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Validating strengths use and deficit correction behaviour scales for South African first-year students

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Orientation: It is well known that the first year at university can be very challenging and stressful for students. While some students mainly depend on the university to assist them through this time, other students want to proactively manage this stressful period themselves by focusing on their strengths and developing in their areas of weakness. Two new scales measuring proactive strengths use and deficit correction behaviour have recently been developed for employees. However, the psychometric properties of these new scales have not yet been tested on first-year students in the South African context.

Research purpose: To examine the validity, measurement invariance and reliability of the proactive strengths use and deficit correction scales for South African first-year university students.

Motivation for the study: In order to cope in the demanding university environment, first-year university students need to develop and apply proactive strategies, including using their strengths and developing in their areas of weaknesses. Several studies have indicated that proactive behaviour, specifically strengths use and deficit correction behaviour, lead to favourable outcomes such as higher engagement, lower burnout and more life satisfaction. Therefore, it is important to validate scales that measure these constructs for first-year students.

Research design, approach and method: A cross-sectional research approach was used. A sample of South African first-year university students aged between 18 and 23 years ($N = 776$) was collected. The two scales were tested for their factor structure, measurement invariance, reliability, and convergent and criterion validity.

Main findings: A two-factor structure was found for the strengths use and deficit correction behaviour scales. Measurement invariance testing showed that the two scales were interpreted similarly by participants from different campuses and language groups. Cronbach's alpha coefficients ($\alpha \geq 0.70$) indicated that both scales were reliable. In addition, the scales demonstrated convergent validity (comparing them with a general strengths use and proactive behaviour scale). Strengths use and deficit correction behaviour both predicted student burnout, student engagement and life satisfaction, with varying strengths of the relationships for strengths use and deficit correction behaviour.

Practical implications: Strengths use and deficit correction behaviour could enable students to manage study demands and enhance well-being. Students will experience favourable outcomes from proactively using strengths and developing their weaknesses, including reduced burnout and enhanced engagement and life satisfaction. Universities and lecturers can be informed, which allows them to develop support structures and provide students with opportunities to apply their strengths and develop thier deficits.

Contribution/value-add: The present study adds to the limited research available on initiating proactive behaviour to use strengths and improve deficits for university students by validating two new scales. This could help in facilitating positive outcomes for first-year university students within the South African context.

Introduction

As is the case with new recruits and newly appointed employees in organisations, first-year students face many challenges adjusting to a new academic environment. Some of these challenges include exposure to independent living, academic pressure, emotional vulnerability, social adaption and problems managing time and finances (Darling, McWey, Howard, & Olmstead, 2007; Fairbrother & Warn, 2003; Misra, Mckean, West, & Russo 2000). The university environment also pose stressors of its own, including adapting to an academic environment (Awino & Agolla, 2008; Ongori, 2007), a new semester system and often inadequate resources available for

students to perform effectively (Agolla, 2009; Fredrickson & Losada, 2005; Reeve, Shumaker, Yearwood, Crowell, & Riley, 2013).

Proactive behaviours are crucial for new students' successful transition from secondary to tertiary education because proactive behaviour is seen as a key component of individual career success (Erdogan & Bauer, 2005; Seibert, Kraimer, & Crant, 2001). They are now entering a new and unfamiliar life phase and need to utilise self-regulatory resources that facilitate new problem-solving skills and improve person–environment fit during this transition period, which is crucial for newcomers who are being socialised into their new roles (Ashforth, Sluss, & Saks 2007; Saks, Gruman, & Cooper-Thomas, 2011). Parker (2000) describes proactive behaviour as active, self-starting, persistent, anticipatory and future- or change-oriented conduct. Different types of proactive behaviour are identified in the literature, including seeking feedback (Ashford, Blatt, & Van de Walle, 2003), demonstrating initiative (Frese & Fay, 2001), building networks (Ashford & Black, 1996), gathering information (Morrison, 1993), helping others (Organ, 1988), taking charge (Morrison & Phelps, 1999) and redefining work (Ashford & Black, 1996; Wrzesniewski & Dutton, 2001).

Recently, and in line with the positive psychology approach, two additional forms of proactive behaviour were identified, namely strengths use behaviour and deficit correction behaviour (Van Woerkom et al., 2016). Individual strengths refer to specific individual characteristics, traits and abilities and when used energise a person and allow performance at his or her personal best (Linley & Harrington, 2006; Wood, Linley, Maltby, Kashdan, & Hurling, 2011). Individual deficits refer to ways of behaving, thinking or feeling, which do not necessarily come naturally to an individual, which the person does not necessarily enjoy doing, but in which the person can become competent if these deficits are developed (Meyers, Van Woerkom, De Reuver, Bakker, & Oberski, 2015).

The introduction of these two specific types of proactive behaviour is based on the notion that the ultimate challenge for positive psychology is to synthesise positive and negative aspects of human behaviour and to develop a combined focus of strengths and deficits, rather than an exclusive focus on one or the other. Therefore, it is important to develop and eventually overcome weaknesses as well as nurturing strengths (Linley, Joseph, Harrington, & Wood, 2006; Lopez, Snyder, & Rasmussen, 2003; Seligman, Parks, & Steen, 2004). Indeed, several recent studies have demonstrated that both strengths use and deficit correction behaviour can be related to valuable outcomes (Meyers et al., 2015; Peterson & Seligman, 2004; Van Woerkom et al., 2016).

