. This notion can be applied to CDSDs through the suggestion that their possession of hardiness on an innate level, would better allow for them to establish the interpersonal relationships and networks to assist in their coping of challenging stressors and circumstances. This correlation is well established by Maddi (2013), who suggested that the three pillars of hardiness naturally contribute to problem-solving activities, engaging in socially supportive interactions and taking measures aimed at self-care. Heightened levels associated with *challenge* allow CDSDs to accept that their work environment is naturally stressful, *commitment* keeps them actively involved in the goings on around them and *control* allows them the ability to seek to make the situation into an advantageous one. These combined attributes that make up hardiness result in CDSDs being able to effectively cope with and learn from their stressful surroundings, said phenomena resulting in being considered resilient.

5.3.6 Relationship between grit and resilience

The results displayed in Figure 4.18 have forced the researcher to reject H₆ and state that no significant relationship exists between grit and resilience. In a similar vein to the rejected fourth hypothesis (see par. 5.3.4), and in light of the challenges associated with the size of the sample group (see par. 3.6), the researcher suggest that the few number of items (eight) within the Grit-S also has a negative impact on the finding of a correlation between these 2 construct (M. Kidd, personal communication, May 17, 2017). The vulnerability resulting from

the brevity of this measure warrants a potential exploration of creating a more robust questionnaire.

5.3.7 Relationship between personality and resilience

Of the established reliable factors within the 16PF, Factor F (Liveliness) and Factor H (Social-Boldness) were both shown to have significant, positive correlations with resilience (see Table 4.6). Regarding Liveliness, CDSs tendency toward taking life more seriously, adopting a mature and inhibiting their spontaneity allows them to more appropriately focus on their interpersonal relationships (Cattell et al., 2006). By viewing these interactions not simply as playful but as a resource for coping with the stressors associated with their occupation CDSs are more readily able to establish goals for these relationships and leverage them towards meeting their psychological and emotional needs, which leads to becoming more resilient (Poppy et al., 2009).

Being more socially bold allows the interactions that take place between CDSs and their peers and colleagues to happen more naturally and without fear or shyness. Their predisposition to being more adventurous in their seeking out relationships, when combined with their scoring on the liveliness factor, allow the researcher to conclude that CDSs, although being willing and able to seek out personal relationships and networks, will do so with an understanding that they are to be taken more seriously and in a mature manner, resulting in more meaningful, deeper networks being established that will create a considerable social support systems leading to resilience (Rutter, 1999).

5.3.8 Relationship between hardiness and grit

The eighth hypothesis was rejected based on the results depicted in Figure 4.19, resulting in the researcher concluding no significant relationship exists between hardiness and grit. Again, cited as a considerable obstacle is the sample size owing to challenges faced in collection (see par. 3.7) in combination with the potentially problematic 8-item Grit-S.

5.3.9 Relationship between personality and grit

Table 4.7 displays the correlation results for H₉. Factor N (Privateness) shows a significant, moderate correlation to grit. CDSs, shown to be slightly more private than forthright in their orientation to being personally open (Cattell et al., 2006), correlated with being able to work towards their challenges with a strenuous effort over considerable lengths of time despite facing failure and adversity (Duckworth et al., 2007). The researcher postulates that CDSs, being more private about their feelings about certain situations, particularly pertaining to the perceptions of the work environment (see par. 3.7), realign their focus on the challenges and tasks associated with their occupation – an attribute associated with grit. This correlation necessarily can be looked at from the reverse perspective – that showing this courage and sheer determination in their pursuit of achieving their goals over time results in CDSs becoming more private.

5.3.10 Relationship between personality and hardiness

As depicted in Table 4.8, there exists no significant correlation between the established reliable factors within the 16PF and hardiness. Once more, the author cites the size of the sample group as being instrumental in this lack of correlation.

5.3.11 Evaluation of mediating variables

Appendix A shows that no mediating variable exists within the data set as is applied by the Sobel test (see par. 5.2). This means that none of the established reliable variables in question mediated the effect that any of the independent variables had on the dependent variable. From a u perspective, the size of the sample was not significant enough for this test to potentially yield any significant or meaningful results. This final hypothesis (H₁₁) was therefore rejected.

