# A confirmatory factor analytic study of a self-leadership measure in South Africa

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**Orientation:** Self-leadership is considered to be essential for effective individual functioning in occupational and academic contexts. The revised self-leadership questionnaire (RSLQ) is widely utilised for measuring self-leadership, but its psychometric properties have not been established on a South African sample. By implication, important questions also exist about the theoretical structure of self-leadership in the South African context.

**Research purpose:** The research aim of this study was to investigate the reliability and factorial validity of the revised self-leadership questionnaire on a South African sample. In doing so, the results of the research would also provide valuable insights into the latent factor structure of the self-leadership construct.

**Motivation for the study:** On a practical level, the research sought internal validity evidence for the use of the RSLQ in the South African context. On a theoretical level, questions remain about the best conceptual representation of self-leadership as a construct.

**Research design, approach and method:** The revised self-leadership questionnaire was administered to a non-probability sample of 375 South African young adults. The first and second-order factor structure underlying contemporary models of self-leadership using confirmatory factor analytic techniques was tested.

**Main findings:** Results showed that the RSLQ measured self-leadership with suitable reliability and internal validity. All eight subscales had high internal consistency coefficients. Confirmatory factor analysis (CFA) of the first and second-order models conclusively demonstrated good factorial validity.

**Practical/managerial implications:** The study found that the RSLQ has good measurement properties for a South African context. Academics, practitioners and managers are urged to use the measure in its present form for applications such as leadership development and promoting self-management.

**Contribution/value-addition:** The study extends the body of psychometric evidence supporting the use of the revised self-leadership questionnaire in the South African milieu. The researchers have further indicated that self-leadership can be represented by a hierarchical latent factor structure, where a general factor drives more specific dimensions of self-leadership.

## Introduction

### Research problem

The bulk of studies on the measurement properties of the revised self-leadership questionnaire (RSLQ) were conducted in the USA, Europe and Asia (for a review, see Houghton *et al.*, 2012); thus it was considered important that local validation of the measure precedes its use in a South African setting. The main research question of the study was thus: Is the revised self-leadership questionnaire a reliable and valid measure of self-leadership on a South African sample? By extension, the primary objective of this study was to test the reliability and construct and/or factorial[1] validity of the RSLQ on a South African sample. To the researchers' knowledge, the RSLQ has been used locally in a single published study (Van Zyl, 2008), but the psychometric properties were not reported.

Aside from psychometric objectives for this study, the researchers were also interested in theoretical and practical issues, for various reasons. Firstly, Houghton and Neck (2002) found that a second-order factor structure, where general self-leadership affects various more specific self-leadership facets, provided a more parsimonious fit to their research data. No other study has replicated this investigation of a possible hierarchical structure for self-leadership. However, a second-order model provides a view of self-leadership that is more 'harmonious with self-leadership

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1. Construct validity is generally seen as a broader term encompassing factorial validity. Although the terms are technically distinct, we use them interchangeably in the study.

theory' (Houghton & Neck, 2002, p. 672). Secondly, it is also an open question whether this second-order structure would replicate to a non-Western setting found in a developing nation, such as South Africa. Other studies have shown that African leadership has unique aspects, but also shares common elements with international models (Van Zyl, 2009). As such, the researchers wanted to test the generalisability of theoretical models of self-leadership to a South African sample. Answers to these theoretical questions could also have important practical implications. For example, the choice of best fitting factor structure could influence the way in which self-leadership measures are used in self-leadership training and development. Also, these results may impact guidelines for the scoring of the RSLQ and the interpretation of its scores. For these reasons, a second objective of the present study was to test both a first and second-order factor structure of self-leadership in the sample.

### Key focus of the study

Self-leadership is a self-influence process through which people seek to direct their cognitions and actions in order to reach desired goals (Manz, 1986; Manz & Neck, 2004), and it is mostly concerned with explaining ways to enhance organisational performance through individual-initiated thinking and acting (DiLiello & Houghton, 2006). This focus has resulted in self-leadership being considered an important contributor to success in occupational and academic settings – a view supported by considerable empirical research. For example, at the individual level, studies consistently show that self-leadership relates to improved work performance (Stewart, Courtright & Manz, 2011) and team role performance (Hauschildt & Konradt, 2012). Self-leadership has also been linked to more specific personal work outcomes, such as enhanced individual innovation and creativity potential (Curral & Marques-Quinteiro, 2009; DiLiello & Houghton, 2006), entrepreneurship (D'Intino, Goldsby, Houghton & Neck, 2007) and productivity (Birdi *et al.*, 2008). Studies show that self-leading employees are better adjusted, more confident (Stajkovic & Luthans, 1998) and enjoy greater career success (Murphy & Ensher, 2001; Raabe, Frese & Beehr, 2007). In addition to individual level outcomes, self-leadership exerts its influences at interpersonal and group levels. For instance, self-leadership has been associated empirically with team performance and processes (Hauschildt & Konradt, 2012; Konradt, Andressen & Ellwart, 2009). In sum, empirical evidence shows that self-leadership plays a critical role in important work outcomes.

### Research purpose

Despite its relevance for learning and performance at work, the uptake of self-leadership in managerial and academic settings has been hampered by measurement issues (Manz & Neck, 2004). The shortcomings of early self-leadership research instruments (e.g., Anderson & Prussia, 1997; Cox, 1993; Manz, 1993a, 1993b, 1993c) were addressed by Houghton and Neck (2002), who developed a RSLQ designed to address these limitations. They argued that the development of self-leadership theory and its application in management practice was being stunted by a lack of

commonly agreed-upon and psychometrically rigorous measurement instruments. It follows that more research is needed to assess the measurement properties of the RSLQ (Houghton & Neck, 2002), especially when it is applied in new cultural contexts (Houghton, Dawley & DiLiello, 2012).

