



The relation between personality type and sense of coherence among technical workers

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The rapidly changing environment in which organisations are operating and the subsequent demands on employees to perform as a multi-skilled, flexible and knowledgeable workforce have led to a renewed interest in the role that personality traits play in the workplace. The increasing demands on employees to perform and adapt have also led to the current focus on employee wellness in organisations. The objective of the present study was to determine the relationship between an aspect of employee wellness, namely sense of coherence as measured by the Orientation to Life Questionnaire, and personality type, as measured by the Myers-Briggs Type Indicator. A convenience sample of 100 volunteer participants from the technical division of the Department of Defence was used. It was found that Sensing and Thinking types predominated in the sample. Furthermore, individuals with the Sensing Judging and Extroverted Judging preference styles scored significantly higher on sense of coherence than individuals with the Sensing Perceiving or Introverted Perceiving preference styles. Multiple regression analysis revealed that the Extraversion/Introversion and Judging/Perceiving continuums were significant predictors of sense of coherence. It was recommended that future studies include larger samples that are more representative of all possible 16 personality types. The relationship between other wellness constructs and personality type should also be investigated.

Introduction

The fast-moving environment in which organisations have to operate has become increasingly complex and uncertain, and results in organisations having to adapt to an ever-increasing rate of change (Green & Bisseker 2002; Wiesner & Vermeulen 1997). Moreover, organisations also need to compete in the global market. The era of globalisation calls for a flexible, multi-skilled, knowledgeable, interchangeable and adaptable workforce (Phakathi 2002; Spruce 2003). These demands on organisations have led to a renewed interest in personality traits in industrial and organisational psychology in recent years (Lee & Klein 2002). In agreement with this, Carr, De la Garza and Vorster (2002) state that the attention given to individual personality traits as a means of predicting an employee's behaviour is one of the prominent trends in organisations today.

Another prominent current trend in organisations is the focus on employee wellness, because there has been a recent shift in psychological research from the pathogenic paradigm to a paradigm of health, psychological strength and well-being. This paradigm is called 'fortigenesis' (Wissing 2000). The shift has also spilled over into organisational

psychology and opened up a new field that focuses on positive outcomes, processes and attributes of organisations and their members. Turner, Barling & Zacharatos (2002) argue that for many organisations, the struggle to compete has meant adopting practices that attempt to reduce costs and increase productivity – a mentality that often favours profits over the welfare of people. However, Cotton & Hart (2003) warn that having an efficient and productive organisation is of little value if it is achieved at the expense of staff well-being. The well-being of employees is in the best interests of employers, who spend substantial resources hiring employees and trying to generate products and profits and maintain loyal customers (Harter, Schmidt & Keyes 2003). Schabracq & Cooper (2000) predict that the way in which organisations deal with well-being and stress will become a critical strategic factor in global competition.

This research sets out to determine the relationship between two variables that form part of these two broader emerging trends in organisations, namely

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the focus on personality and employee well-being. Specifically, the research aims to determine the relationship between personality type (as measured by the Myers-Briggs Type Indicator) from which predictions of individual behaviour and sense of coherence are possible. Sense of coherence has been described as one of the most prominent constructs within the wellness paradigm. Wissing & Van Eeden (1997) reach the conclusion that sense of coherence best describes general psychological well-being.

Sense of coherence

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Antonovsky (1987: 19) coined the term 'sense of coherence', which he defines as follows:

The sense of coherence is a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable; that the resources are available to one to meet the demands posed by these stimuli; and that these demands are challenges worthy of investment and engagement.

The definition includes three dimensions that represent the concept of sense of coherence, namely, comprehensibility, manageability and meaningfulness. 'Comprehensibility' refers to the extent to which individuals perceive stimuli from inside and outside themselves as clear, ordered, structured and consistent information, and to the expectation that these stimuli will in future be orderable, explicable and even predictable. The perception the individual has of the stimuli from the environment must make sense cognitively. In other words, the experience of structured and ordered environments makes it possible to anticipate and find structure in future events. 'Manageability' refers to the perception that individuals' life experiences are bearable, can be coped with, or even better still, are challenges that can be met. The 'available resources' in the definition relate to the fact that such resources can be under the individual's own control or under the control of legitimate others who have the power to resolve matters in the individual's interests, such as a spouse, relatives, friends, formal authorities, trade unions, God, a political party, a physician or leaders. This part of the definition therefore means that individuals base manageability on their experiences of control over the environment and they

trust that the challenges posed by everyday life can be met. 'Meaningfulness' refers to the extent to which individuals feel that events make sense to them emotionally, rather than just on a cognitive level. It refers to the sense of importance and value inherent in events and the feeling that these are worth spending energy on. Meaningfulness is therefore the motivational element of sense of coherence (Antonovsky 1987).

There is a close relationship between these three dimensions; however, successful coping is dependent on an overall sense of coherence and cannot be based on any one or two of these dimensions alone (Antonovsky 1987).

Sense of coherence can be seen as an orientation that helps individuals to cope more effectively with stressors in their environment. A strong sense of coherence enables individuals to make sense of stressful life experiences. People are more likely to understand the nature and dimensions of acute or chronic stressors and will consequently define or redefine a stressor in order not to surrender to it. In making sense of stressors, individuals learn through their own life experiences to cope more effectively with stressors. They would therefore also become involved in activities that would promote health and they would neglect endangering situations.