Originally, the strengths use and deficit correction scales were introduced as additional forms of proactive behaviour and were conceptualised and measured in the organisational context (Stander & Mostert, 2013; Van Woerkom et al., 2016). However, the constructs of strengths use and deficit correction behaviour seem valuable to apply to first-year students. Strengths use behaviour is positively associated with well-being and vitality (Park, Peterson, & Seligman, 2004) and enables individuals to achieve success by fulfilling their potential (Govindji & Linley, 2007). Therefore, when first-year students demonstrate behaviour in which they use their strengths by adapting to new circumstances and their study environment, it could instil positive emotions and behaviour. This will allow them to tap into their personal resources (Frederickson, 2001) and increase their confidence in their abilities to succeed in their studies (Kaslow, Falender, & Grus, 2012). Also, when students work on improving their weaknesses or deficits, it can foster behaviour to identify ways of overcoming obstacles in pursuit of study goals, can ultimately lead to personal mastery and growth (Senge, 1990) and can lead to improvement in their performance (Dunn & Shriner, 1999; Ericsson, Nandagopal, & Roring, 2009).

Focusing on behaviours that emphasise strengths use and deficit correction is also important for universities as institutions (Luthans, Avolio, Avey, & Norman, 2007) because this type of behaviour from first-year students will help build resilience and promote adjustment, enhancing academic success and help lowering the high drop-out rate of first-year university students (DeRosier, Frank, Schwartz, & Leary, 2013). Furthermore, this could ultimately result in successful, educated and well-adjusted individuals equipped with knowledge, skills and competencies that will enable them to excel in the future (Pidgeon, Rowe, Stapleton, Magyar, & Lo, 2014; Wang, 2009).

Based on the discussion above, it is clear that studying strengths use and deficit correction behaviour of first-year students is important. However, the scales measuring these two constructs have been developed and validated in the organisational context and have not yet been validated and tested in a sample of first-year students.

Research objective

The goal of the present study is to validate the proactive strengths use and deficit correction scales for South African first-year university students. More specifically, this study aims to test the factorial validity, measurement invariance, reliability and convergent and criterion validity of these two scales.

Literature review

Proactive strengths use and deficit correction behaviour

Proactivity means the anticipation of both problems and opportunities and then to act upon them by taking a long-term view and then search actively for feedback (Balluerka, Gorostiaga, & Ulacia, 2014). Crant (2000, p. 436) explains that by using proactive behaviour, the role of taking initiative is to 'improve one's current circumstances and challenge the

status quo rather than to passively adapt to current conditions'. Proactive behaviour is also closely related to personal initiative, defined as a proactive and persistent behaviour form that individuals initiate to achieve work goals (Frese & Fay, 2001; Frese, Kring, Soose, & Zempel, 1996). Relevant proactive behaviours include taking charge (Morrison & Phelps, 1999), employing personal initiative (Frese & Fay, 2001), undertaking flexible role orientations (Parker, Wall, & Jackson, 1997), suggesting ideas for future improvements, self-started problem-solving, implementing change initiatives and social network-building (Grant & Ashford, 2008).

Van Woerkom et al. (2016) argue that it would also be valuable to measure strengths use and deficit correction as forms of proactive behaviour. Although several studies focus on the identification of strengths (e.g., the StrengthsFinder, Rath, 2007; the values in action inventory of strengths, Peterson & Seligman, 2004; and StandOut, Buckingham, 2011), recent studies have showed that it is the *use* of strengths that leads to favourable outcomes, including performance (Van Woerkom et al., 2016), well-being and greater self-esteem (Govindji & Linley, 2007; Harzer & Ruch, 2013; Wood et al., 2011). Strengths use behaviour is the active looking for opportunities to use one's strengths and refers to the initiative that students may take to use their strengths in their study environments. Individuals who use their strengths can experience significant increase in their personal growth initiative, hope and resilience and ultimately their performance (Luthans et al., 2007; Meyers et al., 2015).

Students may also take the initiative to overcome, develop or correct their areas of weaknesses or deficits. This is in line with goal orientation theory (Van de Walle, 1997). One may argue that during this phase of a students' life, there are several new challenges and obstacles that they have to overcome. It is likely that students in a new university environment may show the desire to develop themselves by acquiring new skills and improving their competencies, specifically students with learning goal orientation competence (Dweck & Leggett, 1988). Therefore, deficit correction behaviour is the active looking for opportunities to correct or develop one's deficits or weaknesses and refers to the initiative that students may take to develop or correct their shortcomings in their study environment.

Psychometric properties of the proactive strengths use and deficit correction scales

Van Woerkom et al. (2016) developed the strengths use and deficit correction behaviour scales as part of the four-factor Strengths Use and Deficit Correction Questionnaire (SUDCO) – a questionnaire that measures strengths use and deficit correction from both the organisational and individual perspective. Because the first two scales are specifically developed for the organisational context and the items refer to the organisation's support, these scales are not applicable to students. Therefore, only the two individual proactive behaviour scales will be examined in this study.