### Contribution to the field

The study intended to validate a measure of self-leadership in a South African setting and, at the same time, test the transportability of self-leadership theoretical models. In addition to the potential to facilitate the development and performance of employees and managers at work, self-leadership could have wider socio-economic relevance in developing countries such as South Africa. Stemming from its nature, self-leadership is a learning competency that could play an important role in transformation on an individual, group, organisational and societal level (Van Zyl, 2009). A history of segregated development in education and employment (Kamps & Engelbrecht, 2011) has fostered a lack of opportunities to engage in education or training for certain groups, particularly black people and women (De Goede & Theron, 2010). As such, human capital in South Africa requires ongoing affirmative development of a sustainable nature. A key aspect in affirming individuals, groups and society is to foster self-leadership at various levels. Studies show that individual self-leadership is interlinked with higher-level group and organisational self-leadership – it is, essentially, a multilevel construct (Stewart *et al.*, 2011). The researchers saw opportunities to utilise the RSLQ (if it can measure self-leadership appropriately for a local context) in applications that may include both work and non-work uses.

### What will follow

To conclude, the study sought to test the psychometric properties of a self-leadership measure as well as the underlying theoretical model of the construct in the South African context to answer both applied and theoretical reasons. Next, the key literature that informs this investigation will be discussed. An overview of the study method, results and discussion will be provided later on before concluding with recommendations for use in practice and research.

## Literature review

### Self-leadership theory

Self-leadership can be defined as a self-influence process through which people achieve the self-direction and self-motivation necessary to perform (Manz & Neck, 2004). Self-leadership comprises behavioural and cognitive strategies that positively influence personal effectiveness (Neck & Houghton, 2006). Self-leadership theory draws from several psychological theories that include: self-control theory (Cautela, 1969; Thoresen & Mahoney, 1974), social learning theory (Bandura, 1977) and the notion of self-management and self-regulation (Carver & Scheier, 1981; Kanfer, 1970).

According to self-leadership theory, achievement of personal effectiveness is a function of three primary self-leadership

strategies comprising behaviour-focused, natural reward and constructive thought pattern strategies (Manz, 1986; Manz & Neck, 2004). These strategies will be discussed next.

## Self-leadership strategies

**Behaviour-focused strategies**: Behaviour-focused self-leadership strategies are designed to encourage positive, desirable behaviours that lead to successful outcomes, whilst suppressing negative, undesirable behaviours that lead to unsuccessful outcomes (Neck & Houghton, 2006). Behaviour-focused strategies include using self-goal setting, self-observation, self-cueing, self-reward and self-punishment (or constructive self-feedback) (Manz & Neck, 2004). Behaviour-focused strategies raise awareness of when and why individuals engage in specific behaviours. As such, the resulting self-awareness is a critical precondition for changing or eliminating ineffective and inefficient behaviours. Self-goal setting enables the focused action that is required to achieve behaviour change. If these goals are achieved, self-rewards may be applied by the individual when, for example, mentally congratulating oneself for an important accomplishment, or imparting a physical reward as a 'prize' for completing a difficult project. Similarly, individuals who apply self-leadership using behaviour-focused strategies would also self-punish as a means to discourage negative behaviour that results in undesirable consequences they recognise.

**Natural reward strategies:** Natural reward strategies are designed to enhance the intrinsic motivation vital for performance (Manz & Neck, 2004). They increase the subjective experience of competence and self-determination through the enhancement of, and focus on, enjoyable task features (Alves *et al.,* 2006). People apply two primary natural reward strategies because they are motivated by inherently enjoyable aspects of the task or activity, namely (1) building more pleasant and enjoyable features into a given activity so that the task itself becomes naturally rewarding, or (2) shaping one's own perceptions by focusing attention away from the unpleasant aspects of a task and refocusing it on the task's inherently rewarding aspects (Manz & Neck, 2004; Neck & Houghton, 2006). Essentially, the former strategy represents changing the task itself in order to make it better, whilst the latter involves cognitive reframing of the task in order to make it *seem* better.

**Constructive thought strategies:** In contrast to behaviour-focused or reward-focused strategies, constructive thought strategies facilitate the formation of constructive thought patterns and habitual ways of thinking that may positively impact performance (Neck & Houghton, 2006). Being geared towards the creation of positive thinking, constructive thought strategies attempt to reduce dysfunctional beliefs, assumptions and negative self-talk, whilst also increasing positive self-image (Alves *et al.*, 2006). Individuals apply constructive thought strategies when they engage in visualising performance, engage in positive self-talk, and examine individual beliefs and assumptions to align cognitions with desired behaviour (Neck & Manz, 1996; Neck, Stewart & Manz, 1995).

**Criticism against the self-leadership notion:** Despite intuitive appeal and substantial research support, questions have been raised about the notion of self-leadership. Firstly, is self-leadership not simply a recasting of individual difference variables included as a part of existing personality constructs, such as conscientiousness? Secondly, other authors have questioned the uniqueness of self-leadership strategies, because they are founded upon, and operate within, the context of other established theories of self-regulation, motivation and self-influence (Guzzo, 1998; Markham & Markham, 1995, 1998). Houghton *et al.* (2012, p. 220), in response to these criticisms, emphasised that self-leadership is a normative or prescriptive model rather than a deductive or descriptive theory. Normative theories, such as self-leadership, are prescriptive and emphasise *how* something should be done, whereas descriptive theories seek to explain the basic operation of various phenomena without giving normative information for applying an approach. The conceptual distinction between self-leadership and other theories has been a subject of persistent debates (see Neck & Houghton, 2006, for a review). It therefore remains important to consider the possibility that specific self-leadership strategies are distinct from general dimensions that may underlie their operation. Whilst self-leadership consists of a particular set of behavioural and cognitive strategies that are based upon, and related to, other theories of personality, motivation, and self-influence, such as self-regulation theory and social cognitive theory, self-leadership strategies remain distinct from these approaches (Neck & Houghton, 2006).

