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To cite this article: Marianne van Woerkom, Karina Mostert, Crizelle Els, Arnold B. Bakker, Leon de Beer & Sebastiaan Rothmann Jr. (2016) Strengths use and deficit correction in organizations: development and validation of a questionnaire, *European Journal of Work and Organizational Psychology*, 25:6, 960-975, DOI: [10.1080/1359432X.2016.1193010](https://doi.org/10.1080/1359432X.2016.1193010)

To link to this article: <http://dx.doi.org/10.1080/1359432X.2016.1193010>



Published online: 06 Jun 2016.



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Strengths use and deficit correction in organizations: development and validation of a questionnaire

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(Received 1 June 2015; accepted 18 May 2016)

Although the positive psychology tradition emphasizes the importance of a balanced approach regarding individual strengths and weaknesses, there is no valid instrument to measure these phenomena in organizations. The purpose of the present studies is to develop and validate an instrument that measures four dimensions, namely perceived organizational support (POS) for strengths use, POS for deficit correction, strengths use behaviour, and deficit correction behaviour. In study 1 and 2, the Strengths Use and Deficit COrrrection (SUDCO) questionnaire was developed and tested for its factor structure, reliability, and convergent and criterion validity in two samples of South African employees ($N = 338$ and $N = 361$, respectively). In study 3, the convergent and criterion validity of the SUDCO were examined in a sample of Dutch engineers ($N = 133$). Results indicated that the intended dimensions of strengths use and deficit correction can be measured reliably with 24 items and showed convergent validity. Moreover, POS for strengths use and strengths use behaviour correlated positively with self- and manager-ratings of job performance, supporting the criterion validity of these scales. As expected, POS for deficit correction and deficit correction behaviour were unrelated to the performance ratings.

Keywords: positive psychology; strengths use; deficit correction; perceived organizational support; proactive behaviour

The emergence of the positive psychology approach has evoked an interest in the study of individual strengths, which refer to specific individual characteristics, traits, and abilities that, when employed, are energizing and allow a person to perform at his or her personal best (Linley & Harrington, 2006; Wood, Linley, Maltby, Kashdan, & Hurling, 2011). While instruments have been developed for the identification of particular strengths (e.g., the VIA-IS; Peterson & Seligman, 2004), recent studies have indicated that it is the use of strengths, no matter what these strengths are, that leads to valuable outcomes, such as work engagement and well-being (Harzer & Ruch, 2013; Keenan & Mostert, 2013), and reduced stress and greater self-esteem (Wood et al., 2011). Also, there is some initial evidence that employees who perceive a strengths-based climate in their organization perform better (van Woerkom & Meyers, 2015). This makes strengths use behaviour of employees and the perceived organizational support (Eisenberger, Huntington, Hutchison, & Sowa, 1986) for employees to use their strengths relevant concepts for organizational scholars.

Whereas some authors propagate an exclusive focus on strengths because amplifying strengths is thought to be

more effective than repairing weaknesses (Seligman & Csikszentmihalyi, 2000), and “fixing” weaknesses is thought to be demoralizing and demeaning (Hodges & Clifton, 2004), most authors agree that the ultimate challenge for positive psychology is to synthesize positive and negative aspects of human experience. This means that positive psychology should concern itself with repairing weakness as well as with nurturing strengths, and with remedying deficits as well as promoting excellence (Linley, Joseph, Harrington, & Wood, 2006; Seligman, Parks, & Steen, 2004). Individual deficits refer to ways of behaving, thinking, or feeling which do not come natural to an individual, which he or she does not enjoy doing, but in which he or she can achieve competent functioning if trained accordingly (Meyers, van Woerkom, de Reuver, Bakk, & Oberski, 2015). In spite of the recent attention for individual strengths, most developmental processes in organizations are still based on a deficit model in which a person’s area of weakness is seen as their greatest area of opportunity (Bouskila-Yam & Kluger, 2011; Roberts, Dutton, Spreitzer, Heaphy, & Quinn, 2005; Seligman & Csikszentmihalyi, 2000). Training, coaching, performance feedback or on the job

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learning processes (Cheng & Hampson, 2008; Jordan & Audia, 2012; Passmore, 2007) are often seen as a means to narrow identified competence gaps and to remediate employee deficits, and can indeed lead to considerable performance improvement (Dunn & Shriner, 1999; Ericsson, Nandagopal, & Roring, 2009; LaFleur & Hyten, 1995).

Previous studies have, however, never systematically compared the effects of a focus on strengths use versus deficit correction, and have never posed the question which of these approaches or which combination of both approaches leads to the most favourable outcomes. To answer this question, the field seems in need of scales to measure these phenomena. Although two scales have been developed to measure individual strengths use, one of these scales was validated among college students (Govindji & Linley, 2007), while the other scale applies to adults in general, but not to the working context specifically. Moreover, the latter scale combines items related to individual strengths use behaviour and items that refer to opportunities regarding strengths use (Wood et al., 2011). For this reason, we developed a new instrument that includes four scales to measure (1) strengths use behaviour, (2) deficit correction behaviour, (3) perceived organizational support (POS; Eisenberger et al., 1986) for strengths use, and (4) POS for deficit correction (anonymous, the authors). Although one scale of this instrument has been applied in the banking sector (Keenan & Mostert, 2013) and an adapted version of the instrument has been used in the context of sports coaching (Stander & Mostert, 2013), the complete instrument with all items was never systematically validated. Therefore, the aim of the present series of studies is to describe the development and validation of this instrument. A validated instrument creates the opportunity for future empirical studies to investigate the outcomes of strengths use and deficit correction, and the possible conditions under which it would be best to focus on either strengths or deficits or a combination of both to optimize individual and organizational outcomes. In the following sections, we elaborate on the theoretical background of our instrument. Next, we describe three studies: In study 1, we develop the new scales and examine their psychometric properties. In study 2, we cross-validate the factor structure of the scales and examine their convergent and criterion validity. Finally, in study 3, we examine the convergent validity of the scales in another cultural context, and test the criterion validity.