People with a strong sense of coherence would also perceive stressors as manageable. They would therefore select resources at their disposal or those under the power of significant others to deal with a stressor rather than reverting to measures such as helplessness. They assume responsibility for choosing their own destiny amidst stressful life experiences. A strong sense of coherence leads to allocating energy to stressors and seeing them as challenges on which it is worth spending energy. A weak sense of coherence would entail that stressors are perceived as negative and unwanted, and individuals thereby immobilise themselves by doing nothing to change a stressful situation at hand.

According to Antonovsky (1987), sense of coherence not only influences well-being positively, but it also affects how people experience and understand their work environment and job factors. Support for this has been found in other studies (Kalimo & Vuori 1991; Vuori 1994). Strümpfer (1990) elaborates on the effect that sense of coherence would have on the experience of work. A strong sense of coherence would lead individuals:

- To make cognitive sense of the workplace in perceiving the stimuli in the working environment as clear, ordered, structured, consistent and predictable information
- To perceive work as experiences that can be coped with, that are bearable and that are seen as challenges that can be met with personal resources, or resources under the control of legitimate others
- To meet work demands as challenges that are welcome, worthy of engaging in and investing energy in, by making emotional and motivational sense of them.

Kalimo, Pahkin & Mutanen (2002) found that a strong sense of coherence appears to protect workers from strain and thus maintains well-being. Feldt (1997) also found that individuals with a strong sense of coherence appear to be better protected from the adverse effects of certain work characteristics such as pressure of time. Another way in which these patterns of behaviour and differences between people can be viewed is from the perspective of personality type.

Personality type as measured by the Myers-Briggs Type Indicator

Jung (1949) developed a theory of psychological type to explain some of the random differences that can be observed in individual behaviour. His theory of psychological type explains that predictable differences in individuals are caused by differences in the way people prefer to use their minds to take in information, to organise that information and reach conclusions. Personality preferences are therefore defined as reflections of habitual choices between the rival alternatives in the ways information is received and decisions are made (Myers & McCaulley 1992). Jung (1949) also observed that a person is inclined to be drawn towards either the external or the internal world. Katherine Cook Briggs (1875–1968) and her daughter, Isabel Briggs Myers (1897–1980), elaborated on Jung's theory and developed the Myers-Briggs Type Indicator (MBTI) to assess personality differences based on psychological type (Myers 1998). The MBTI thus measures the following preferences of people on four preference scales (Myers & McCaulley 1992):

- The way individuals prefer to relate to others: Extraversion (E) – Introversion (I). Individuals who prefer extraversion tend to focus on the outer world of people and the external environ-

ment. People are chosen as a source of energy, and they prefer to work out ideas by talking them through. Extraverts tend to be sociable and expressive and they derive energy from taking action and interacting with people. Individuals who prefer introversion focus more on their own inner world. Energy is derived by reflecting on thoughts, memories and feelings. Introverts tend to be private and contained and they like to understand the world before experiencing it (Keirsey & Bates 1984; Myers 1998).

- The way individuals prefer to attend to and gather data: Sensing (S) – Intuition (N). People who prefer sensing appreciate the realities of a situation by using their eyes, ears and other senses. They are realistic and practical and are good at remembering and working with a great number of facts. They carefully and thoroughly build towards conclusions, trust their experience and understand ideas and theories through practical application. People who prefer intuition focus on the big picture and try to grasp the essential patterns. They are good at identifying the meanings, relationships and possibilities that go beyond the information for their senses. Such individuals quickly move to conclusions and follow hunches, while having a desire to clarify ideas and theories before putting them into practice (Keirsey & Bates 1984; Myers 1998).
- The way individuals prefer to process data and make decisions: Thinking (T) – Feeling (F). People who prefer thinking decide objectively, based on cause-and-effect reasoning, and make decisions by analysing and weighing the evidence. They solve problems through logic and they seek an objective standard of truth. People who prefer feeling consider what is important to the self or to others, and base their decisions on person-centred values. This results in value-based decision-making related to honouring people. They are characterised as being empathetic with others and strive for harmony and positive interaction with other people (Keirsey & Bates 1984; Myers 1998).
- The way individuals prefer to organise themselves: Judgement (J) – Perception (P). People who prefer a judging attitude tend to live in a planned, orderly way, wanting to regulate life and control it. They prefer to make decisions, come to closure and then carry on. They are time and deadline orientated and like to get things settled and finished. People who prefer perception like to live in a flexible and spontaneous way. They prefer to gather information, while keeping their options open. They prefer to leave things open for alteration and do not like to

follow lists or plans. They feel energised by last-minute pressures, seek variety in experience and do not want to miss out on anything (Keirsey & Bates 1984; Myers 1998).

Extraversion/Introversion and Judging/Perceiving are regarded as attitudes. These attitudes describe where individuals prefer to focus their attention and their orientation towards the external world. Sensing/Intuition and Thinking/Feeling are regarded as functions. These functions describe how people take in information and make decisions.

Individuals display a preference for one of the poles on each of the four preference scales and thus receive a four-letter code that describes their personality. Such a combination of preferences tends to produce a recognisable set of traits and potentialities that indicate a specific personality type. The various possible combinations of these preferences result in 16 different personality types.