Factorial validity: Two studies confirm the four-factor structure of the SUDCO (Stander & Mostert, 2013; Van Woerkom et al. 2016) comprising the following factors: perceived organisational support for strengths use, perceived organisational support for deficit improvement, strengths use behaviour and deficit correction behaviour. An exploratory factor analysis in the study of Van Woerkom et al. (2016) clearly showed a four-factor structure, where the four factors explained 64.73% of the variance. Confirmatory factor analyses (CFAs) were also used in these two studies to confirm the factor structure of the SUDCO (Stander & Mostert, 2013; Van Woerkom et al. 2016). Four competing models were tested, including a four-factor model, a one-factor model (including all four dimensions), a two-factor model (distinguishing between strengths use and deficit improvement) and another two-factor model (differentiating between organisational and individual dimensions). The results of these studies showed that the four-factor model showed a significantly better fit compared to the competing models. Although all four factors were included in these studies, it is clear that proactive strengths use and deficit correction behaviour are two separate, although related, constructs. Based on these results, it is expected that a two-factor model will show a significantly better fit compared to a one-factor model (*Hypothesis 1*).

Measurement invariance: Measurement invariance refers to the level of comparability of scores across cultures (He & Van de Vijver, 2012, 2013; Van de Vijver & Tanzer, 2004) and investigates if measurement operations yield measures of the same attribute under different conditions (Horn & McArdle, 1992). Therefore, members from different groups who have the same standing on a particular construct should score the same on a test and ascribe the same meaning to measurement items (Schmitt & Kuljanin, 2008; Steenkamp & Baumgartner, 1998). Researchers will only be able to unambiguously interpret group differences when the measurement invariance of an instrument has been confirmed (Horn & McArdle, 1992; Steenkamp & Baumgartner, 1998).

Van de Vijver and Tanzer (2004) identified three levels of invariance. Firstly, configural invariance occurs when the model fits the data satisfactorily in all groups. When all nonzero factor loadings are significantly and substantially different from zero, and any correlations between the factors are significantly below a unity of one, one can indicate that there is discriminant validity between the (sub) factors comprising the above-mentioned construct (Byrne, Shavelson, & Muten, 1989). Secondly, metric invariance (also known as equal factor loadings) indicates that the units of measurement are similar across the groups tested. Metric invariance is an essential condition when comparing across groups and for all levels of measurement equivalence. Thirdly, scalar invariance indicates that subjects who have the same value on the latent construct should show equal values on the observed variable (Byrne et al., 1989).

Van Woerkom et al. (2016) investigated measurement invariance of the SUDCO. This was performed by means of configural, metric and scalar models for tests of invariance (Preti et al., 2013) based on age and gender in a multi-group analytical framework. The results showed strong measurement invariance, which indicates that male and female subjects, as well as employees from the different age groups perceive the items of the four dimensions in a similar way. Based on these results, it is expected that the proactive strengths use and deficit correction behaviour scales will also demonstrate measurement invariance between different campuses and language groups of first-year students (*Hypothesis 2*).

Reliability: Adequate reliability scores have been found in previous studies for the proactive strengths use and deficit correction scales. Van Woerkom et al. (2016) and Stander and Mostert (2013) reported Cronbach's alpha values of $\alpha > 0.90$ for both scales. Therefore, it is hypothesised that the strengths use and deficit correction behaviour scales will be reliable ($\alpha \geq 0.70$; *Hypothesis 3*).

Convergent validity: Convergent validity was investigated by relating the proactive strengths use and deficit correction behaviour scales to theoretically related constructs (Campbell & Fiske, 1959), including a general proactive behaviour measure (Belschak, Den Hartog, & Fay, 2010) and a general Strengths Use Scale (Govindji & Linley, 2007). As strengths use and deficit correction behaviours are considered to be forms of proactive behaviour, it can be assumed that these scales would correlate with a general scale measuring proactive behaviour. The Strengths Use Scale (Govindji & Linley, 2007) was included to assess the extent to which students use their strengths. Although it is argued that strengths use and deficit behaviour is positively related, a stronger correlation is expected between proactive strengths use behaviour than proactive deficit correction behaviour. Therefore, it is expected that strengths use and deficit correction behaviour will be related to general proactive behaviour and general strengths use (*Hypothesis 4*).

Criterion validity: In order to establish criterion validity of the proactive strengths use and deficit behaviour scales, the empirical association with external criterion that might be consequences of strengths use and deficit correction behaviour will be examined (DeVellis, 2011). This study will focus on potential outcome variables, including student burnout, student engagement and life satisfaction.

Students' experience of burnout manifest in feelings of exhaustion because of 'excessive studying and too many demands', that could leave them feeling incompetent with a cynical and detached outlook towards their studies. On the other hand, student engagement refers to a positive and fulfilling state of mind where students experience high levels of energy and are dedicated towards their studies (Schaufeli, Salanova, González-Romá, & Bakker, 2002). When students show proactive behaviour and initiate more favourable circumstances for themselves (Crant, 2000) by searching and using opportunities to apply their strengths and correct or develop their deficits, it could lead to feelings of fulfilment, accomplishment and competence, leading to increased levels of energy, motivation and enthusiasm (Erickson & Grove, 2007; Langelaan, Bakke, Schaufeli, & Van Doornen, 2006; Schaufeli & Salanova, 2007) and ultimately reduced feelings of burnout (Linley & Harrington, 2006; Seligman, Steen, Park, & Peterson, 2005). Also, the extent to which students apply proactive behaviour will determine the effort they put into educationally purposeful activities (Hu & Kuh, 2001). Coates (2007) states that when students use their strengths, they will choose to partake in learning and challenging academic activities, engage in formative communication with academic staff, become involved in enriching educational experiences and actively seek support from the university's learning entities. This self-starting behaviour from students promotes a sense of accomplishment (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007) that can lead to engagement (Coates, 2009). In addition, students can be engaged by improving their deficits by means of challenging themselves to learn (Coates, 2005), trying out new ideas and practicing their current skills. Also, when students self-assess, they refocus their own responsibility to remain engaged in the learning process (Krause, 2005). The findings of Van Woerkom et al. (2016) support this notion, showing that strengths use behaviour is strongly and positively related to vigour and dedication, while deficit correction behaviour was negatively related to cynicism. Based on these results, it is expected that strengths use behaviour and deficit correction behaviour will be negatively related to burnout (*Hypothesis 5*) and positively related to engagement (*Hypothesis 6*).