POS for strengths use and deficit correction

POS refers to employees' general beliefs regarding the extent to which their organization values their contributions and cares about their well-being (Eisenberger et al., 1986). Previous studies have indicated that employees can

perceive different forms of organizational support, for example, POS for innovation (Henkin & Davis, 1991) and POS for personal development (Hung, 2004). In this study, we argue that two additional forms of POS can be distinguished, namely POS for strengths use and POS for deficit correction.

In line with the general concept of POS, POS for strengths use refers to employees' beliefs concerning the extent to which the organization actively supports them to apply their strengths at work (Keenan & Mostert, 2013). Organizations can provide their employees with strengths use support by changing the allocation of tasks in line with employees' individual strengths, and by making use of complementary partnering with others (Linley & Harrington, 2006). This may shift performance requirements for an individual employee within a team to another domain, while the team as a whole is still responsible for the same task, making individual weaknesses less relevant for individual and team task performance.

POS for deficit correction refers to employees' beliefs concerning the extent to which the organization actively supports them to correct their deficits. Organizations may provide this kind of support by narrowing the gap between the actual and desirable performance through training, coaching, feedback, or on the job learning processes. Both POS for strengths use and POS for deficit correction can be seen as new types of organizational resources that are functional in achieving work-related goals, reducing job demands, and stimulating personal growth and development (Bakker & Demerouti, 2014). When employees are supported to engage in tasks that capitalize on their strengths, they are more likely to achieve performance goals. Moreover, these goals, or the way in which they are achieved, will be more self-concordant (Sheldon & Elliot, 1999), making it more likely that people put persistent effort into achieving them (Koestner, Lekes, Powers, & Chicoine, 2002). Being supported to use one's strengths is expected to bring about feelings of competence (Peterson & Seligman, 2004), making employees more effective in coping with job demands (Folkman & Moskowitz, 2004). Furthermore, strengths use support is likely to stimulate growth and development because learning curves tend to be steep when people get the chance to further their best skills and abilities (Peterson & Seligman, 2004).

POS for deficit correction can also be seen as a job resource because correcting performance deficits also contributes to the attainment of goals and to employee development. In addition, training and development opportunities to address individual weaknesses may diminish the stress that is associated with incompetent task performance (e.g., Brouwers & Tomic, 2000; Maslach, Schaufeli, & Leiter, 2001). Therefore, assisting employees in correcting their deficiencies may play an important role in reducing job demands and in providing opportunities for growth and development.

Strengths use and deficit correction behaviour

Apart from the organizational support for strengths use and deficit correction, employees may also engage in proactive behaviour aimed at using their own strengths or improving their deficits. Proactive behaviour refers to the initiative that employees take in improving their current circumstances or creating new favourable circumstances for themselves, rather than passively adapting to present conditions (Crant, 2000). Research suggests that proactive behaviour in the workplace is characterized by an active self-starting approach to work, thereby going beyond formal job requirements, and being persistent in overcoming difficulties that arise in the pursuit of goals (Frese & Fay, 2001). Proactive behaviour at work can, for instance, be aimed at improving working conditions and developing personal prerequisites to meet work demands, as well as seeking learning opportunities (Frese, Kring, Soose, & Zempel, 1996; Parker, 2000).

In the literature, a range of different types of proactive behaviour is discussed, including proactively seeking feedback (Ashford, Blatt, & Vandewalle, 2003), demonstrating initiative (Frese & Fay, 2001), and redefining work (Wrzesniewski & Dutton, 2001). In this study, we argue that actively looking for opportunities to use one's strengths or to correct one's deficits are also forms of proactive work behaviour.

Strengths use behaviour refers to the initiative that employees may take to use their strengths at work. For example, a business consultant with strength in building relationships may go about her task of selling consulting services by engaging in one-on-one dialogues with individual clients she already knows, instead of giving presentations to large audiences. Strengths use behaviour may also involve looking for complementary partnering, so that two or more colleagues with complementary strengths accomplish together what they would not have accomplished separately (Linley & Harrington, 2006).

Similarly, employees might take the initiative to correct their deficits. For instance, the same business consultant who has difficulties with giving presentations to large audiences that we discussed earlier may look for opportunities to practise her presentation skills in front of her colleagues. This is in line with goal orientation theory (Vandewalle, 1997) that posits that individuals with a learning goal orientation desire to develop themselves by acquiring new skills and improving competence (Dweck & Leggett, 1988). However, the learning goal orientation does not clarify what individuals may take as starting point for developing their competences; their strengths or deficits?

To conclude, the phenomena of strengths use and deficit correction in organizations can be described by distinguishing between the organizational support that employees perceive to use their strengths or correct their

deficits, and the proactive behaviour of employees aimed at using their strengths or correcting their deficits.