## Self-leadership as a global factor

When considering the domains within which self-leadership may occur, namely thought, behaviour and reward, it becomes evident that self-leadership may represent a dynamic interaction of cognitive, behavioural and affective elements all geared towards self-influencing the actions of the individual. Contemporary views that attempt to explain behaviour adopt systems approaches that incorporate elements that span across different domains of functioning. For example, the cognitive-affective system theory of personality (Mischel & Shoda, 1995) proposes that stable systems mediate how individuals select, construe and process information before generating behaviours. These interdependent systems encompass the respective domains of thinking about behaviour, feelings toward these behaviours and, lastly, engaging and disengaging in behaviours. Following this interdependence logic, it can be speculated that self-leadership strategies that focus on behaviour, natural reward and constructive thought are influenced by an underlying, general predisposition to influence the self. If a general latent dimension of self-leadership exists, then it would be observed as a single underlying factor driving self-leadership strategies, such as those outlined above. As such, a hierarchical view of self-leadership is proposed where a general self-leadership predisposition influences the operation of specific self-leadership strategies (see Figure 1). One of the aims of the study was to test the possibility that self-leadership may be represented as a hierarchical construct – a view that would be harmonious with self-leadership theory (Houghton & Neck, 2002).

### Measurement of self-leadership

Although research evidence suggests that self-leadership is an important organisational pre-requisite for effective individual-initiated functioning, its uptake and potential contribution has been marred by the lack of a universal and psychometrically sound research instrument to measure the construct (Houghton *et al.*, 2012). Manz (1993a, 1993b, 1993c) first developed items to measure both self-leadership and self-management at the individual level. The scales were designed to capture dimensions of both self-management and self-leadership, although aspects of self-leadership such as constructive thought were still not yet fully developed in this instrument (Neck & Houghton, 2006; Stewart *et al.*, 2011). At about the same time, Cox (1993) developed and tested a 34-item unpublished self-leadership questionnaire (SLQ), with eight unique factors (by Principle Components Analysis) labelled as: self-problem-solving initiative, self-efficacy, teamwork, self-reward, self-goal setting, natural rewards, opportunity thought and self-observation or evaluation.

Building on the work of Manz (1993a, 1993b, 1993c), Anderson and Prussia (1997) made further developments to the SLQ, based largely on earlier prototypes (e.g., Manz, 1992; Manz & Sims, 1991). Content validation of their initial 90-item SLQ resulted in 50 items which measured ten factors falling into three dominant categories: behaviour-focused strategies, natural reward strategies, and creating constructive thought pattern strategies. The ten factors were labelled as: self-goal setting, self-reward, self-punishment, self-observation, self-cueing and self-withholding, focusing thoughts on natural rewards, visualising successful performance, self-talk and evaluating beliefs and assumptions. The first six factors represent an individual's behaviour-focused strategies, one factor (focusing thoughts on natural rewards) represents the natural rewards obtained from self-leadership, and the remaining three factors evaluate the constructive thought pattern strategies of self-leadership. However, the major drawback of their measure was that several items loaded on the wrong factor and/or demonstrated slightly above threshold cross-loadings with other factors (Houghton & Neck, 2002). Attempts to validate the instrument on a second sample indicated that the *focusing thoughts on natural rewards* subscale showed inadequate internal consistency (α = 0.62), implying significant instability of reliability across samples for the subscale (Anderson & Prussia, 1997).

The revised self-leadership questionnaire (RSLQ) (Houghton & Neck, 2002) attempted to further refine the psychometric properties of the original SLQ because of the shortcomings already discussed. The RSLQ was created by eliminating or rewriting ambiguous items from the SLQ (Anderson & Prussia, 1997) and by integrating additional items from the previously unpublished self-leadership assessment instrument (Cox, 1993). The RSLQ consists of 35 items in nine subscales, representing three self-leadership dimensions, namely: behaviour-focused, natural reward, and constructive thought dimensions. The behaviour-focused dimension is made up of five subscales: self-goal setting; self-reward;

self-punishment; self-observation and self-cueing. The natural reward dimension consists of one subscale, whilst the constructive thought dimension has three subscales: visualising successful performance; self-talk; and evaluating beliefs and assumptions. The RSLQ has shown a greater degree of reliability and construct validity than earlier measures (e.g., the SLQ of Anderson & Prussia, 1997). Exploratory factor analytic studies by Houghton and Neck (2002) supported the three-dimensional structure of the RSLQ. These authors also conducted confirmatory factor analysis of a hierarchical model, but although a second-order solution was confirmed, the generalisability of their results to other samples has not been determined.