MBTI preferences may also interact across indices to form powerful combinations. Keirsey & Bates (1984) describe four possible temperaments based on an MBTI profile. The temperaments may be summarised as follows:

- Idealists – Intuitive Feelers (NF) base their decisions on personal likes and dislikes and focus their interest on possibilities, rather than concrete situations. They have the ability to understand the complexities of communication and want to be respected as unique persons. They tend to lose self-confidence rapidly when receiving negative criticism or disapproval. The values and priorities of others are held above their own – to the extent that they could become over-tired and find little personal time. They excel at working with and through people (Keirsey & Bates 1984; Myers & McCaulley 1985).
- Rationals – Intuitive Thinkers (NT) are logical and ingenious. They focus on possibilities, which are dealt with through impersonal analysis. Their scepticism demands that things make sense, to the extent that they question everything and base their answers on laws and principles. They become dissatisfied when designs and plans are not carried out as desired. Maintenance does not interest them, as they focus on results. They do not enjoy personal comments and are therefore experienced as cold and distant at times (Keirsey & Bates 1984; Myers & McCaulley 1985).
- Artisans – Sensing Perceivers (SP) are good observers of the immediate situation and can be

seen as adaptable realists. They focus on new experiences and facts that have immediate applicability to the present moment, while inwardly they are judging their circumstances. They seek and welcome change and can easily adapt to situations as they arise. They are not threatened by the possibility of failure and therefore take risks boldly. They are excellent problem solvers, and if there are no problems to solve, they can become rigid. They do not use energy to worry about aspects that cannot be changed, and are seen as process-oriented negotiators (Keirsey & Bates 1984; Myers & McCaulley 1985).

- Guardians – Sensing Judges (SJ) are realistic decision-makers with a preference for judging the good or bad in their outward behaviour, while inwardly they focus on facts that apply to the immediate experience. They lend stability and confidence, seek order in their environment, are organised, dependable and conservative. They dislike ambiguity and resist change. Problems are solved through reliance on past experience. They are steady, patient, cautious and careful. Their over-concern with the possibility that things could go wrong uses energy, because they anticipate crises that never occur. They are not always accurate in perceiving interpersonal transactions, which could lead to unnecessary criticism and harshness (Keirsey & Bates 1984; Myers & McCaulley 1985).

The practical utilisation of the MBTI assumes the possibility of predicting the behaviour of an individual in real life situations. Personality influences the appraisal and handling of situations in life and would therefore also yield important information regarding the appraisal of and coping with stressful life situations. Grigsby (2000) demonstrates a relationship between personality (as operationalised by the MBTI) and stress symptomatology and coping styles. Results indicate that ISFJs reported the greatest number of stress symptoms, and INTJs the least. Thomas (2000) designed a study to determine if there were differences in job-related stress levels experienced by human service workers, using personality as the group divider. The personality measure used was the Myers-Briggs Type Indicator (MBTI), and the Job Stress Survey (JSS) was used as the stress measure. The findings support the hypothesis that there is a difference in perceived overall job stress levels between thinkers and feelers.

Apart from using the MBTI to gain knowledge about coping with stressful life situations, it can also be

used to gain information regarding differences of approach to analysing problem situations and even to solving problems. Harrison (1994) hypothesised that subjects of different psychological types would differ in their perceptions of their ability to solve personal problems, and in the number and kinds of problems they experienced; that subjects with positive perceptions of their ability to solve personal problems would experience a different number of problems and different kinds of problems from those who held negative perceptions of their ability; and that there would be an interaction between psychological type and perceived problem-solving capabilities for both the number and kinds of problems respondents would experience. The study sample comprised African American males ($N = 51$) and females ($N = 49$) with graduate degrees. The modal type for males was ISTJ (Introverted, Sensing, Thinking, Judging types) and for females was ESTJ (Extraverted, Sensing, Thinking, Judging types). While the problems experienced by subjects were few in number, there were statistically significant findings:

- Judging types perceived themselves as more effective problem-solvers than Perceiving types, and reported significantly fewer problems than Perceiving types, especially in the areas of health and economic security.
- Subjects with more negative perceptions of their problem-solving capabilities experienced different kinds of problems from those with positive perceptions of their abilities, but on average, experienced about the same total number of problems.

Sense of coherence also describes how individuals perceive and deal with stressors in their environment, as well as how they would view a particular problem situation. Greaves (1998) confirms this by indicating that in a sample of 75 recently unemployed people, those with a higher sense of coherence showed fewer stress-related physical and psychological symptoms. Participants with a higher sense of coherence relied on problem-solving coping strategies, while those with a weak sense of coherence favoured avoidant strategies.

Because both the MBTI and sense of coherence predict coping with stressful life situations and different approaches to problem situations, one would expect a relationship between sense of coherence and certain personality types as measured by the MBTI. Ruiselová & Ruisel (1994) investigated this relationship in a sample of 203 college students. They found that the dimensions EI and SN have no relation to coping as measured by

sense of coherence. In males, dimension J correlated significantly with comprehensibility, manageability as well as an overall sense of coherence. In females, J correlated significantly with meaningfulness (Ruiselová & Ruisel 1995). They investigated various combinations of preferences as measured by the MBTI and found that individuals with the ST combination scored significantly higher on their overall sense of coherence than individuals with the SF combination. They also found that TJ individuals scored higher on comprehensibility, manageability and their overall sense of coherence than individuals with the TF combination. They considered the results of the comparison to be an argument for illustrating the positive effect of the T function in the subjective assessment of the possibility of coping with stressful situations.

Fourie (2000) investigated this relationship in a South African sample of 57 managers from a large financial institution. She found no difference between the sense of coherence scores of any of the 16 personality types. A possible explanation for these results might have been the small sample size and the fact that the different personality types were not equally represented in the sample, with the ESTJ type dominating the sample. However, she found a statistically significant relationship between extraversion and sense of coherence. This result was to be expected, because both extraversion and sense of coherence are related to positive affect (Strümpfer 1997; Watson & Clark 1992).