Life satisfaction can be seen as a subjective self-assessment of an individual's quality of life defined by feelings of contentment, fulfilment and happiness (Diener, Emmons, Larsen, & Griffin, 1985; Hamarat & Steele, 2002). Researchers agree with Seligman's findings that strengths use is not only a predictor of subjective well-being among students but also of life satisfaction (Forest et al., 2012; Linley, Nielsen, Gillett, & Biswas-Diener, 2010; Proctor et al., 2011). By using one's strengths, it is possible to enhance a fulfilling and satisfying life (Isaacowitz, Vaillant & Seligman, 2003; Seligman, 2002). In a similar fashion as with engagement, developing and improving one's weaknesses could also enhance general satisfaction with one's life (Rust, Diessner, & Reade, 2009). Therefore, it is expected that both strengths use and deficit correction behaviour will be positively related to life satisfaction (*Hypothesis 7*).

Research design

Research approach

A quantitative cross-sectional research design was used. Struwig and Stead (2001) describe the quantitative design as a form of conclusive research involving large representative samples and structured data collection procedures. Using the cross-sectional research design, the data were gathered by means of an electronic survey, making it possible to study participants at an exact point in time (Du Plooy, 2002). This approach is economical, cost-effective and saves time for the study.

Research method

Research participants and procedure

A convenient sample of first-year students studying at a South African tertiary institution with different campuses was used (N = 776). After permission was obtained from the university, data collection took place. The survey was web-based, and a link was sent to the respondents through e-mail. The e-mail explained the purpose and goal of the study and stated the possible value it can add to the university and its students. The participants were also ensured of the confidentiality and anonymity of their information and results. Participation was strictly voluntary. The proposed time-frame for completing the questionnaire was approximately 25–30 minutes. A reminder of completion was sent after 2 weeks of receiving access to the link.

The sample consisted of 776 participants of whom 479 (60.70%) were female and 297 (38.30%) were male participants. The majority of the participants' ages were between 18 and 23 years (86.20%). Furthermore, 449 (57.90%) of the sample were black, 293 (37.80%) were white, 29 (3.70%) were mixed race and 2 (0.30%) were Indian. The predominant home language of the participants was Afrikaans (39.70%) and Setswana (33.10%). The remaining languages represented 27.20% of the entire sample. The majority of the participants were on-campus students (62.10%).

Measuring instruments

A socio-demographic questionnaire was administered and included questions on age, gender, race, language, campus, faculty and degree. In addition, the following questionnaires were administered:

Proactive strengths use and deficit correction behaviour: It was measured with the two individual sub-scales of the Strengths Use and Deficit Correction (SUDCO) questionnaire (Van Woerkom et al., 2016). Five items that related best to the student context were chosen for proactive strengths use behaviour (e.g. 'I use my strengths proactively') and five items to measure deficit correction behaviour (e.g. 'I make an effort to improve my limitations'). All the items were measured on a 7-point Likert-type scale ranging from 0 (Almost never) to 6 (Almost always). Van Woerkom et al. (2016) found the scales to be reliable (Cronbach's α for strengths use behaviour = 0.92; Cronbach's α for deficit correction behaviour = 0.93).

General strengths use: It was measured with the Strengths Use Scale (Govindji & Linley, 2007). The scale consists of 14 items that enquire about the extent to which individuals use their strengths, which are then rated on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). The items in this scale were developed from a review of positive psychology literature (Wood, Linley, Maltby, Kashdan, & Hurling, 2011) and are the only measure available to assess strength use rather than the presence of strength. The Strength Use Scale has good psychometric properties including a clear one-factor structure, high loading items, high internal consistency (Cronbach's α > 0.90) and test-retest reliability of r = 0.84, as well as criterion and predictive validity with various indices of well-being (Govindji & Linley, 2007; Wood et al., 2011).

Proactive behaviour: It was measured by means of an adapted scale of Belschak, Den Hartog, and Fay (2010). The scale consists of 11 items that are measured on a seven-point scale, ranging from 1 (disagree strongly) to 7 (agree strongly). The first seven items measure students' behaviour within a study group (e.g. 'When working in a study group, you personally take the initiative to help share knowledge with group members'). The second set of items consist of four items referring to students' personal preference towards studying and career-enhancing methods (e.g. 'On a personal level, when you study you find new approaches to execute your tasks so that you can be more successful'). The alpha coefficient for the scale is 0.80 (Belschak & Den Hartog, 2010).