Despite questions about the best way to conceptualise self-leadership (e.g., hierarchically versus a first-order factor structure), the applications of the RSLQ suggest that it is an effective self-leadership measure with the potential to facilitate more empirical self-leadership research (Curral & Marques-Quinteiro, 2009; Houghton & Jinkerson, 2007). Moreover, the RSLQ has been translated into a number of foreign languages, including Chinese (Ho & Nesbit, 2009; Neubert & Wu, 2006), Portuguese (Curral & Marques-Quinteiro, 2009), Turkish (Dogan & Sahin, 2008), Hebrew (Carmeli, Meitar & Weisberg, 2006), and German (Andressen & Konradt, 2007). The translated versions of the RSLQ further confirm the original findings by Houghton and Neck (2002) and give additional evidence of the measure's cross-cultural validity (Houghton *et al.*, 2012). However, the English measure's properties have not been investigated in the South African context. Although the RSLQ has been administered in a South African setting (e.g., Van Zyl, 2008), its reliability and construct validity was not reported.

### The present study

The study attempted to test the psychometric properties of the RSLQ on a South African sample, with two primary objectives in mind. First, more research was needed on the reliability and validity of the RSLQ before it could be used in applied and research settings in South Africa. As a result, the researchers hypothesised that the RSLQ would show acceptable reliability and good model fit in a South African sample.

Second, important questions remain about the theoretical structure of self-leadership internationally, but also in a South African setting. More specifically, the researchers wanted to determine whether or not a second-order model (that includes a general self-leadership factor) would represent the self-leadership construct better than a first-order factor structure (where self-leadership consists of three subcomponents). In sum, the researchers hypothesised that a second-order factor model (with a single self-leadership dimension affecting three self-leadership sub-dimensions and subsequent observed variables) would fit the data better than a first-order model (three sub-dimensions affecting the observed variables).

# Research design

## Research approach

A quantitative survey design was used to achieve the research objectives. A cross-sectional correlational study design was required to obtain data for confirmatory factor analysis (CFA) and structural equation modelling (SEM). Common source bias – a typical threat in studies using this type of research design – was not considered a threat in this study, as the researchers measured only a single variable (i.e., self-leadership) and its components.

## Research method

### Research participants

The study used young adults studying full-time at a South African university. Using a non-probability sampling strategy, 400 questionnaires were distributed to participants and 375 completed questionnaires were returned. The resulting response rate was very high (93.75%) because research questionnaires were administered in class, with voluntary participation. The demographic characteristics of the sample are shown in Table 1. The sample consisted of 248 female (66.1%) and 127 male (33.9%) participants. The majority (54.4%) fell in the age category between 21 and 30 years. The ethnic distribution in the sample was White people (75.2%), Mixed race people (16%) and Black people (7.7%). The majority (86.4%) of respondents had a matric qualification as the highest level of education.

### Measuring instrument: Revised self-leadership questionnaire (RSLQ)

Self-leadership was measured using the revised self-leadership questionnaire (RSLQ) (Houghton & Neck, 2002). The RSLQ is a self-report measure that contains 35 item statements rated by means of a 5-point Likert scale ranging from 1 (not at all accurate), 2 (somewhat accurate), 3 (a little accurate), 4 (mostly accurate) and 5 (completely accurate). The RSLQ items comprise nine subscales categorised into three groups.

**Behaviour-focused self-leadership:** Behaviour-focused self-leadership was measured with five subscales identified as

**TABLE 1:** Sample description.

| Variable | | N | % |
|---|---|---|---|
| Gender | Male | 127 | 33.9 |
| | Female | 248 | 66.1 |
| Age of participants | Below 20 | 159 | 42.4 |
| | 21–30 | 204 | 54.4 |
| | 31–40 | 009 | 02.4 |
| | 41–50 | 002 | 00.5 |
| | Above 50 | 001 | 00.3 |
| Ethnic group | Black people | 029 | 07.7 |
| | Mixed race people | 061 | 16.0 |
| | Indian people | 002 | 00.5 |
| | White people | 282 | 75.2 |
| Education | Matric | 324 | 86.4 |
| | Diploma | 019 | 05.1 |
| | First degree | 023 | 06.1 |
| | Honours degree | 006 | 01.6 |
| | Masters degree | 003 | 00.8 |

self-goal setting (five items), self-reward (three items), self-punishment (four items), self-observation (four items) and self-cueing (two items).

**Constructive thought self-leadership:** Constructive thought self-leadership was measured with three subscales comprising visualising successful performance (five items), self-talk (three items) and evaluating beliefs and assumptions (four items). The self-punishment subscale was excluded from the analyses as advised by Jeffery Houghton (J. Houghton, personal communication, 31 March, 2011).

**Natural reward self-leadership:** Natural reward self-leadership was measured with a single five-item scale. Earlier studies (e.g., Houghton & Neck, 2002) have shown generally acceptable Cronbach's alpha internal consistency coefficients of the nine underlying subscales (0.74 to 0.93) and factor stability across samples.

### Research procedure

Permission for the research was obtained from the participating institution's research ethics committee. After briefing participants about the aim of the study, they received a composite questionnaire, which included a covering letter and a biographical section. The covering letter introduced the reason for the study and instructions and provided information concerning the participants' rights to voluntary participation. Informed consent was sought from the participants before completion of the questionnaires and confidentiality of the information or data obtained was maintained. No potential hazards to participants were envisaged in the study.

### Statistical analysis

The data were analysed with confirmatory factor analysis (CFA) and structural equation modelling (SEM). CFA is usually performed to test the measurement model underlying a measure, whilst the structural model is tested with SEM. SEM helps to explain the patterns of covariances found amongst the observed variables in terms of the relationships hypothesised by both the measurement and structural models (Diamantopoulos & Siguaw, 2000). These techniques represent the best multivariate procedures for testing both the construct validity and theoretical relationships amongst a set of concepts represented by multiple measured variables (Hair, Black, Babin & Anderson, 2010).