Hypothesis 1: Strengths use and deficits correction in organizations consists of four dimensions, namely POS for strengths use, POS for deficit correction, strengths use behaviour, and deficit correction behaviour.

Study 1: scale development and explorative test

The purpose of our first study is to develop a questionnaire that can be used to measure strengths use and deficit correction in organizations. By developing an instrument that can be used in different types of organizations and occupations, we enable more systematic research comparing the effects of a strengths-based approach to a more traditional deficit-based approach. We first describe the scale construction and then present results regarding the factorial validity and reliability of the developed scales.

Method

Participants and procedure

We collected data among a convenience sample of 697 South African employees working across different industries. A team of four student assistants and one PhD student approached several organizations sending them a research proposal to inform them about the project and asking them to forward the mail to their contacts and colleagues. As was outlined in this proposal, having a good command of English was a requirement for participating in the study. The surveys were delivered by hand or in electronic format to the participants. Only individuals working under the supervision of someone else with a minimum of a grade 10 high school qualification were requested to complete the questionnaires. We randomly split the data set in two, leaving 338 respondents for study 1, and 361 respondents for study 2. In the study 1 sample, respondents had an average age of 39.1 years ($SD = 10.73$) and the majority of the sample consisted of females (59.6%). Most employees worked in the mining and metal industry (32.3%), engineering (10.1%), and nursing (9.3%). On average, participants worked 6.6 years ($SD = 7.4$) for their current organization. A total of 43.7% of the sample had a high school qualification, 12.6% held a bachelor's degree, and 11.7% had a postgraduate degree.

Scale construction

We constructed a pool of 40 items (10 items for each of the constructs) to capture POS for strengths use, POS for

deficit correction, strengths use behaviour, and deficit correction behaviour. Based on the definitions of the constructs, preliminary items were generated by tapping into the literature on strengths use and deficit correction in organizations. The response options were worded to signify roughly equal intervals with respect to frequency of occurrence and included a seven-point frequency scale (0 = almost never, 6 = almost always).

After the items were developed, a panel of three subject experts and five masters' students in industrial psychology were provided with a definition of the four dimensions, and were then requested to classify the items, in so doing also identifying unclear or ambiguous items. In the case of problematic items, the panel members were asked to clarify issues with items and alternatives were discussed. After this evaluation phase, the items were scrutinized and adapted where necessary, resulting in an item pool of 33 items.

Results and discussion

Exploratory factor analysis

We used principal component analysis (maximum likelihood) with oblique rotation in SPSS to examine whether the items that were intended to measure our four constructs would indeed load on four separate components. Factors that consisted of more than one item and with an Eigen value ≥ 1.00 and items that loaded higher than .35 on the intended factor and lower than .35 on any other factor were retained. On the basis of these criteria, one item that loaded on a fifth factor had to be deleted. A second factor analysis on the remaining items resulted in a factor solution that satisfied all criteria. The results indicated that we can distinguish four dimensions of strengths use and deficit correction in organizations that were equal to the hypothesized dimensions, confirming our first hypothesis. [Table 1](#) presents the items, item means, standard deviations, Cronbach's alphas and factor loadings.

Together, the four factors explained 64.73% of the variance. Factor one (Eigenvalue = 12.59) was labelled POS for strengths use (seven items) and explained 39.35 % of the variance. The second factor (Eigenvalue = 4.61) was termed deficit correction behaviour (eight items) and explained 14.40% of the variance. Factor three (Eigenvalue 3.45) was labelled strengths use behaviour (nine items), which explained 10.77% of the variance. Finally, factor four (Eigenvalue = 1.42) was termed POS for deficit correction (eight items) and explained 4.43% of the variance. All four dimensions had high reliabilities, between .92 and .96. These results provide support for the hypothesized four dimensions regarding strengths use and deficit correction. However, to rule out that the four-factor structure may be due to specific characteristics of our sample, we cross-validated the findings on the other half of the data set.

Study 2: confirmatory factor analysis, convergent, and criterion validity

The purpose of the second study is to investigate whether the four-factor structure can be replicated in the other half of the sample, using confirmatory factor analysis. We expect that this four-factor model will fit the data better than (a) a two-factor model in which the items for POS for strengths use and POS for deficit correction load on one factor, whereas the items for strengths use behaviour and deficit correction behaviour load on the other factor and (b) a two-factor model in which the items for POS for strengths use and strengths use behaviour load on one factor, whereas the items for POS for deficit correction and deficit correction behaviour load on the other factor. We hypothesize:

Hypothesis 2: The four-factor model will fit the data better than two alternative models, in which items of different constructs were allowed to load on similar factors.

Moreover, we investigate the convergent validity of POS for strengths use and POS for deficit correction by relating them to theoretically related constructs (Campbell & Fiske, 1959). Since we conceptualize POS for strengths use and POS for deficit correction as job resources that are functional in achieving work-related goals, reducing job demands, and stimulating personal growth and development (Bakker & Demerouti, 2014), we expect that these scales will relate positively to another type of job resource with similar characteristics, namely supervisor support. POS for strengths use and POS for deficit correction are likely to be positively related to supervisor support, which also refers to instrumental help that may facilitate employees in reducing the impact of their job demands (Bakker, Demerouti, & Euwema, 2005). Also, supervisors act as agents of the organization and employees tend to view their supervisor's orientation towards them as indicative of the organization's support (Eisenberger et al., 1986). Several studies have reported positive relationships of POS with perceived supervisor support (Rhoades, Eisenberger, & Armali, 2001; Yoon & Thye, 2000).