Many current researchers have been using the NEO Five-Factor Inventory, measuring neuroticism, extraversion, openness to experience, agreeableness and conscientiousness, when researching the relationship between personality and psychological well-being (Harrington & Loffredo 2001). For instance, Hayes & Joseph (2003) found that neuroticism, extraversion and conscientiousness are related to subjective well-being. More specifically, Strümpfer, Gouws & Viviers (1998) found a significant positive relationship between sense of coherence and the emotional stability factor of the Five-Factor Inventory. Ruiselová (2000) furthermore found that sense of coherence was negatively correlated with neuroticism and positively correlated with conscientiousness for males and females. In this specific study, females also showed a positive relationship between sense of coherence and agreeableness. More recently, Coetzee (2003) confirmed that sense of coherence was significantly related to stability, extraversion and openness to experience.

Various researchers have reported that the Intuition (N) type, as measured by the MBTI, is positively correlated with openness to experience, the Feeling preference is positively related to agreeableness, and the Judging preference is positively correlated with conscientiousness (McCrae & Costa 1989; MacDonald, Anderson, Tsagarakis & Holland 1994). Furnham (1996) found similar results, but in addition found a positive relationship between the Thinking preference and conscientiousness, as well as between the Extraversion preference and extraversion.

In view of the foregoing, it was expected that high levels of sense of coherence are associated with the Thinking, Judging and Extraversion preferences as measured by the MBTI, because both show relationships with some of the big five personality dimensions. Furthermore, based on previous research such as that of Grigsby (2000) and Thomas (2000), the authors expected that some types would cope better than others and therefore score higher on sense of coherence. The purpose of the study was therefore to establish whether individuals' sense of coherence depended upon their personality type, as conceived originally by Jung (1971) and as operationalised by the Myers-Briggs Type Indicator (Myers & McCaulley 1992). More specifically, the goal was to investigate whether:

- There were differences between the various MBTI temperaments, attitudes, functions and personality type categories of individuals with regard to their levels of sense of coherence
- Individuals' personality types substantially predicted their levels of sense of coherence.

Method

Participants

A convenience sample of 100 volunteer participants from the technical division of the Department of Defence was used in the present study. Forty per cent of the sample worked in Cape Town, while 60% worked in Pretoria, in a wide array of technical occupations. The majority of the participants (77%) were 35 years old or younger, and 63% indicated that they had been employed by the department for ten years or less. Most of the participants were male (94%), and 85% indicated that their highest educational qualification was Grade 10 or lower. About half of the sample indicated that they had no dependants (51%) and that they owned their places of accommodation (45%). The rank of sergeant was held more often than any other rank (36%), and 74% of the participants indicated that they had been

in their present rank for not more than three years. In 80% of cases, they had been transferred between bases/units, but 55% had not been transferred between squadrons. Approximately half the participants (48%) indicated that their career goals were in alignment with the goals of the organisation. More than half of them (56%) had no operational training or combat experience. Furthermore, most of the participants (82%) had never attended a course on stress management.

Measuring instruments

Two measuring instruments, namely the Myers-Briggs Type Indicator (Myers & McCaulley 1985) and the Orientation to Life Questionnaire (Antonovsky 1987) were used in the present study. A biographical questionnaire was used to obtain personal details of the participants.

Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator (MBTI) is based on Jung's typology theory. Jung's model of personality types is concerned with the habitual or preferred way in which individuals orientate themselves in the world (Van Rooyen, De Beer & Proctor 1999). The version of the MBTI that was used in this study to assess individuals' orientation towards multifaceted aspects of personality on four preference scales according to Jungian theory was the self-scorable MBTI – Form G (Myers & McCaulley 1985). Form G consists of a short version with 94 items that was used in this study and a longer 126-item version.

The MBTI measures individuals' standing on four preference scales, each defined by two poles on a continuum. The preference scales are Extraversion/Introversion (EI), Sensing/Intuition (SN), Thinking/Feeling (TF) and Judging/Perceiving (JP). The four scales, with their corresponding eight poles, create a model that allows for 16 unique personality type combinations (Myers 1998). The MBTI uses a forced-choice format. For each item, individuals have to indicate their preferred choice between two statements reflecting two of the poles of the four Jungian preferences. Only one answer is therefore to be given per item, with the exception of 17, which involves a choice between three options. No time limit is prescribed when the indicator is applied. Omissions are allowed when respondents do not understand a choice to be made, or when the question lies beyond the respondents' experience. Scores are obtained for each pole of the four preferences, and the highest score on each preference then indicates the direction and strength of the preference. For any individual, the letters

associated with the highest score on each of the four preference scales results in a four-letter code that is regarded as the individual's personality type.

The dichotomous preference scores on the MBTI may also be treated as if they were continuous scores (as was done in the present study). Continuous scores are a linear transformation of the preference scores, using the following convention (Myers & McCaulley 1992):

- For E, S, T or J preference scores, the continuous score is 100 minus the numerical portion of the preference score.
- For I, N, F or P preference scores, the continuous score is 100 plus the numerical portion of the preference score.