Student burnout: It was measured with the Maslach Burnout Inventory-Student Survey (MBI-SS) (Schaufeli et al., 2002), measured as one factor (De Beer & Bianchi, *in press*) using items from the core components of burnout, exhaustion and cynicism (Schaufeli & Taris, 2005). Exhaustion was measured with five items (e.g. 'I feel emotionally drained by my studies') and cynicism by means of four items (e.g. 'I have become less enthusiastic about my studies'). Items were scored on a seven-point frequency rating scale ranging from 0 (never) to 6 (always). The MBI-SS has been validated internationally (Schaufeli et al., 2002) and in South Africa (Mostert, Pienaar, Gauche, & Jackson, 2007). Mostert et al. (2007) reported Cronbach's α values of 0.74 for exhaustion and 0.68 for cynicism.

Student engagement: It was measured with the Utrecht Work Engagement Scale-Student Survey (UWES-S) (Schaufeli et al., 2002), also as one factor, using items from the core components of engagement, vigour and dedication (Llorens, Schaufeli, Bakker, & Salanova, 2007; Van Wijhe, Peeters, Schaufeli, & Van den Hout, 2011). Vigour was measured with five items (e.g. 'When I study, I feel like I am bursting with energy'). Dedication was also measured with five items (e.g. 'I am enthusiastic about my studies'). Items were scored on a seven-point Likert scale ranging from 0 (never) to 6 (every day). The UWES-S has been validated internationally (Schaufeli et al., 2002). In South Africa, Mostert et al. (2007) also reported acceptable Cronbach's α of 0.70 for vigour and 0.78 for dedication.

Life satisfaction: The Satisfaction with Life Scale (Diener et al., 1985) was used to measure life satisfaction on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Five questions were used (e.g. 'So far I have gotten the important things I want in life'). The internal consistency of the scale was found to be reasonable (α = 0.67; Diener et al., 1985).

Statistical analysis

Mplus 7.2 (Muthén & Muthén, 2014) was used to determine the psychometric properties of the adapted questionnaire. To determine the factorial validity, CFA was used. The

maximum likelihood estimator was used with the covariance matrix as input (Muthén & Muthén, 2014). To assess fit of the measurement and structural models, the following fit indices were considered: χ^2 statistic, the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA) and the standardised root mean square residual (SRMR). Acceptable fit is considered at a value of 0.90 and above for the CFI and TLI (Byrne, 2001; Hoyle, 1995). For the RMSEA, a value of 0.05 or less indicates a good fit, whereas values between 0.05 and 0.08 are considered to be an acceptable model fit (Browne & Cudeck, 1993). The cut-off point for SRMR was set at 0.05 (Hu & Bentler 1999). The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were also used to compare the fit of competing models (i.e. the lowest AIC and BIC value indicated the best fitting model; Van de Schoot, Lugtig, & Hox, 2012). Cronbach's α coefficients were used to determine the reliability of the constructs.

Measurement invariance was investigated based on campus and language groups. This was performed in Mplus by ascertaining the significance of the configural (similar factor structure), metric (similar loadings) and scalar (similar intercepts) models compared against each other. In instances where invariance tests are applied, a $p > 0.05$ is sought for the chi-square difference test to show that the models do not differ significantly.

Pearson product-moment correlation coefficients were used to investigate the relationship between the latent variables. In terms of statistical significance, the cut-off value was set at the 95% level ($p \leq 0.05$). Effect sizes were used to decide on the practical significance of the correlations (Steyn, 1999). A correlation of 0.30 and larger indicates a medium effect, whereas a correlation of 0.50 and larger indicates a large effect. Regressions were also added to create a structural model in order to investigate the hypothesised relationships between proactive SUDCO behaviour, burnout, engagement and life satisfaction.

Results

This section focuses on reporting the results for testing the factorial validity, measurement invariance based on campus and language groups, reliability and convergent and criterion validity. Results are presented in tables, followed by a description after each table.

Factorial validity

In order to determine the factorial validity of the proactive strengths use and deficit behaviour scales for students, CFA was used to test two competing measurement models. The first model was the hypothesised two-factor model consisting of strengths use behaviour (specified as the first dimension with five items loading on this factor) and deficit correction behaviour (specified as the second factor with five items loading on this factor). Competing was a one-factor model, where one factor was specified – the five strengths use and five deficit correction behaviour items loaded on a single factor. Table 1 displays the results after comparing the two-factor and one-factor measurement models.

The results presented in Table 1 show that the two-factor model was the best fit for the data. This model fitted the data significantly better compared to the one-factor model ($\Delta\chi^2 = 508.89$; $\Delta df = 1$; $p < 0.05$). These results offer support for *Hypothesis 1* – that a two-factor structure will fit the data significantly better compared to a one-factor structure. Table 2 presents the results for the standardised loadings of the items for the latent variables.

Table 2 indicates that the items loaded sufficiently on the respective factors. Standard errors were small, which indicates accurate estimations. For the strengths use behaviour factor, the smallest factor loading was for item 2 (0.62; 'I focus on the things I do well'), while the largest loading was for item 3 (0.79; 'I make the most of my strong points'). For deficit correction behaviour, the smallest loading was for item 6 (0.61; 'I concentrate on my areas of development'), while the largest proved to be for item 7 (0.78; 'I focus on developing the things I struggle with').

Measurement invariance testing

Invariance was tested between the different campuses and language groups. Three campus groups were included in the sample. The participants of each campus consisted of the following: Campus 1 (396 participants), Campus 2 (296 participants) and Campus 3 (73 participants). Because 73

TABLE 1: Results of the measurement models.