Therefore:

Hypothesis 3: POS for strengths use and POS for deficit correction are positively related to supervisor support.

Furthermore, we investigate the criterion validity of strengths use behaviour and deficit correction behaviour (De Vellis, 1991). Because we define strengths use behaviour and deficit correction behaviour as specific forms of proactive behaviour, we expect these scales to be negatively related to cynicism and exhaustion and positively related to vigour and dedication. Workers

Table 1. Study 1: Items, means, standard deviations, Cronbach's alphas, and factor loadings of the strengths use and deficit correction scales ($N = 338$).

Item wording	<i>M</i>	<i>SD</i>	α	Factor			
				1	2	3	4
<i>POS for strengths use</i>							
This organization gives me the opportunity to do what I am good at	4.08	1.72	.96	.899	-.007	-.067	-.028
This organization allows me to use my talents	3.96	1.77		.889	-.033	-.008	.062
This organization ensures that my strengths are aligned with my job tasks	3.93	1.65		.878	.056	.000	.042
This organization makes the most of my talents	3.70	1.78		.835	.005	.038	.081
This organization focuses on what I am good at	3.76	1.77		.825	.003	.120	.052
This organization applies my strong points	3.73	1.72		.809	-.058	.123	.073
This organization allows me to do my job in a manner that best suits my strong points	4.24	1.51		.742	.022	-.001	-.009
<i>Deficit correction behaviour</i>							
At work, I focus on developing the things I struggle with*	4.13	1.47	.93	.029	.935	-.058	-.117
I engage in activities to develop my weak points at work	3.96	1.63		.060	.858	-.140	.062
In my job, I concentrate on my areas of development*	3.91	1.65		.019	.745	.040	.027
In my job, I make an effort to improve my limitations	4.27	1.44		.062	.733	.100	.015
In my job, I work on my shortcomings	3.87	1.58		-.015	.685	.044	.130
At work, I seek training opportunities to improve my weaknesses	3.96	1.76		-.131	.667	.073	.194
At work, I seek feedback regarding my areas of development	3.88	1.73		.009	.625	.111	.063
I reflect on how I can improve the things in my job that I am not good at	4.15	1.54		-.102	.604	.169	.185
<i>Strengths use behaviour</i>							
At work, I focus on the things I do well*	4.50	1.51	.92	-.134	-.093	.849	.102
In my job, I make the most of my strong points	4.61	1.41		.006	.047	.841	-.008
I organize my job to suit my strong points	4.58	1.44		.000	-.030	.832	-.008
I capitalize on my strengths at work	4.55	1.39		.040	-.043	.800	.039
I seek opportunities to do my work in a manner that best suits my strong points	4.66	1.37		-.013	-.008	.797	.021
I draw on my talents in the workplace*	4.51	1.42		.228	-.059	.653	.084
In my job, I try to apply my talents as much as possible	4.86	1.27		.175	.097	.591	-.091
I actively look for job tasks I am good at*	4.17	1.54		.002	.087	.551	-.057
I use my strengths at work	4.68	1.25		.180	.156	.417	-.108
<i>POS for deficit correction</i>							
In this organization, I receive training to improve my weak points	2.84	2.01	.92	-.022	-.036	-.018	.900
This organization focuses on improving my areas of development*	3.15	1.92		.141	-.056	-.063	.884
This organization requires me to work on my shortcomings	3.14	1.86		.056	-.085	.053	.864
In this organization, my development plan aims to better my weaknesses	3.45	1.80		-.052	.201	.079	.678
In this organization, performance appraisals address my areas of development	3.26	1.98		-.005	.133	.031	.669
This organization emphasizes the development of my weak points*	2.85	1.73		.019	.035	-.003	.628
This organization expects me to improve the things I am not good at	3.73	1.81		.081	.225	.028	.559
In this organization, I receive feedback regarding my limitations*	3.16	1.93		.138	.216	-.060	.553

*Based on the results of study 2, these items were not included in the final scale.

who are proactive and take the initiative to create more favourable circumstances for themselves (Crant, 2000) by looking for opportunities to leverage their strengths or correct their deficits may create an environment that provides a good fit with their values and needs (Strauss & Parker, 2014), making it less likely that they become cynical and exhausted, and more likely that they become vigorous and dedicated. Both strengths use behaviour and deficit correction behaviour are likely to enhance the need for competence, which increases worker vitality (Strauss & Parker, 2014). Previous studies found that proactive behaviour was positively associated with vigour, positive affect, and job satisfaction (Fritz & Sonntag, 2007; Greenglass & Fiksenbaum, 2009; Hahn, Frese, Binnewies, & Schmitt, 2012;

Wanberg & Kammeyer-Mueller, 2000) and negatively associated with absenteeism (Greenglass & Fiksenbaum, 2009; Wanberg & Kammeyer-Mueller, 2000). Therefore, we hypothesize that:

Hypothesis 4: Strengths use behaviour and deficit correction behaviour are positively related to vigour and dedication and negatively related to cynicism and exhaustion.

Method

Participants and procedure

We used the other half of the randomly split data set reported in study 1 (total data set $N = 697$), consisting of

Table 2. Study 2: Results of the confirmatory factor analysis of the strengths use and deficit correction scales ($N = 361$).