Since 1975, the MBTI has been progressively used internationally and has been distributed in South Africa since 1993 (De Beer & Van der Walt 1999). In terms of validity evidence, acceptable predictive validities have been reported for the MBTI (Hammer 1996; Quenk 1993). Its construct validity has been examined extensively by its correlation with other personality-measuring instruments and instruments of properties such as interests and values (Myers & McCaulley 1985). As mentioned earlier, Furnham (1996) found that the four MBTI preference scales also correlated with all the Five-Factor dimensions except for neuroticism. Significant discriminant and convergent validity evidence for the four-factor structure of the MBTI has been demonstrated (Hammer 1996).

Myers & McCaulley (1985) report that split-half reliabilities for Form G for various samples of high school students varied between 0.73 and 0.87, whereas coefficient alpha reliabilities ranged between 0.64 and 0.84. Generally speaking, lower coefficients were obtained for samples with educational levels below matriculation. Test-retest reliability coefficients on Form G varied between 0.48 and 0.93, but the majority of the coefficients exceeded 0.80. Furthermore, the internal consistency reliabilities of the MBTI remained stable with up to 25 omissions of items on Form G.

Orientation to Life Questionnaire

The Orientation to Life Questionnaire (OLQ) (Antonovsky 1987, 1993) was used in the present study to obtain a measurement of sense of coherence, in other words, to assess the participants' global orientation towards coping. The OLQ has been used in various countries, including South Africa, Israel and Japan (Antonovsky 1993; Frankenhoff 1998; Strümpfer & Wissing 1998).

The OLQ is a 29-item self-report questionnaire that uses a seven-point Likert scale with two anchoring phrases at its extremes as its response format. It contains items measuring the dimensions of manageability, meaningfulness and comprehensibility. Antonovsky (1993) defines these dimensions as measuring the following:

- Comprehensibility measures the extent to which individuals perceive the world as being ordered, predictable and clearly observable.
- Manageability measures the extent to which individuals perceive the world as being manageable.
- Meaningfulness measures the extent to which individuals perceive the world as being meaningful.

Total scores on the OLQ are obtained by adding the scores obtained on each of the three dimensions. A high score indicates a high degree of sense of coherence. In the present study, only the total scores, as opposed to the sub-scale scores, were used to indicate the participants' global orientation.

The reliability and validity of the OLQ has been demonstrated across cultures, social classes, ethnic groups, gender groups and age groups (Antonovsky 1996). In his summary of the findings of 29 researchers, Antonovsky (1993) shows that the internal consistency reliability of the OLQ is consistently high for a wide variety of samples. Alpha coefficients ranging between 0.82 and 0.95 were obtained by these researchers. Similarly, test-retest reliabilities varied between 0.52 and 0.97. In a review of some 30 South African studies on the OLQ, Strümpfer & Wissing (1998) report that the mean coefficient alpha for the 29-item version across all studies was 0.87, whereas the mean alpha for the short version was 0.80. The systematic procedure that was followed when the OLQ was constructed has ensured a high level of content, face and criterion validity for the instrument (Antonovsky 1993). Antonovsky (1993) reviewed criterion validity evidence that presented correlational data between the OLQ and measures in four domains, namely, global orientation, stressors, health and well-being, and attitudes and behaviour. The majority of the correlations were statistically significant. In studies that examined the factor structure of the scale, the findings indicated that one clear global factor presented the best solution (Antonovsky 1993). In South Africa, a wealth of construct validity evidence has been obtained by researchers that published correlations between scores on the OLQ and various other measures

(Strümpfer & Wissing 1998). Support for the satisfactory psychometric properties of the questionnaire was also found by Kalimo & Vuori (1990) and Sammallahti, Holi, Komulainen & Aalberg (1996).

Procedure

The participants were approached by their respective managers, who explained the reasons for the research to them. Volunteers who were willing to take part in the project were assembled in two groups on predetermined dates. The rationale underlying the study and the process applicable to the completion of the questionnaires was explained to the participants in a short lecture. At this stage, the participants were given an opportunity to withdraw from the study. Upon completion of the questionnaires, feedback was given to individuals who were interested in receiving feedback about their personal results. The questionnaires were scored manually according to the instructions of the authors thereof.

Results

To test the hypotheses regarding the relationship between personality type and sense of coherence, the analyses of the data involved two stages. Firstly, analyses of variance were carried out to test whether there were significant differences between mean scores on the OLQ for the various interpretation categories of the MBTI, namely, the temperament, function, attitudes and MBTI types that were discussed in the introductory section of the paper. Secondly, a multiple regression analysis was performed to determine the extent to which personality type or scores on the four MBTI preference scales predicted scores on the OLQ.

In Table 1, the descriptive statistics for scores on the four personality type scales and the OLQ are reported. The mean score on the OLQ was 131.58, with a standard deviation of 23.30. No statistically significant levels of skewness or kurtosis were found for this measure of sense of coherence. The internal consistency reliability of the OLQ was computed using Cronbach's alpha coefficient. The obtained alpha of 0.88 was indicative of the acceptable high reliability of this instrument.

The percentages of the sample, as categorised by the MBTI into the eight poles of the preference scales to represent the individual personality types of the participants, are also given in Table 1. It is clear that Sensing types (84%) and Thinking types (78%) were predominant in this sample. On the Extraversion/Introversion and Judging/Perceiving preferences, the obtained ratios were more evenly distributed. The mean scores that were obtained on the MBTI also reflect these percentages, because on all four continuums (EI, SN, TF and JP), the means were below 100, which is the balancing point of the continuum. This showed that, overall, the tendency of the sample was towards a preference for Extraversion, Sensing, Thinking and Judging. This resulted in the personality type distributions being positively skewed (see Table 1). In the cases of Sensing/Intuition and Thinking/Feeling, the skewness values were statistically significant at the 0.05 level.