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC	BIC
Two-factor	107.02*	33	0.98	0.97	0.05	0.04	23076.85	23225.77
One-factor	615.91*	34	0.82	0.76	0.15	0.09	23583.72	23728.01

*, $p < 0.01$.

χ^2, Chi-square; *df*, Degrees of freedom; CFI, Comparative fit index; TLI, Tucker-Lewis index; RMSEA, Root mean square error of approximation; SRMR, Standardised root mean square residual; AIC, Akaike information criterion; BIC, Bayesian information criterion.

TABLE 2: Standardised factor loadings of the items for the latent variables.

Factor	Item text	Loading	SE
Strengths	1. I use my strengths proactively	0.75*	0.02
	2. I focus on the things I do well	0.62*	0.03
	3. I make the most of my strong points	0.79*	0.02
	4. I capitalise on my strengths	0.72*	0.02
	5. I organise tasks to suit my strong points	0.68*	0.02
Deficits	6. I concentrate on my areas of development	0.61*	0.03
	7. I focus on developing the things I struggle with	0.78*	0.02
	8. I reflect on how I can improve the things in my life that I am not good at	0.75*	0.02
	9. I make an effort to improve my limitations	0.77*	0.02
	10. I seek feedback regarding my areas of development	0.70*	0.02

*, $p < 0.001$; no cross-loadings of items between the different items.

SE, Standard error.

participants from Campus 3 were not sufficient for a CFA model, invariance was only tested between Campus 1 and Campus 2. Invariance among the 12 language groups in the present study could not be determined, as there were not enough participants in each language group. Instead, the participants were divided into two groups. The first group, consisting of 335 individuals, was labelled 'Western Germanic'. This group consisted of English- and Afrikaans-speaking students. The second group were labelled 'African' and consisted of 443 participants. The results of the measurement invariance tests are reported in Table 3.

As can be seen in Table 3, the two scales showed strong measurement invariance across all campuses, indicating no significant difference between metric against configural invariance (p = 0.35), scalar against configural invariance (p = 0.49) or scalar against metric invariance (p = 0.60). The two scales also showed strong measurement invariance for both Germanic and African language groups, indicating no significant difference between metric against configural invariance (p = 0.29), scalar against configural invariance (p = 0.16) and scalar against metric invariance (p = 0.16). These results confirm *Hypothesis 2* – that the proactive SUDCO behaviour scales will demonstrate measurement invariance between different campuses and language groups of first-year students.

Reliability coefficients, convergent validity and relationships with outcome variables

Table 4 displays the Cronbach's α coefficients and the correlation matrix for the latent variables of the research model.

As can be seen in Table 4, all scales were reliable (Cronbach's α reliability coefficients α ≥ 0.70). More specifically, strengths use behaviour (Cronbach's α = 0.84) and deficit correction behaviour (Cronbach's α = 0.84) were reliable, providing support for *Hypothesis 3.*

Convergent validity was established, since significant and positive relationships were found – both strengths use behaviour and deficit correction behaviour were statistically significantly correlated with strengths use (r = 0.74; r = 0.56) and also with proactive behaviour (r = 0.51; r = 0.47). These results provide support for *Hypothesis 4*.

Criterion validity

To test for criterion validity, a structural model was tested where strengths use behaviour and deficit correction behaviour predicted student burnout, student engagement and life satisfaction. The fit of the structural model was satisfactory (χ^2 = 2035.762; CFI = 0.90; TLI = 0.89; RMSEA = 0.06; SRMR = 0.05). Table 5 displays the results.

The regression results displayed in Table 5 indicate that strengths use behaviour has a significant negative relationship with burnout (β = -0.26; p = 0.001) and a significant positive relationship with engagement (β = 0.24; p = 0.001) and life satisfaction (β = 0.38; p = 0.001). Furthermore, deficit correction behaviour has a significant negative relationship with burnout (β = -0.16; p = 0.001). A significant positive predictive relationship was found between deficit correction behaviour and engagement (β = 0.34; p = 0.001) and life satisfaction (β = 0.16; p = 0.002). These results provide support for the criterion validity of the SUDCO behaviour scales, providing support for *Hypotheses 5, 6* and *7*. Furthermore, the structural model explained adequate variance in all the latent constructs: burnout (R^2 = 13.60%), engagement (R^2 = 28.10%) and life satisfaction (R^2 = 18.60%).

Discussion

This study argues that two recently developed scales, proactive strengths use behaviour and proactive deficit

TABLE 3: Results of the invariance testing based on campus and language.

Structural models	$\Delta\chi^2$	*df*	*p*
Campus			
Metric against configural	17.64	16	0.35
Scalar against configural	31.59	32	0.49
Scalar against metric	13.95	16	0.60
Language group			
Metric against configural	9.73	8	0.29
Scalar against configural	21.60	16	0.16
Scalar against metric	11.87	8	0.16

$\Delta\chi^2$, chi-squared; *df*, degrees of freedom; *p*, statistical significance.

TABLE 5: Regression results for the structural model.

Regression path	*β*	SE	*p*
Strengths use behaviour→ Burnout	-0.26	0.05	0.001
Strengths use behaviour→ Engagement	0.24	0.05	0.001
Strengths use behaviour→ Life satisfaction	0.38	0.05	0.001
Deficit correction behaviour → Burnout	-0.16	0.05	0.001
Deficit correction behaviour→ Engagement	0.34	0.05	0.001
Deficit correction behaviour→ Life satisfaction	0.16	0.05	0.001

β, beta coefficient; SE, standard error; *p*, two-tailed statistical significance.