The researchers decided to adopt a confirmatory analytic technique instead of employing Exploratory Factor Analysis (EFA). Whereas EFA searches for structure amongst variables by allowing loadings between every observed variable (i.e., item or item parcel) and every factor (i.e., scale), in CFA, the full measurement model is specified a priori as an effort to achieve a much stronger test of the measurement theory underlying a measure (Williams, Vandenberg & Edwards, 2009). As such, CFA is generally considered more appropriate for theory testing than EFA (Hair et al., 2010).

LISREL 8.80 (Du Toit & Du Toit, 2001) was used to perform a first and second-order confirmatory factor analysis on the

**TABLE 2:** Descriptive statistics and inter-correlations of subscale scores of the revised self-leadership questionnaire.

| Subscales | M | SD | VSP | S-GOAL | S-TALK | S-REW | EBA | S-OBS | FTNR | S-CUE |
|---|---|---|---|---|---|---|---|---|---|---|
| VSP | 18.19 | 3.76 | **0.82** | - | - | - | - | - | - | - |
| S-GOAL | 19.71 | 3.37 | 0.63** | **0.84** | - | - | - | - | - | - |
| S-TALK | 11.35 | 2.97 | 0.44** | 0.30** | **0.87** | - | - | - | - | - |
| S-REW | 11.12 | 3.02 | 0.34** | 0.24** | 0.28** | **0.90** | - | - | - | - |
| EBA | 14.95 | 2.72 | 0.39** | 0.38** | 0.30** | 0.37** | **0.76** | - | - | - |
| S-OBS | 15.24 | 2.83 | 0.46** | 0.60** | 0.22** | 0.27** | 0.38** | **0.82** | - | - |
| FTNR | 19.37 | 3.18 | 0.53** | 0.58** | 0.26** | 0.37** | 0.52** | 0.49** | **0.74** | - |
| S-CUE | 7.02 | 2.34 | 0.40** | 0.45** | 0.21** | 0.27** | 0.27** | 0.29** | 0.30** | **0.82** |

$N$ = 373
Coefficient alphas for the participants are presented diagonally and are indicated in bold. VSP, Visualising successful performance; S-GOAL, Self-goal setting; S-TALK, Self-talk; S-REW, Self-reward; EBA, Evaluating beliefs and assumptions; S-OBS, Self-observation; FTNR, Focusing thoughts on natural rewards; S-CUE, Self-cueing.
**$p < 0.01$ (two-tailed).

RSLQ to determine the fit of the models. Robust maximum likelihood (RML) estimation was used to estimate the parameters set free in the model because of the lack of multivariate normality in the data (Jöreskog & Sörbom, 1996; Mels, 2003).

# Results

## Preliminary analyses

### Missing values

In order to ensure that all cases formed part of the analyses, the researchers analysed the extent of missing values. There were very few missing values and these had no obvious pattern. The use of imputation by matching resulted in an effective sample size of 373 cases, with only two cases being lost (Jöreskog & Sörbom, 1996).

### Item analysis

Item analysis using the statistical package for the social sciences (SPSS) reliability procedure (IBM Corporation, 2011) was performed on the items of the revised self-leadership questionnaire. All subscales showed high (α > 0.80) (Nunnally, 1978) coefficient alpha values, except for two subscales (*evaluating beliefs and assumptions* and *focusing thoughts on natural rewards*) which were slightly below 0.80. A summary of the internal consistency reliability coefficients is shown in Table 2, where alphas are reported in the diagonal (in bold).

### Dimensionality analysis

To confirm the uni-dimensionality of each scale prior to CFA (Williams *et al.*, 2009), unrestricted principal axis factor analyses with direct oblimin rotation were performed on each of the eight revised self-leadership questionnaire (RSLQ) subscales, each representing a facet of the multi-dimensional self-leadership construct. The eigenvalue-greater-than-unity rule of thumb was used to determine the number of factors to extract. All eight sub-scales of the RSLQ were found to be uni-dimensional. All factor loadings were acceptable (> 0.30) and variance explained in each factor was satisfactory (> 40%).

The results are presented in Table 3. It must be noted that the aim of the EFA was to assess dimensionality of each scale and not to explore the factor structure of the RSLQ across dimensions, which would have been inappropriate if CFA was to follow (Hair *et al.*, 2010).

### Confirmatory factor analysis (CFA) results

**First-order confirmatory factor analysis:** The goodness-of-fit index (GFI) indices for the first-order measurement model are displayed in Table 4. In the model tested here, the eight subscales were hypothesised to represent latent factors that cause variance in their respective indicator variables. The root mean square error of approximation (RMSEA) of 0.04 indicated good (close) fit, with 90% CIs [0.03; 0.04] indicating that the hypothesis of close fit was not rejected at $p = 0.01$. The absolute, relative and comparative indices all indicated acceptable model fit, goodness-of-fit (GFI) = 0.89, normed fit index (NFI) = 0.97, comparative fit index (CFI) = 0.99.

The standardised factor loadings (see Table 5) were generally significant and substantial (> 0.5), except for one item (Item 8) with a relatively low loading (0.36) on its hypothesised latent factor, that is, *focusing thoughts on natural rewards*. As is evident, all items were reasonable indicators of their respective latent factors.