Outliers were investigated for the potential influence of extreme values of a distribution on the analyses. In the case of the MBTI, two outliers were obtained for the EI, SN and JP continuums and one outlier for the TF continuum. For the purpose of this study, however, the outliers were regarded as extraordinary observations that did not threaten the representativeness of the sample. They were retained in the data set despite the sensitivity of analysis of

Table 1: Descriptive statistics for scores on the OLQ and four MBTI personality types

	Mean	Standard deviation	Variance	Skewness	Kurtosis
OLQ (Sense of coherence)	131.58	23.30	542.91	0.16	0.88
Personality type (Ratio)					
E (56%) / I (44%)	98.28	17.74	314.85	0.23	-1.72*
S (84%) / N (16%)	86.47	13.46	181.16	1.53*	1.02*
T (78%) / F (22%)	88.71	13.53	182.98	0.99*	-0.27
J (52%) / P (47%)	99.09	20.41	416.65	0.10	-1.80*

* Statistically significant at the 0.05 level

Table 2: Descriptive statistics of scores on the OLQ for the various MBTI temperament, attitude, function and type categories

		%	OLQ mean	OLQ standard deviation
Temperament	SP	38	124.34	22.67
	SJ	46	138.00	20.93
	NT	11	130.70	18.02
	NF	5	128.80	36.78
Function	ST	66	131.30	23.10
	SF	18	133.90	21.50
	NF	5	128.00	36.90
	NT	11	131.20	17.20
Attitude	IJ	23	134.50	22.50
	IP	22	117.20	21.30
	EP	25	130.70	25.00
	EJ	30	140.20	17.70
MBTI type	ISTJ	17	136.60	23.90
	ISFJ	3	123.00	20.50
	INFJ	1	139.00	0.00
	INTJ	2	131.50	11.50
	ISTP	10	108.60	21.50
	ISFP	6	129.20	19.60
	INFP	1	124.00	0.00
	INTP	4	119.00	14.90
	ESTP	16	126.40	16.90
	ESFP	6	140.30	25.10
	ENFP	2	128.50	57.50
	ENTP	3	138.00	10.70
	ESTJ	23	140.70	18.90
	ESFJ	3	141.30	5.40
	ENFJ	0	–	–
	ENTJ	3	136.70	18.80

variance to deviating scores. No further explanation is thus offered, and all the data were retained as valid observations.

Table 2 reports on the percentages of the sample that corresponded to the preferred personality type combinations of temperament (Keirse & Bates 1984), function, attitude and MBTI type that were identified as the personality elements of importance in this study. With regard to temperament, the preference was for SP (38%) and SJ (46%). Furthermore, the predominating function was ST (66%), but the four attitude combinations (IJ, IP, EJ and EP) were relatively evenly spread across the participants. The most common four-letter codes obtained for the present sample were ESTJ (23%), ISTJ (17%) and ESTP (16%).

The mean OLQ scores, with their corresponding standard deviations obtained by the sample groups

that formed the various MBTI categories, are also presented in Table 2. These means were compared to determine whether there were statistically significant differences between MBTI category groups on the sense of coherence measure, OLQ. From Table 2, it is evident that the temperament group with the highest OLQ mean was the SJ preference style ($M = 138.00$, $SD = 20.93$), whereas the temperament group with the lowest OLQ mean was the SP category ($M = 124.34$, $SD = 22.67$). The differences between the OLQ means of the four function categories were not large enough to expect statistically significant differences between the groups. The attitude group with the highest OLQ mean was the EJ preference style ($M = 140.20$, $SD = 17.70$), whereas the attitude group with the lowest OLQ mean was the IP group ($M = 117.20$, $SD = 21.30$). The groups that formed the MBTI personality types

Table 3: Analysis of variance of scores on the OLQ for the various MBTI categories

Independent variable	Source of variation	df	Sum of squares	Mean sum of squares	F	p
Temperament	Between groups	3	3 957.46	1 319.15	2.54*	0.061
	Within groups	96	49 790.90	518.66		
	Total	99	53 748.36			
Function	Between groups	3	167.42	55.81	0.10	0.960
	Within groups	96	53 580.94	558.14		
	Total	99	53 748.36			
Attitude	Between groups	3	6 151.21	2 050.40	4.14**	0.008
	Within groups	96	47 597.15	495.80		
	Total	99	53 748.36			
MBTI Type	Between groups	14	10 000.38	714.31	1.39	0.177
	Within groups	85	43 747.99	514.68		
	Total	99	53 748.36			

* Statistically significant at the 0.10 level

** Statistically significant at the 0.01 level

with the highest means on the OLQ were the ESFJ, ESTJ and ESFP types (141.30, 140.70 and 140.30 respectively). The lowest OLQ means were obtained by the ISTP and INTP types (108.60 and 119.00).

The OLQ means reported in Table 2 were compared for statistical significance by means of five separate one-way ANOVAs. The purpose of these analyses was to determine whether the groups that formed the preference styles of temperament, function, attitude and MBTI type differed with regard to their sense of coherence scores on the OLQ. The results are presented in Table 3.