TABLE 4: Cronbach's alpha coefficients, correlation matrix for the latent variables.

Variables	1	2	3	4	5	6	7
1 Strengths use behaviour	(0.84)	-	-	-	-	-	-
2 Deficit correction behaviour	0.61***	(0.84)	-	-	-	-	-
3 General strengths use	0.74***	0.56***	(0.94)	-	-	-	-
4 General proactive behaviour	0.51***	0.47**	0.64***	(0.78)	-	-	-
5 Burnout	-0.34**	-0.32**	-0.35**	-0.32**	(0.81)	-	-
6 Engagement	0.40**	0.47**	0.54***	0.52***	-0.42**	(0.82)	-
7 Life satisfaction	0.43**	0.38**	0.52***	0.41**	-0.57***	0.61***	(0.89)

Cronbach's alpha reliability coefficients in brackets on the diagonal: *, Statistically significant; **, Medium practical effect; ***, Large practical effect.

correction behaviour, could be valuable to examine among first-year university students. However, these two scales were developed and validated for employees working in organisations and have not yet been validated in a sample of students. Therefore, the objective of this study was to validate the proactive SUDCO scales (Van Woerkom et al., 2016) in a sample of South African first-year university students. More specifically, the study aimed at providing evidence by investigating the factorial validity, measurement invariance, scale reliability, and convergent and criterion validity of these two scales.

To examine the factorial validity, two competing measurement models were tested (a one-factor model vs. a two-factor model). The hypothesised two-factor model showed a significantly better fit to the data compared to a one-factor model, indicating that the two forms of proactive behaviour are distinct, although related. This result is in line with validation studies on employees, which also showed that these two scales are two distinct factors (Stander & Mostert, 2013; Van Woerkom et al., 2016).

Measurement invariance is seen as a requirement for any study in a cross-cultural situation (He & Van de Vijver, 2012) and focus on the level of measurement at which scores across different groups can be compared (Van de Vijver & Tanzer, 2004). This study focused on the measurement invariance across two unique campuses and between two main language groups. The configural, metric and scalar models were compared against each other respectively. The language groups consisted of the Germanic and African groups, and students from two distinct campuses were included as part of the invariance testing. No significant differences were found. These results provide preliminary evidence that these two scales have the potential to be administered successfully to students from different groups in cross-cultural studies, particularly for campus and language groups. Furthermore, the conclusions concerning similarities and differences found in these types of studies can be considered valid with more confidence and not discriminatory towards a specific language group or between different campuses (He & Van de Vijver, 2012; Van de Vijver, 2011).

In order to determine whether the proactive strengths use and deficit scales were reliable, Cronbach's α coefficients were calculated. Cronbach's α coefficients ≥ 0.70 were found for strengths use behaviour (α = 0.84) and for deficit correction behaviour (α = 0.84). Supporting results were found in the studies by Van Woerkom et al. (2016) and Stander and Mostert (2013), who found Cronbach's α values ≥ 0.90 for all four SUDCO scales. These results show promise that items consistently will measure the extent to which students apply proactive behaviour towards strengths use and deficit correction behaviour. The results can also be used for further studies aiming to investigate these constructs reliably among first-year students in a tertiary educational environment.

The next objective was to determine the convergent validity of the proactive SUDCO behaviour scales by investigating the relationship between theoretically similar constructs (i.e. general strengths use and proactive behaviour). Pearson product-moment correlation coefficients showed that both strengths use behaviour and deficit correction behaviour were moderately to strongly and positively related to strengths use and proactive behaviour. As expected, the relationship between proactive behaviour towards strengths use and general strengths use was much stronger compared to the relationship between proactive behaviour towards deficit correction and general strengths use, while both scales were related with about equal strength to proactive behaviour.

Finally, the criterion validity was examined by testing a structural model specifying the direct impact of proactive SUDCO behaviour on three relevant student outcomes, including student burnout, student engagement and life satisfaction. All the regression paths in the structural model were significant and in the expected direction.

The results showed that both scales were significantly negatively related to burnout, with strengths use behaviour showing a stronger relation with burnout (β = -0.26) than deficit improvement behaviour (β = -0.16). It has been shown in previous studies that individuals' use of their strengths is associated with lower stress levels (Buick & Muthu, 1997; Proctor, Maltby, & Linley, 2011; Wood et al., 2011). This may be because individuals experience a higher level of perceived competence to perform in their studies when using their strengths. When students are able to use their strengths, they tend to feel more content and good about themselves and are therefore more motivated to fulfil their potential (Linley & Harrington, 2006; Seligman et al., 2005). In addition, when individuals improve and develop their perceived deficits, it may create a sense of mastery or accomplishment. Performing tasks that fall within one's area of deficits and improving these deficits can have a positive effect on goal achievement, which, in turn, increases feelings of competence, which can reduce the effects of burnout (Erickson & Grove, 2007; Maslach, 2006; Schaufeli & Peeters, 2000).