5.4 CHAPTER SUMMARY

This chapter saw the discussion of the results obtained from the various statistical analyses conducted on the data set, specifically exploring the descriptive statistics and inferential results outlining the different hypothesised relationships.

Significant, mentionable results include the relationships between the dependent and independent variables (hardiness and SCS; resilience and SCS). The inter-relationships between the dependent variables were measured, yielding significant results between hardiness and resilience, personality factor's F (Liveliness) and H (Social-Boldness) and resilience; personality factor N and grit. The application of the Sobel test indicated that no mediating effect was found between the variables tested. The author elaborated on the effects of these findings as they apply to CDSDs, as well as highlighting potential reasons for anomalies encountered.

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The aim of this study was to explore the various relationships that may exist between the psychological construct of personality, hardiness, resilience and grit as they affect the experiencing of SCS in the sample group of CDSDs. These constructs were chosen due to the author's hypothesis that they would be applicable to the success within the CDSD industry, from observations made through personal experience with members of the sample group. The literature highlighted the parallels between the work environments, demands and stressors between that of the military and CDSD, in order to derive meaning from the literature pertaining to the former, to be applied to the latter – a result of the distinct lack of psychological inquiry into CDSD as a whole. The empirical objective of the study (see Fig. 1.1) was scientifically tested to determine the presence and significance (if any) between the dependent and independent variables, as well as the inter-relationships between the former.

The significance of the study can be derived from the empirical results yielded. It is the author's belief that the outcome of this research is crucial in forming a foundation to warrant further research into the psychological make-up of CDSDs. The literature highlighted the effect that possessing heightened levels of hardiness, resilience and grit have on effectively performing and coping with the stressors associated with the harsh working climate of CDSDs. Through revisiting the results, one can conclude that CDSDs do indeed possess heightened levels of hardiness, resilience, grit and the experiencing of SCS. This importance is hinged not only on effective work performance, but can be applied to ensuring the safety and security of all those within the offshore environment. This allows the researcher to conclude that not only are some of bear significant relationships with one another (see Ch. 4), but that their presence allows the sample group to function effectively within their work environment.

Although it was shown that the sample group possessed elevated levels of the constructs hardiness, resilience and grit, the results of this research indicated no mediating effect of

possessing these traits on experiencing SCS, through application of the Sobel Test (see Appendix A).

6.2 LIMITATIONS

The limitations associated with the study are readily apparent in the observation of the sample size. The author elucidated on the method of data collection (see par. 3.6) and the specific challenges associated therewith. These obstacles were unforeseen, and allow the author a revised understanding of the sheer challenges faced with studying such a unique sample group.

Also cited as a limitation is the nature of the measures themselves. Firstly, the of time length required for the battery of measures administered may have detracted from accurate reporting for participants, with particular reference to the rather lengthy 185-item 16PF. The inaccuracy of the results may have also been exacerbated by the first language distribution of the sample group (see Fig. 4.4). Although no participants requested the use of a translator, their respective commend of the English language (or lack thereof) may have manifested itself in a misunderstanding of the syntax and context of the questionnaires – revealing apparent ambiguities in the items. Secondly, the reliance of self-report data from the sources bears with potential distortions, including exaggerated responses, a reluctance to reveal personal information and the prevalence of biases among the sample group.

The length of the items selected, in particular reference to the 8-item Grit-S, was cited as a potential obstacle in the derivation of meaningful and accurate results (see par. 5.3.6; 5.3.8). This has allowed the author to make certain recommendations for further study.

6.3 RECOMMENDATIONS

This research has highlighted the importance of possessing certain psychological traits to ensure sound performance, safety and emotional well being in the field of CDS. The fact that the administering of psychometric screening is not a prerequisite within the selection criteria of these employees is quite frankly, astounding. Considering the responsibility that CDSs bear in the execution of their job – often operating within the oil and gas industry with volatile equipment and materials - illustrates a clear risk to both the environment and personal safety of the CDS and colleagues. This environment leaves very little margin for error, and the opportunity costs for not ensuring that the correct people (of sound qualification and psychological make-up) are placed in these positions is dire to say the least.