From Table 3, it is clear that the analyses yielded only two statistically significant *F* ratios. In the case of the temperament preference types, the obtained *F* ratio was statistically significant at the 0.10 level ($F(3, 96) = 2.54, p = 0.061$). Similarly, for the attitude preference types, the obtained *F* ratio was statistically significant at the 0.01 level ($F(3, 96) = 4.14, p = 0.008$). To determine the means between which there were statistically significant differences, Tukey's *post hoc* multiple comparison test, the HSD test, was used. The results for the temperament preferences are presented in Table 4. The OLQ mean for the SJ types was statistically significantly larger than the OLQ mean for the SP types at the 0.05 level (absolute difference = 13.70). The results for the attitude preferences are presented in Table 5. In this case, EJ types obtained a significantly larger OLQ mean score than IP types (absolute difference = 21.52, $p = 0.005$).

Table 4: Tukey's multiple comparison test (HSD) of OLQ means for the MBTI temperament categories

Temperament	Compared with	Mean difference	Standard error	p
SP	SJ	13.70*	4.99	0.036
	NT	6.48	7.80	0.840
	NF	4.46	10.83	0.976
SJ	NT	7.23	7.64	0.781
	NF	9.24	10.72	0.824
NT	NF	2.02	12.28	0.998

* Statistically significant at the 0.05 level

Table 5: Tukey's multiple comparison test (HSD) of OLQ means for the MBTI attitude categories

Attitude	Compared with	Mean difference	Standard error	p
IJ	IP	15.80	6.64	0.088
	EP	4.56	6.43	0.893
	EJ	5.27	6.17	0.790
IP	EP	11.24	6.51	0.316
	EJ	21.52*	6.25	0.005
EP	EJ	10.28	6.03	0.327

* Statistically significant at the 0.01 level

The second step of the data analyses required a multiple regression analysis to determine the extent

Table 6: Intercorrelation matrix of scores on the OLQ and four MBTI personality types

	OLQ	EI	SN	TF	JP
OLQ	1.00				
EI	-0.22(0.026)*	1.00			
SN	-0.06(0.552)	0.03(0.759)	1.00		
TF	0.07(0.482)	0.04(0.708)	0.001(0.995)	1.00	
JP	-0.32(0.001)*	-0.07(0.490)	0.22(0.026)*	0.20(0.047)*	1.00

p values are given in brackets

* Statistically significant at the 0.05 level

to which personality type or scores on the four MBTI preference scales predicted scores on the OLQ. In Table 6, the intercorrelations between sense of coherence as measured by the OLQ and the four MBTI personality types are reported. The *p* values associated with the various correlations are indicated in brackets. The correlation between the OLQ and EI is statistically significant at the 0.05 level and is equal to -0.22 ($p = 0.026$). This means that high levels of Extraversion tend to be associated with high levels of sense of coherence, and *vice versa*. Similarly, the moderate correlation between the OLQ and the JP preference ($r = -0.32$, $p = 0.001$) indicates that high levels of Judging tend to be associated with high levels of sense of coherence.

A multiple regression analysis using the four MBTI personality preference types as the independent variables, and sense of coherence as measured by the OLQ as the dependent variable, was subsequently performed. The results are presented in Table 7. The multiple regression was statistically

significant ($F = 5.52$, $p < 0.001$) and yielded a multiple correlation coefficient equal to 0.43. The *t* tests for the statistical significance of the beta coefficients indicated that EI and JP contributed significantly to the prediction of sense of coherence at the 0.01 level. The relatively low value of the adjusted squared multiple correlation indicates that only 15.4% of the variance in sense of coherence is explained by the four MBTI preference scales. This relatively low percentage, associated with a high *F* ratio, may be an indication of multicollinearity.

To determine whether multicollinearity significantly affected the obtained results, the multiple regression analysis was repeated entering only the EI and JP continuums as predictors. The obtained collinearity diagnostics indicated a variance inflation factor (VIF) of 1.005 and a tolerance statistic of 0.995 for the two variables. Because the VIF was less than 10 and the tolerance larger than 0.10, it was assumed that the role of collinearity was negligible in this study. The interpretation of the regression coefficients should therefore not be

Table 7: Multiple regression analysis of OLQ (sense of coherence) scores on MBTI personality type

		Source of variation	SS	df	MS	<i>F</i>	<i>p</i>
Multiple R	0.434	Regression	10 137.07	4	2 534.27	5.52*	0.000
Multiple R ²	0.189	Residual	43 611.29	95	459.07		
Adjusted R ²	0.154	Total	53 748.36	99			
Standard error of estimate	21.43						

	Unstandardised coefficients <i>b</i>	Standard error	Standardised coefficients β	<i>t</i>	<i>p</i>
Constant	178.81	23.43		7.63*	0.000
EI	-0.34	0.12	-0.26	-2.75*	0.007
SN	0.06	0.16	0.03	0.34	0.736
TF	0.27	0.16	0.16	1.65	0.102
JP	-0.43	0.11	-0.38	-3.90*	0.000

* Statistically significant at the 0.01 level

affected adversely by collinearity. One may conclude that the variables EI and JP contributed jointly to the prediction of sense of coherence.

Discussion

In the introduction, it was pointed out that a limited amount of research had been done to study the association between personality type and the ability to cope with stress. The goal of this study was therefore to explore the relationship between personality type and the salutogenic variable, sense of coherence, since both offer the possibility of predicting coping behaviour when faced with stressful life situations. It was hypothesised that certain personality types tend to experience a higher sense of coherence than other types.