The latent correlations amongst the eight RSLQ dimensions are given in Table 6. These correlations essentially reflect the

**TABLE 3:** Exploratory factor analysis output for the RSLQ self-leadership dimensions.

| Scale | Number of items | Factor Loadings | % Variance explained |
|---|---|---|---|
| Visualising successful performance | 5 | 0.47–0.87 | 50.4 |
| Self-goal setting | 5 | 0.62–0.77 | 51.3 |
| Self-talk | 3 | 0.80–0.86 | 69.8 |
| Self-reward | 3 | 0.78–0.92 | 75.1 |
| Evaluating beliefs and assumptions | 4 | 0.50–0.80 | 45.5 |
| Self-observation | 4 | 0.64–0.83 | 54.3 |
| Focusing thoughts on natural rewards | 5 | 0.36–0.76 | 40.1 |
| Self-cueing | 2 | 0.84–0.84 | 69.8 |

**TABLE 4:** Goodness-of-fit indices obtained for the measurement and structural models.

| CFA Model | RMSEA | $p_{close\ fit}$ | SRMR | GFI | AGFI | NNFI | NFI | CFI |
|---|---|---|---|---|---|---|---|---|
| First-order CFA | 0.04 | 1.00 | 0.05 | 0.89 | 0.87 | 0.99 | 0.97 | 0.99 |
| Second-order CFA | 0.04 | 1.00 | 0.06 | 0.88 | 0.86 | 0.98 | 0.96 | 0.99 |

RMSEA, Root mean square error of approximation; $p_{close\ fit}$, $p$-value for test of close fit ($H_0$: RMSEA < 0.05); SRMR, Standardised root mean residual; GFI, Goodness-of-fit; AGFI, Adjusted goodness-of-fit index; NNFI, Non-normed fit index; CFI, Comparative fit index.

correlations between the eight RSLQ subscales corrected for the attenuating effect of (random and systematic) measurement error. The correlations are within reasonable limits ($0.29 < r < 0.76$), as high values ($> 0.90$) may have indicated severe multi-collinearity (Tabachnick & Fidell, 2001).
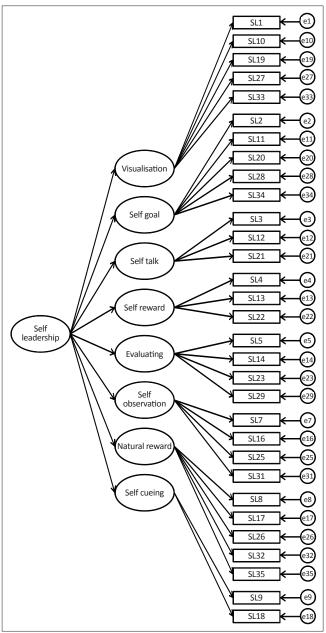
## Second-order confirmatory factor analysis

Next, the researchers tested a second-order hierarchical model, where a single self-leadership latent dimension was hypothesised to affect the eight remaining sub-dimensions

of self-leadership, which, in turn, would cause variance in their respective observed variables (see Figure 1). The results of the second-order CFA indicated that the data fit the

**TABLE 5:** Factor loading estimates[a] for self-leadership measurement model (first-order).

| Item[b] | VSP | S-GOAL | S-TALK | S-REW | EBA | S-OBS | FTNR | S-CUE |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.56 | - | - | - | - | - | - | - |
| 10 | 0.80 | - | - | - | - | - | - | - |
| 19 | 0.86 | - | - | - | - | - | - | - |
| 27 | 0.76 | - | - | - | - | - | - | - |
| 33 | 0.52 | - | - | - | - | - | - | - |
| 2 | - | 0.59 | - | - | - | - | - | - |
| 11 | - | 0.77 | - | - | - | - | - | - |
| 20 | - | 0.75 | - | - | - | - | - | - |
| 28 | - | 0.74 | - | - | - | - | - | - |
| 34 | - | 0.72 | - | - | - | - | - | - |
| 3 | - | - | 0.77 | - | - | - | - | - |
| 12 | - | - | 0.86 | - | - | - | - | - |
| 21 | - | - | 0.85 | - | - | - | - | - |
| 4 | - | - | - | 0.79 | - | - | - | - |
| 13 | - | - | - | 0.89 | - | - | - | - |
| 22 | - | - | - | 0.93 | - | - | - | - |
| 5 | - | - | - | - | 0.64 | - | - | - |
| 14 | - | - | - | - | 0.75 | - | - | - |
| 23 | - | - | - | - | 0.53 | - | - | - |
| 29 | - | - | - | - | 0.75 | - | - | - |
| 7 | - | - | - | - | - | 0.69 | - | - |
| 16 | - | - | - | - | - | 0.66 | - | - |
| 25 | - | - | - | - | - | 0.80 | - | - |
| 31 | - | - | - | - | - | 0.70 | - | - |
| 8 | - | - | - | - | - | - | **0.36** | - |
| 17 | - | - | - | - | - | - | 0.55 | - |
| 26 | - | - | - | - | - | - | 0.68 | - |
| 32 | - | - | - | - | - | - | 0.76 | - |
| 35 | - | - | - | - | - | - | 0.76 | - |
| 9 | - | - | - | - | - | - | - | 0.80 |
| 18 | - | - | - | - | - | - | - | 0.87 |

Factor loadings < 0.40 are in bold.
VSP, Visualising successful performance; S-GOAL, Self-goal setting; S-TALK, Self-talk; S-REWARD, Self-reward; EBA, Evaluating beliefs and sssumptions; S-OBS, Self-observation; FTNR, Focusing thoughts on natural rewards; S-CUE, Self-cueing.
[a], Factor loadings (*lambda X*) are completely standardised; [b], Item numbers correspond to the order in: Houghton, J.D., & Neck, C.P. (2002). The revised self-leadership questionnaire: Testing a hierarchical factor structure for self-leadership. *Journal of Managerial Psychology, 17*(8), 672–691. http://dx.doi.org/10.1108/02683940210450484



Note: Coefficient estimates were excluded for the sake of simplifying the path diagram.