With regards to the relationship with engagement, the results indicated that both SUDCO behaviours were significantly positively related to engagement. Interestingly, deficit correction behaviour had a stronger relationship with engagement (β = 0.34) compared to strengths use behaviour (β = 0.24). When students take the initiative to engage in activities that require continuous learning and place themselves in the position to practise skills and tasks in which they usually underperform, they will experience a sense of accomplishment in their studies, which in turn can lead to increased motivation and engagement. Wang, Cullen, Yao and Li (2013) found that first-year students who behave proactively in a university environment experienced higher engagement levels. This

may be because it is arguable that educational settings are focused and organised in such a way as to enhance students' strengths and overcome their weaknesses. The authors viewed it as essential for students to work proactively on overcoming 'pessimistic tendencies' in order to become more engaged in their educational and social environment. Also, studies have shown that employees' engagement is directly related to the use of their strengths (Lopez, Hodges, & Harter, 2005).

Finally, both SUDCO behaviours showed a significant and positive relationship with life satisfaction, although the relationship between strengths use behaviour and life satisfaction was much stronger ($\beta = 0.38$) than the relationship between deficit correction behaviour and life satisfaction ($\beta = 0.16$). The first-year student sample in the present study, who displayed self-starting behaviour to proactively use their areas of strengths, were most probably able to deal with challenges associated with the university environment and as a result experience higher levels of life satisfaction. This suggests that students who utilise their strengths and improve on their deficits will not only be able to deal with university challenges and stressors but also can have meaningful personal and study experiences (Seligman, 2011), which heighten their levels of life satisfaction. The study of Stander, Diedericks, Mostert and De Beer (2015) provides support for this finding by also demonstrating a positive predictive relationship between strengths use and life satisfaction. Additionally, the student sample studied by Rust et al. (2009) experienced significant increases in life satisfaction when improving their character strengths and weaknesses against a compared group who was not assigned to work on strengths and/or weaknesses. The group was required to keep weekly logs on how they used their strengths and tapped into opportunities to improve on weaknesses. The success of the second group was measured by the feasibility of the plans made in order to achieve this result, and the number of times they sought weekly feedback from trustees. Those who performed the above-mentioned activities frequently experienced higher levels of life satisfaction.

To conclude, the results of this study confirmed the validity of the proactive SUDCO scales, including factorial validity, measurement invariance, reliability and convergent and criterion validity. Both scales were significantly related to important student outcomes, including burnout, engagement and life satisfaction. Interestingly, compared to deficit correction behaviour, strengths use behaviour was more strongly related to burnout and life satisfaction, while deficit correction behaviour was more strongly related to engagement, compared to strengths use behaviour. This indicates that the two scales have different relationships with outcome variables. In general, this study provides a good foundation for future studies that want to examine proactive SUDCO behaviour among university students, specifically first-year students.

Limitations and recommendations

Although the present study makes valuable contributions to the measurement of SUDCO behaviour of first-year university students, some limitations and recommendations for future research should be mentioned. Firstly, the main focus of the study was on first-year university students. Future studies should also include students from different higher education tertiary institutions and students from different academic years. Secondly, a cross-sectional research design was used, which implies that the present study was restricted from exploring causal statements about the hypothesised relations to outcome variables. In order to draw more specific conclusions about the relation of SUDCO behaviour to student burnout, student engagement and life satisfaction, longitudinal research studies are recommended (Govindji & Linley, 2007). Thirdly, the present study could only investigate relations to three outcome variables, including burnout, engagement and life satisfaction. As the field of strengths use and deficit improvement is still relatively new (especially among students), it would also be valuable to investigate causal relationships of the SUDCO scales with other important outcome variables relevant to the student context, such as flourishing, well-being and academic performance. A fourth limitation was the use of a single self-report questionnaire since common method variance between predictor and outcome variables might have occurred (Malhotra, Kim, & Patil, 2006). Future studies could consider using mixed methods to obtain richer data, including interviews, reflection diaries and focus groups.

Practical implications

Literature is readily available on first-year university student drop-out rates and the challenges they face. However, literature is limited on the role that students' SUDCO behaviour may have on their success and well-being. The findings of the present study can be used to help students obtain knowledge about the outcomes of being proactive in using strengths and deficits. The findings of the present research will also add value to universities and educators by providing a better understanding of what proactive behaviour towards SUDCO entails and whether students are demonstrating this behaviour. Universities may develop supporting structures and interventions and work in collaboration with educators to provide first-year students with opportunities to apply their strengths and develop their weaknesses and thereby enhance the process of adapting and coping with a new academic environment. The results of the present study can serve as a basis for programs aimed at (1) providing academic, social and personal support in the first year; (2) involving students in activities to help familiarise them with the university, and thus become effective learners (e.g. guiding students to connect to university life and committees in order to develop a sense of belonging, Tinto, 1999, 2000; Pitkethly & Prosser, 2001); (3) exposing students to the university's diverse groups in order to enhance their learning

experience (Pitkethly & Prosser, 2001); (4) promoting effective, proactive and healthy ways to deal with university stress and demands; and (5) promoting increased performance, resilience, effective coping skills and positive reinforcement. These programmes might even be adapted to suit the needs of senior university students. This may lead to improved conditions for tertiary educators and students, as well as enhanced well-being and academic success among students.

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Competing interests

The authors declared no conflict of interest in the writing of this article.

Author's contributions

The first author, Prof Karina Mostert, was responsible for the conceptualisation of the article as part of a larger validation study of the SUDCO Questionnaire instrument and was mainly responsible for the writing of the article and interpretation of the results. Bianca Theron was responsible for the collection of the data, the reporting and interpretation of the research results and assistance with the writing of the article. Dr Leon de Beer was responsible for analyses of the data and interpretation of the results.

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