It is the author's recommendation that further examination is made into this niche industry and the people that work within it. If standards of entry are recognised and enforced within the industry, this may result numerous positive outcomes, including more productive employees that are equipped to cope with the significant stressors of the environment, and a reduced occurrence of accidents, loss of life and potential damage to the environment resulting from human error.

Specifically, it is the author's recommendation that the following areas be further explored in the potential formation of a training regime for both current CDSs and would-be CDSs that are seeking to gain entry in the job market:

- Stress management programmes aimed at both identifying the most prevalent stressors within the CDS work environment and equipping incumbents with the ability to manage exposure to such.
- Cultural diversity training – owing to the diverse make-up of the employee contingent on board the dive platform, understanding certain cultural nuances and means of managing such is crucial in ensuring sound interpersonal and professional relationships and means of communication.
- Specific training to bolster hardiness, and resilience within the CDS community would be beneficial in allowing them to better manage and handle the stressors associate with their occupation, and the positive repercussions derived therefrom would

potentially not only lead to a greater productivity, but may even save lives and thwart the damage to eco-systems and the environment.

- A more in-depth evaluation of grit and the Grit-S would ensure that even smaller sample groups may be able to yield more accurate results. Training in line with this would warrant further exploration to be applied in a similar vein as with hardiness and resilience.
- Family support programmes, structured and managed by the host organisations would serve to create a network that CDSDs could rely upon in their stress management, and may lead to a mitigation of the experiencing of stress related to family concerns.
- Risk management training should ideally become mandatory for all within the occupation in an effort to understand recognition and prevention thereof whilst on board

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APPENDIX A: Sobel Test

	1	2	3	4	5	6	7	8
	Independent variable	Mediator	Dependent variable	Indirect effect	z-value	p-value	Bootstrap 95% CI lower	Bootstrap 95% CI upper
1	resilience	grit	SCS	0.01	0.28	0.78	-0.18	0.14
2	resilience	hardiness	SCS	0.19	1.27	0.20	-0.07	0.64
3	resilience	AMH Commitment	SCS	0.22	1.09	0.28	-0.16	0.68
4	resilience	AMH Challenge	SCS	0.06	0.71	0.48	-0.06	0.33
5	resilience	AMH Control	SCS	0.08	0.65	0.51	-0.19	0.44
6	resilience	personality B	SCS	0.01	0.28	0.78	-0.12	0.14
7	resilience	personality Q3	SCS	-0.00	-0.15	0.88	-0.09	0.11
8	resilience	personality I	SCS	0.00	0.19	0.85	-0.12	0.14
9	resilience	personality A	SCS	-0.06	-0.75	0.45	-0.22	0.12
10	AMH Commitment	resilience	SCS	0.32	1.63	0.10	-0.12	0.80
11	AMH Commitment	grit	SCS	0.00	0.01	0.99	-0.13	0.08
12	AMH Commitment	personality B	SCS	-0.01	-0.20	0.84	-0.13	0.12
13	AMH Commitment	personality Q3	SCS	-0.01	-0.26	0.80	-0.16	0.11
14	AMH Commitment	personality I	SCS	-0.01	-0.35	0.73	-0.13	0.11
15	AMH Commitment	personality A	SCS	0.00	0.02	0.98	-0.08	0.13
16	hardiness	resilience	SCS	0.27	1.65	0.10	-0.04	0.63
17	hardiness	grit	SCS	0.01	0.25	0.81	-0.13	0.11
18	hardiness	personality B	SCS	0.02	0.37	0.71	-0.06	0.14
19	hardiness	personality Q3	SCS	-0.01	-0.23	0.82	-0.16	0.10
20	hardiness	personality I	SCS	0.00	0.03	0.98	-0.16	0.15
21	hardiness	personality A	SCS	-0.01	-0.23	0.82	-0.13	0.10