**FIGURE 1:** The RSLQ second-order confirmatory factor analysis path diagram indicating eight first-order factors loading onto a single second-order self-leadership factor.

**TABLE 6:** Inter-correlations between Latent RSLQ dimensions, Average variance extracted (AVE) and shared variance estimates.

| DIMENSIONS | VSP | S-GOAL | S-TALK | S-REWARD | EBA | S-OBS | FTNR | S-CUE |
|---|---|---|---|---|---|---|---|---|
| VSP | **0.51** | 0.58 | 0.27 | 0.15 | 0.23 | 0.30 | 0.42 | 0.25 |
| S-GOAL | 0.76 | **0.51** | 0.17 | 0.08 | 0.23 | 0.52 | 0.52 | 0.29 |
| S-TALK | 0.52 | 0.41 | **0.69** | 0.11 | 0.16 | 0.10 | 0.15 | 0.08 |
| S-REWARD | 0.39 | 0.29 | 0.33 | **0.76** | 0.18 | 0.10 | 0.20 | 0.12 |
| EBA | 0.48 | 0.48 | 0.40 | 0.43 | **0.45** | 0.22 | 0.41 | 0.14 |
| S-OBS | 0.55 | 0.72 | 0.31 | 0.31 | 0.47 | **0.54** | 0.37 | 0.14 |
| FTNR | 0.65 | 0.72 | 0.39 | 0.45 | 0.64 | 0.61 | **0.41** | 0.15 |
| S-CUE | 0.50 | 0.54 | 0.29 | 0.34 | 0.38 | 0.37 | 0.39 | **0.70** |

*N* = 373
Correlations are below the diagonal, squared correlations are above the diagonal and average variance extracted (AVE) estimates are presented on the diagonal.
VSP, Visualising successful performance; S-GOAL, Self-goal setting; S-TALK, Self-talk; S-REWARD, Self-reward; EBA, Evaluating beliefs and assumptions; S-OBS, Self-observation; FTNR, Focusing thoughts on natural rewards; S-CUE, Self-cueing.

model well (see Table 4), RMSEA = 0.04 (90% CIs: 0.03; 0.04), GFI = 0.88, NFI = 0.96, CFI = 0.99. Although the value for the standardised root mean squared residual (RMR) (0.06) marginally missed the 0.05 cut-off indicative of good fit, the other Goodness-of-fit Indices (see Table 4) indicated good fit of the second-order model with the data. The resulting fit indices suggest that a second-order model is a reasonable representation of the self-leadership construct, supporting the results of Houghton and Neck (2002).

The unstandardised gamma matrix (see Table 7) was used to assess the significance of the estimated path coefficients ($\gamma_{ij}$) expressing the strength of the influence of the general self-leadership factor on the eight latent self-leadership facets. In this table, the gamma parameters are significant if $t > |1.96|$ ($p < 0.05$) (Diamantopoulos & Siguaw, 2000). Judging from the $t$-values (all $> 1.96$) general self-leadership appears to have a positive and significant influence on all the sub-facets of self-leadership.

### Model modification indices (first-order model)

The aim of the model modification indices is to determine whether any of the currently fixed parameters, when freed in the model, would significantly improve the parsimonious fit of the model. Modification indices indicate the extent to which the chi-square fit statistic decreases when a currently fixed parameter in the model is freed and the model re-estimated (Jöreskog & Sörbom, 1993). According to the modification indices, consideration should be given to the possibility of a number of cross-loadings between items and factors other than those they were designed to measure. For example, fit would increase if item 16 loaded on the *Visualising successful performance* dimension and having items three, 14 and 29 loaded on the *Self-goal setting* dimension. Consideration should also be given to the possibility of having items three, 10, 21, 27 and 28 loaded on the *Evaluating beliefs and assumptions* dimension and having items 10 and 27 loaded on the *Self-observation* dimension. However, the magnitudes of the expected completely standardised parameter changes (i.e., the expected factor loading estimates that would be obtained if the currently fixed parameters would be set free) associated with the fixed parameters in this matrix do not warrant setting any of these parameters free, with a few exceptions. Item 29 could be freed to load onto *Self-goal*

**TABLE 7:** Latent variable intercorrelations between second-order self-leadership and first-order factors (unstandardised gamma matrix).

| Factor | γ | SE | $t^a$ |
|---|---|---|---|
| VSP | 0.83 | 0.08 | 10.61* |
| S-GOAL | 0.88 | 0.08 | 11.15* |
| S-TALK | 0.52 | 0.06 | 8.71* |
| S-REWARD | 0.47 | 0.06 | 7.61* |
| EBA | 0.65 | 0.08 | 7.91* |
| S-OBS | 0.73 | 0.07 | 10.82* |
| FTNR | 0.82 | 0.14 | 5.85* |
| S-CUE | 0.57 | 0.07 | 8.69* |

$N$ = 373.
γ, completely standardised path coefficients; SE, Standard error estimates; $t^a \geq |1.96|$ indicate significant parameter estimates. VSP, Visualising successful performance; S-GOAL, Self-goal setting; S-TALK, Self-talk; S-REWARD, Self-reward; EBA, Evaluating beliefs and assumptions; S-OBS, Self-observation; FTNR, Focusing thoughts on natural rewards; S-CUE, Self-cueing.
*$p < 0.05$.