The MBTI is one of the measuring instruments that has been used most widely in many countries across the globe. There is ample evidence that the opposite poles of the MBTI personality continuums are not evenly distributed in most populations, and that the proportions may also vary across populations. De Beer (1997, in De Beer & Van der Walt 1999), using 6 452 South African MBTI profiles, demonstrated that the STJ profiles reflected the highest incidence, whereas profiles with NF and P preferences were more scarce. In the present study, it was again found that Sensing and Thinking types predominated (see Table 1). Although the sample was small and the participants were drawn exclusively from a very specific occupational group, the proportions of participants falling into certain categories were in accordance with results obtained in other South African studies (see Tables 1 and 2). For instance, in a study regarding the preferences of lecturers and students at a tertiary education institution, Coetzee, Fouché, Rothmann & Theron (2000) also found that S, T and J preferences dominated the combined sample of 282 students and lecturers. These results also supported those of Fourie (2000), reported earlier.

The first step in the analysis of the data was to investigate whether there were statistically significant differences in respect of sense of coherence between the various MBTI preference types that are suggested in the literature. In particular, it was investigated whether the types exhibiting TJ preferences scored significantly higher on sense of coherence (Ruiselová & Ruisel 1994, 1995) than FJ preferences. Another specific goal was to establish whether individuals who exhibited the function of

ST scored significantly higher on sense of coherence than those that exhibited the function of NT (Ruiselová & Ruisel 1994, 1995).

With regard to temperament as measured by the MBTI, the category of respondents who obtained the highest mean score on the sense of coherence measure, the OLQ, was the SJ preference style. This mean differed statistically significantly from the OLQ mean of participants categorised as SP. This means that a strong sense of coherence is associated with individuals who have a realistic, deciding, outward judgement of good or bad, while maintaining an inward focus on the facts applicable to immediate circumstances. Problems are solved through reliance on past experience and traditions, which indicates a resistance to change (Myers & McCaulley 1985). Individuals with a strong sense of coherence, in making sense of stressors, learn through their own life experiences to cope more effectively with stressors in the future. In contrast, individuals with a weak sense of coherence are not always able to make sense of their current context (scoring low on the dimension of comprehensibility) and may not have had experiences of successfully dealing with stressors in the past. Therefore, they may not feel comfortable relying on these past experiences in order to solve current problems.

For the various function preferences, no statistically significant differences were obtained between any of the groups with respect to their sense of coherence. This result is contradictory to the findings of Ruiselová & Ruisel (1994, 1995), who found that individuals with the ST function scored significantly higher on sense of coherence than individuals with the SF function.

The category of respondents that obtained the highest mean score on the sense of coherence measure among the four attitude types was the EJ preference style. Their mean differed statistically significantly from the OLQ mean of participants who exhibited an IP preference. This means that a strong sense of coherence is best associated with being a decisive extravert. A decisive extravert is fast moving, appears to be confident, and enjoys making things happen. Furthermore, a weak sense of coherence is associated with being an adaptable introvert. An adaptable introvert is keen on introspection, adaptable in small things, while being firm on important issues. This finding is in accordance with the findings of Fourie (2000), indicating that Extraversion is associated with a strong sense of coherence, and of Ruiselová & Ruisel (1994, 1995), indicating that the J preference can be associated with a strong sense of coherence.

The sample was too small to have a reliable test between sense of coherence means for the 16 MBTI personality types, because ten of the types were represented by sub-samples of fewer than five participants each. Not surprisingly, the *F* test yielded a statistically non-significant result. Nevertheless, there were sizeable absolute mean OLQ differences between some of the types, such as between ESTJ (*M* = 140.70, *N* = 23) and ISTP (*M* = 108.60, *N* = 10). It is recommended that attempts be made in further studies involving larger samples to determine whether individuals with a strong sense of coherence are characterised by having a breadth of interests, being analytical, practical, realistic, systematic and assertive, with a strong preference for organising and running activities, whereas individuals with a weak sense of coherence are characterised by being quiet, reserved, impersonal and objective, analysing life with a detached curiosity, with a preference for variety and novelty.

The second step in the analysis of the data was to establish by means of multiple regression analysis whether the four personality preference continuums could predict sense of coherence. The results showed that two of the four continuums were successful predictors of sense of coherence, namely the Extraversion/Introversion continuum and the Judging/Perceiving continuum. The correlational analysis indicated that a strong sense of coherence is associated with Extraversion and Judging. It therefore appears that individuals with a strong sense of coherence will be activity oriented and outward focused while planning, structuring and giving order to their lives. Extraverts rather than introverts, and judgers rather than perceivers, were found to cope better with stress-provoking demands. It appears that, based on preferences, the respective personality types make use of different coping mechanisms under similar circumstances.

The main limitation of the study was arguably the relatively small sample size that was used. Whereas the size of the sample was probably adequate for the multiple regression analysis and for most of the ANOVAs, the credibility of the *F* test for differences between the means of 16 groups was compromised by having a sample of only 100 participants. In future studies of the relationship between personality and salutogenic constructs, researchers should ensure that they obtain larger samples. The convenience sample and the fact that it was limited to technical staff of the Department of Defence naturally also limits the generalisation possibilities of the results.

Despite these limitations, the study showed promise for investigations of the association between personality type, as conceptualised by the Myers-Briggs Type Indicator, and ability to cope. The present study included only a single salutogenic construct, namely sense of coherence. The inclusion of a wider scope of salutogenic measuring instruments in such a study should yield more insightful conclusions regarding the relationships between personality types and salutogenic constructs.

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