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
1: Four-factor model (POS for strengths use, POS for deficit correction, strengths use behaviour , deficit correction behaviour)	1664.89	489	.88	.87	.08	.06
2: Two-factor model (POS and behaviour)	4125.23	494	.63	.61	.14	.12
3: Two-factor model (strengths use and deficit correction)	4183.39	494	.63	.60	.14	.13
4: Refined four-factor model	783.30	276	.92	.91	.08	.05

361 respondents. Characteristics of the respondents were similar to those reported in study 1, with a slight majority of the sample consisting of females (56.8%), an average age of 36.41 years ($SD = 10.62$) and an average organizational tenure of 7.46 years ($SD = 7.4$). Just like the respondents in study 1, respondents worked in a diversity of sectors with the largest groups working in the mining and metal industry (29.2%) and engineering (9.7%). Educational background of the respondents was also comparable to study 1, with 39.7% having a high school qualification, 21.7% a (higher) vocational training background, 12.7% a bachelor's degree, and 13.8% a postgraduate degree.

Measures

POS for strengths use, POS for deficit correction, strengths use behaviour, and deficit correction behaviour were measured with the 32 items that were reported in study 1.

Supervisor support was measured with eight items from the English version of the Questionnaire on the Experience and Assessment of Work ("VBBA" scale; Van Veldhoven, De Jonge, Broersen, Kompier, & Meijman, 2002). An example item is "If necessary, can you ask your superior for help?" Items were rated on a four-point scale (1 = never, 4 = always). Cronbach's alpha was .74.

Cynicism and exhaustion were measured with subscales of the Maslach Burnout Inventory-General Survey (Schaufeli, Leiter, Maslach, & Jackson, 1996). Responses were given on a 7-point scale from 0 (never) to 6 (always). An example item for cynicism is "I doubt the significance of my work". An example item for exhaustion is "I feel burned out because of my work". Cronbach's α was .81 for each of the scales.

Vigour and dedication were measured with three-item subscales of the Utrecht Work Engagement Scale (UWES; Schaufeli, Bakker & Salanova, 2006). An example item of vigour is: "At work, I feel bursting with energy". An example item of dedication is "I find the work that I do full of meaning and purpose" (0 = never, 6 = always). Cronbach's α was .71 for vigour, and .83 for dedication.

Results

Confirmatory factor analysis

To test whether the four-factor solution fits the data better than six alternative models (Hypothesis 2), seven possible measurement models were tested with maximum likelihood estimation in the Mplus 7.3 software package. To assess the model fit, we used the χ^2/df ratio, the comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). For the χ^2/df ratio, values that are lower than 3 indicate a good model fit (Kline, 1998). Furthermore, levels of .90 or higher for CFI and TLI, and .08 or lower for RMSEA and SRMR indicate an acceptable fit of the model to the data (Hu & Bentler, 1999).

The results as presented in Table 2 indicate that the hypothesized four-factor model (Model 1) provided a significantly better fit to the data in comparison to Model 2 which consisted of a combined POS factor and a combined behaviour factor as latent variables ($\Delta\chi^2 = 2460.34$, $\Delta df = 5$, $p < .001$). The fit of the four-factor model was also significantly better than that of Model 3 with strengths use and deficit correction as the latent variables ($\Delta\chi^2 = 2518.5$, $\Delta df = 5$, $p < .001$). Therefore, Hypothesis 2 was supported. To further improve the fit of the four-factor model and to remove redundant items given the high reliabilities that we found in study 1, we removed eight items based on their wordings being similar to other items, modification indices, and the face and content validity of the remaining items. This led to a refined four-factor model (Model 4) with acceptable fit indices (CFI = .92, TLI = .91, RMSEA = .08, SRMR = .05, and χ^2/df ratio below 3). Moreover, the factor loadings of all items proved to have statistically significant acceptable values between .67 and .92, and the standard errors of all items were low (between .01 and .03) supporting the accuracy of estimation. Cronbach's alphas for the four scales were good (.95 for POS for strengths use, .89 for strengths use behaviour, .90 for POS for deficit correction, and .90 for deficit correction).

Convergent and criterion validity

To investigate the convergent and criterion validity of the SUDCO, we calculated correlations. The results are

Table 3. Study 2: Results of the invariance testing based on gender and age.

Grouping	Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	p
Gender*	Configural	1189.04	492	2.42	.90	.89	.09	.06	40.09 ^a	40	.63
	Metric	1206.35	512	2.36	.90	.89	.09	.06	17.31 ^b	20	.63
	Scalar	1232.13	532	2.32	.90	.89	.09	.06	25.78 ^c	20	.17
Age**	Configural	1192.32	492	2.42	.90	.88	.09	.06	40.16 ^a	40	.46
	Metric	1223.15	512	2.39	.90	.89	.09	.07	30.82 ^b	20	.06
	Scalar	1232.48	532	2.32	.90	.89	.09	.07	9.34 ^c	20	.98

Notes: *male $n = 152$, female $n = 200$ ** ≤ 35 years $n = 185$, ≥ 36 years $n = 167$. ^a = Configural vs. scalar; ^b = configural vs. metric; ^c = scalar vs. metric; p = model comparison significance

Table 4. Correlations among the dimensions of strengths use and deficit correction, job characteristics and well-being ($N = 361$).