*setting*; 21, 27, and 28 onto *Evaluating beliefs and assumptions* and item 27 onto *Self-observation*. However, to justify freeing the identified items, a convincing theoretical argument would have to be offered to explain why the items should be regarded as also reflecting latent dimensions and why the factor loading could be expected to be positive. A close look at the RSLQ items identified above shows that, although the modification indices point to the direction of including the items as indicators of the latent variables that they are also loading on, it does not make theoretical sense to do so.

### Power assessment

A Rweb (1.03) translation of the Statistical Analysis System (SAS) syntax provided by Preacher and Coffman (2006) was used to derive the power estimates for the tests of exact and close fit. In the study, a significance level (α) of 0.05, a sample size of 373 and the degree of freedom (*df*) in the structural model (second-order model) were used for calculations. A resulting power value of 1 for the tests of exact fit and close fit implies that, under the conditions that characterised this specific study, approximately 100% of incorrect models would be rejected. This boosts confidence in the model.

### Discriminant validity

Farrell (2010) presented a method for assessing the discriminant validity of two or more factors by comparing the average variance extracted (AVE) of each construct with the shared variance between constructs. The AVE reflects the average proportion of variance in the indicator variables that is accounted for by the latent variable that the indicator variables were tasked to represent (Diamantopoulos & Sigauw, 2000). If the AVE for each construct is greater than its shared variance with any other construct, discriminant validity is supported. In this case, two of the shared variance estimates were marginally greater than the average variance extracted estimates for each of the constructs (see Table 6). However, the use of 95% confidence intervals utilising an Excel macro developed by Scientific Software International (Mels, 2010) indicated that all the eight latent variables show discriminant validity as none of the 28 confidence intervals include unity.

## Discussion

The objective of the study was to contribute to the international research on the revised self-leadership questionnaire (Houghton & Neck, 2002) by testing the reliability and construct validity of the RSLQ on a South African sample.

### Outline of the research results

All the subscales with the exception of the focusing thoughts on natural rewards and evaluating beliefs and assumptions subscales had reliability coefficients above 0.8. First-order CFA confirmed the relationships between the observed variables comprising the eight latent variables of self-leadership. The results indicate that the RSLQ demonstrated sufficient factorial and/or construct validity. The second-order CFA confirmed that the eight self-leadership factors contributed to an overall self-leadership construct.

Based on the outcomes of the current study using a South African sample of young adults, it can be concluded that the revised self-leadership questionnaire showed good reliability, discriminant and factorial validity. This outcome is consistent with the findings reported in several other studies conducted in different countries such as China (Ho & Nesbit, 2009; Neubert & Wu, 2006), Portugal (Curral & Marques-Quinteiro, 2009), Turkey (Dogan & Sahin, 2008), and Germany (Andressen & Konradt, 2007).

### Practical implications

The study contributes to practice by confirming the sound psychometric properties of the RSLQ on a South African setting. The study also contributes to the advancement of the use of valid and reliable instruments as legislatively required (e.g., Employment Equity Act [No. 55 of 1998], Republic of South Africa, 1998) in South Africa.

The results of the study suggest that the RSLQ was able to measure self-leadership reasonably well in a South African sample. The measure appeared to render scores with an underlying theoretical structure that conforms to the proposed first and second-order structures of self-leadership. As such, the researchers recommend that practitioners and researchers utilise the current measure in its present form. However, more work is needed to replicate the researchers' findings in other populations, such as with working adults.

The study highlighted some possible weaknesses in some of the subscales, especially in the shorter measures. Future studies should develop some of the shorter subscales (e.g., self-cueing, self-reward and self-talk) in order to ensure that the underlying constructs are adequately measured in terms of breadth and depth of their respective content domains.

### Limitations of the study and suggestions for future research

The study had limitations which should be acknowledged. First, the study findings cannot be generalised to the broader population of working adults without further replication. The sample that was used consisted of mostly young adults (21–30 years) in the student role and, despite its adequate gender balance, it does not fully represent the demographic profile of South Africans from an ethnicity point of view. As such, more research is needed on the structure of self-leadership in a more demographically balanced sample. The researchers are also not sure that the measurement and structural models would fit equally well when comparing different cultural groups. With measurement invariance across cultures being such an important question in South African applied psychology, the researchers urge more work on the equivalence of the RSLQ on a multicultural South African sample. Also, an item bias analysis could indicate whether all items function equally well from an equivalence point of view. However, despite these recommendations, extant findings suggest that self-leadership measures transport relatively well across cultures (e.g., Ho & Nesbit, 2009; Neck & Houghton, 2006).

Lastly, there is a need to replicate the study using a sample made up of employees in the public and private sectors to see if similar results would be obtained. Future studies should attempt to draw probability samples from larger, more general populations in order to increase the generalisability of the results.

### Conclusion

The psychometric evaluation of the RSLQ in the study indicates good reliability and factorial validity. Overall, the results of this study are in line with international research regarding the psychometric properties of the RSLQ. The researchers also extend this research by showing that the factor structure of self-leadership may be hierarchical in nature, where general self-leadership 'causes' self-leadership in specific forms, as measured by the facets of the RSLQ.

The RSLQ may prove to be an effective self-leadership measure with much potential to facilitate empirical self-leadership research and practice. The researchers urge practitioners to use the RSLQ to promote self-leadership as a means to enhance both job and academic performance.

# Acknowledgements

### Competing interests

### Authors' contributions

B.M. (Stellenbosch University) was the project leader responsible for the data collection, statistical analyses and write-up of the article, whilst A.S.E. (Stellenbosch University) and F.D.K. (who was working at Stellenbosch University at the time of the study, now at the University of Cape Town) contributed to the write-up of the article.

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