	1.	2.	3.	4.	5.	6.	7.	8.
1. POS for strengths use								
2. Strengths use behaviour	.48**							
3. POS for deficit correction	.51**	.35**						
4. Deficit correction behaviour	.36**	.54**	.52**					
5. Supervisor support	.16**	.23**	.20**	.17**				
6. Exhaustion	-.15**	-.19**	-.18**	-.08	-.39**			
7. Cynicism	-.28**	-.24**	-.29**	-.12*	-.45**	.66**		
8. Vigour	.37**	.49**	.39**	.37**	.33**	-.23**	-.37**	
9. Dedication	.46**	.47**	.49**	.38**	.31**	-.27**	-.50**	.78**

* $p < .05$, ** $p < .01$ (one-tailed testing)

presented in Table 4. We hypothesized that POS for strengths use and POS for deficit correction would be positively related to supervisor support (Hypothesis 2). As can be seen in Table 3, we found positive correlations between POS for strengths use and supervisor support ($r = .16, p < .01$). Likewise, POS for deficit correction was also positively correlated with supervisor support ($r = .20, p < .01$), confirming our second hypothesis. Moreover, we hypothesized that strengths use behaviour and deficit correction behaviour would be negatively correlated with cynicism and exhaustion, and positively correlated with vigour and dedication (Hypothesis 3). We found that strengths use behaviour was indeed negatively correlated with exhaustion and cynicism ($r = -.19, p < .01$ and $r = -.24, p < .01$, respectively). Strengths use behaviour was also positively correlated with vigour and dedication ($r = .49, p < .01$ and $r = .47, p < .01$, respectively). Deficit correction behaviour was unrelated to exhaustion, and negatively related to cynicism ($r = -.08, n.s.$, and $r = -.12, p < .05$, respectively). Furthermore, deficit correction behaviour was positively correlated with vigour and dedication ($r = .37, p < .01$ and $r = .38, p < .01$, respectively), partially confirming our third hypothesis.

Conclusion and discussion

One of the aims of study 2 was to examine whether the four-factor structure that we found in study 1 could be replicated in

a new sample, using confirmatory factor analysis. We indeed found that the fit of the four-factor model was superior compared to two alternative models with two factors, in which items of different constructs were allowed to load on similar factors. We further improved the fit of the four-factor model by removing eight items with redundant item wordings, leading to an adequate model fit. Additionally, we found the four scales to be highly invariant for men and women and for young versus older workers, indicating robustness of the scale (see Appendix).

Another aim of study 2 was to examine the convergent validity of the SUDCO. As predicted, we found that both types of POS were positively related to supervisor support, suggesting that employees who feel supported to work on either their strengths or deficits are likely to feel supported by their supervisor. Furthermore, we found that both behavioural scales were negatively related to cynicism, and positively related to vigour and dedication. This suggests that strengths use and deficit correction indeed energize employees, leading to higher levels of engagement and lower levels of inactive work behaviour. Although we were not able to test for causality, it seems likely that strengths use and deficit correction behaviour on the one hand and well-being on the other hand are reciprocally related, thereby leading to a positive gain spiral (Hakanen, Perhoniemi, & Toppinen-Tanner, 2008). Whereas strengths use behaviour was negatively related to exhaustion, deficit correction

behaviour was not. Possibly, when employees make the effort to correct deficits, this costs energy, which means that their exhaustion will not be reduced.

In general, however, we can conclude that engaged employees are more likely to use their strengths and correct their deficits, while employees who feel burned out are less likely to do so. Moreover, we can conclude that employees who perceive support from the organization to use their strengths or correct their deficits, are more likely to perceive supervisor support. We do, however, not know how strengths use behaviour and deficit behaviour are related to proactive behaviour in general and how POS for strengths use and POS for deficit correction are related to POS in general. Also, we do not know to what extent our newly developed scales can predict job performance. Therefore, we investigate these matters in a third study.

Study 3: criterion validity of the SUDCO

In study 3, we further scrutinize the convergent validity of the SUDCO by relating POS for strengths use and POS for deficit correction to the general POS construct (Eisenberger et al., 1986). Although the general POS construct is much broader than our newly developed POS scales, we expect both scales to be related to POS because each of them refers to a specific type of support and expresses the care for the well-being of the employee, although in different ways. Hence:

Hypothesis 5: POS for strengths use and POS for deficit correction are positively related to POS.

We define strengths use behaviour and deficit correction behaviour as specific types of proactive behaviour. Therefore, we expect that both types of behaviour will be conceptually related to personal initiative (Frese & Fay, 2001) and proactive personality (Bateman & Crant, 1993), which refer to the actions that people can initiate and maintain to directly change their surrounding environment or themselves and to go beyond what is formally required in a given job.

Hypothesis 6: Strengths use behaviour and deficit correction behaviour are positively related to personal initiative and proactive personality.

Another aim of study 3 is to examine the criterion validity of the SUDCO by investigating the empirical association with an external criterion that might be the consequence of strengths use and deficit correction (DeVellis, 2011). We focus on job performance, as rated by the employee and the manager. In the positive psychology literature, it is widely propagated that people can only excel when they are in a position to build on their strengths (Buckingham & Clifton, 2001; Roberts et al., 2005; Seligman & Csikszentmihalyi, 2000), and that learning curves of

people who actively use their strengths are steep, leading to rapid performance improvement (Peterson & Seligman, 2004).

There are several theoretical explanations why using one's strengths would lead to better performance. First, employees who use their strengths capitalize on their abilities and research has shown that there is a linear relationship between ability and performance (Coward & Sackett, 1990). Second, using strengths while working will enhance experiences of mastery, thereby stimulating employees' self-efficacy (Bandura, 1997), which is positively related to performance (Stajkovic & Luthans, 1998). Third, employees who work in areas that suit their strengths experience higher levels of positive affect and well-being (van Woerkom & Meyers, 2015; Wood et al., 2011), which are both linked to job performance (Wright & Cropanzano, 2000). Although there is not much empirical evidence for the claim that strengths use leads to better performance, there are some indications that this might indeed be the case. For example, van Woerkom and Meyers (2015) found that a strengths-based psychological climate is positively linked to self-reported in-role and extra-role performance, and Meyers et al. (2015) found that a strengths intervention led to significant increases in hope and resilience, which are both related to performance (Luthans, Avolio, Avey, & Norman, 2007). Therefore, based on the reasoning above, we hypothesize that:

Hypothesis 7: POS for strengths use is positively related to self- and manager-ratings of job performance.

Hypothesis 8: Strengths use behaviour is positively related to self- and manager-ratings of job performance.

It is more complex to predict the relationship between deficit correction and performance. On the one hand, employees who remediate their deficits will set performance goals and will direct attention and effort towards these goals. This may lead to higher performance, especially when employees pursue a goal that is personally meaningful to them (Locke & Latham, 2002). Also, several studies among executives have shown that the most effective executives do not just stick to what comes naturally to them, but take on a variety of new assignments, learn critical lessons, and develop a wide repertoire of skills, abilities, and perspectives (Kaiser & Overfield, 2011; Lombardo & Eichinger, 2005). This suggests that working on deficits can contribute to individual performance.

On the other hand, correcting deficits is more tiresome and often requires numerous practice trials before a new task is finally mastered (Buckingham & Clifton, 2001; Ericsson, Krampe, & Tesch-Römer, 1993). The

cost-efficiency ratio of energy spent on correcting deficits is therefore less optimal than energy spent on strengths capitalization; while deficit correction may eventually lead to acceptable performance (Bouskila-Yam & Kluger, 2011), using strengths may foster excellent performance (Buckingham & Clifton, 2001). Deficit correction will therefore not quickly evoke mastery experiences and self-efficacy, and will be less inherently enjoyable, energizing, and motivating (e.g., Peterson & Seligman, 2004), so that it eventually may not affect job performance. This is in line with a study by Meyers and colleagues (2015) who found no effects of an intervention that focused on deficit correction on participants' levels of hope, resilience, self-efficacy, or optimism, which function as important mediators in reaching performance improvement (Luthans et al., 2007). For this reason, we do not formulate a hypothesis regarding the relation between POS for deficit correction or deficit correction behaviour on the one hand and job performance on the other hand.

Method

Participants and procedure

We conducted our third study within a department of a multinational organization situated in the Netherlands that develops devices and services for medical applications. The participants were researchers, clinical scientists, engineers, and support staff. After consent of the HR department, participants were informed about the purpose of the study through an explanatory letter enclosed with the questionnaire. Anonymity of the respondents was guaranteed and we stressed that participation was voluntary. The English paper and pencil questionnaires were distributed and collected by a research assistant. In total, 163 questionnaires were distributed of which 133 were completed (response rate of 81.6%). The majority of the respondents were males (79.7%). The average age of the respondents was 43.5 years (*SD* = 10.9). The respondents were highly educated; 38.3% had a bachelor's degree and 51.1% had a master's degree. Employees' average tenure at the organization was 14 years (*SD* = 11.9).

Measures

POS for strengths use, POS for deficit correction, strengths use behaviour and deficit correction behaviour were measured with 24 items of the newly developed scales (see Table 1). The reliabilities of the scales were good: POS for strengths use: $\alpha = .96$; POS for deficit correction: $\alpha = .84$; strengths use behaviour: $\alpha = .92$; and deficit correction behaviour: $\alpha = .95$.

POS was measured with the 16-item Survey of POS (SPOS) by Eisenberger and colleagues (1986). The items

could be scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). An example item is "Help is available from the organization when I have a problem". Cronbach's alpha was .90.

Proactive personality was measured with the six-item scale developed by Bateman and Crant (1993). An example item of this scale is "If I see something I don't like, I fix it" (1 = strongly disagree, 7 = strongly agree). Cronbach's alpha was .82.

Personal initiative was measured with a seven-item scale developed by Frese and colleagues (1997). An example item of this scale is "I actively attack problems" (1 = strongly disagree, 7 = strongly agree). Cronbach's alpha was .85.

Job performance was measured with two indicators from respondents' most recent official performance evaluation regarding their results (rated as 1 "partially meets expectations", 2 "solid results", or 3 "exceptional results") and behaviour (rated as 1 "correction required", 2 "valued player", or 3 "role model"). Also participants were asked to evaluate their own job performance using Wright and Staw (1999) global performance measure which consists of one item: "Overall, how would you rate your performance at this time?", ranging from (1) "poor" to (10) "excellent". The performance appraisal by the manager was available shortly before the time of data collection, making the causal order of the relation between strengths use and performance unclear. However, the most important aspect of criterion validity is not the time relationship between the measure and the criterion, but rather the strength of the empirical relationship between the two events (De Vellis, 1991).

Results

In hypothesis 5, we predicted that POS for strengths use and POS for deficit correction would be positively related to the general POS construct. As can be seen in Table 5, both POS for strengths use and POS for deficit correction correlated positively with general POS ($r = .68, p < .01$

Table 5. Correlations among the strengths use and deficit correction dimensions, POS, proactive behaviour, and personal initiative (*N* = 133)*.

	POS	Proactive personality	Personal initiative
Strengths use behaviour	.47	.45	.51
Deficit correction behaviour	.28	.40	.51
POS for strengths use	.68	.23	.33
POS for deficit correction	.37	.21	.21

*All correlations are significant at $p < .01$ (one-tailed testing)

and $r = .41, p < .01$, respectively), confirming our fifth hypothesis. Because of the rather high correlation between POS for strengths use and the general POS construct, we additionally examined whether the constructs were distinct from each other. The results of a confirmatory factor analysis indicated that a model with POS for strengths use and the general POS construct loading on separate latent factors fitted the data quite well ($\chi^2 = 360.369, df = 229, CFI = .93, TLI = .93, RMSEA = .07, SRMR = .06$), and significantly better than a model with the items from both constructs loading on one common factor ($\Delta\chi^2 = 278.80, \Delta df = 1, p < .001$). Together, these findings indicate that POS for strengths use and general POS are positively related but can be empirically distinguished.

In hypothesis 6, we predicted positive relationships between strengths use behaviour and deficit correction behaviour on the one hand and proactive behaviour and personal initiative on the other hand. As can be seen in Table 5, strengths use behaviour correlated positively with proactive behaviour and personal initiative ($r = .45, p < .01$, and $r = .51, p < .01$, respectively). Also, deficit correction behaviour correlated positively with proactive behaviour and personal initiative ($r = .39, p < .01$, and $r = .50, p < .01$, respectively). Together, these results support our sixth hypothesis.

To test our hypotheses regarding the criterion validity of our instrument, we calculated the correlations between our newly developed scales, manager-rated results, manager-rated behaviour, and self-rated performance. As can be seen in Table 6, the results show that POS for strengths use correlated significantly with self-rated performance ($r = .30, p < .01$), and work behaviour and results rated by the manager ($r = .18, p < .05$ and $r = .17, p = .05$). These results largely support hypothesis 7, in which we predicted a positive relationship between POS for strengths use and employee performance. Furthermore, we found significant positive relations between strengths use behaviour and self-rated performance ($r = .32, p < .01$), manager-rated behaviour ($r = .19, p < .05$), and manager-rated results ($r = .21, p < .01$). These results support our hypothesis 8, predicting a positive relationship

between strengths use behaviour and performance. In line with our reasoning, we did not find significant correlations between POS for deficit correction and deficit correction behaviour on the one hand and the three different performance ratings on the other hand.

Conclusion and discussion

In study 3, we examined the convergent and criterion validity of our new scales. We found additional support for the convergent validity by showing that POS for strengths use and POS for deficit correction are related to general POS and that strengths use behaviour and deficit correction behaviour are related to proactive behaviour and personal initiative.

Regarding the criterion validity, we can conclude that POS for strengths use and strengths use behaviour are positively related to performance, whereas POS for deficit correction and deficit correction behaviour are unrelated to performance. Although the correlations that we found with the manager ratings were small, they were still encouraging, especially given the small sample size. Taking the limitations into account, our findings do suggest quite consistently that strengths use may be a predictor of job performance, while deficit correction seems unrelated to performance. Although we did not expect POS for deficit correction and deficit correction behaviour to be related to performance, we can of course not prove that these relationships do not exist. Further research is needed, linking deficit correction to more specific performance measures.

General discussion

Although the positive psychology tradition emphasizes the importance of a balanced approach regarding individual strengths and weaknesses (Linley et al., 2006), there are no valid instruments to measure strengths use and deficit correction in organizations. Our studies contribute to the positive psychology literature by developing a reliable and valid instrument, consisting of four dimensions: (1) POS for strengths use; (2) POS for deficit correction; (3) strengths use behaviour; and (4) deficit correction

Table 6. Study 3: Correlations between dimensions of strengths use and deficit correction and self-rated and manager-rated performance ($N = 133$).

	Self-rated performance ^a	Performance appraisal organization behavior ^b	Performance appraisal organization results ^c
Strengths use behaviour	.32**	.19*	.21**
Deficit correction behaviour	.14	.11	.05
POS for strengths use	.30**	.18*	.17*
POS for deficit correction	.10	-.01	-.02

** $p < .01$, * $p < .05$, (one-tailed testing). Correlations with ^a are Pearson correlations. Correlations with ^b and ^c are Spearman correlations.

behaviour. We found support for the convergent and criterion validity of the SUDCO, indicating the robustness of our scales. With this questionnaire, future researchers can investigate the relative importance of investing in overcoming employee weaknesses and capitalizing on employee strengths and throw more light on the antecedents, consequences, and possible boundary conditions for effectiveness of these phenomena.

By showing that strengths use is related to performance, while deficit correction is not, our studies are among the first to provide support for the claim of positive psychologists that nurturing strengths may lead to excellent performance and may indeed be more effective compared to remediating deficits (Seligman et al., 2004). This is in line with Harzer and Ruch (2013) who found that when individuals apply their strengths at work, this leads to valuable outcomes irrespective of the content of the strengths. An explanation for the link between strengths use and performance may be found in self-determination theory (Deci & Ryan, 2000), which proposes that conditions supporting the need for autonomy, competence, and relatedness foster well-being and performance. Strengths use fosters these needs by allowing individuals to express their authentic self, use their capabilities, and thereby increase the chance that others will see them as they see themselves, leading to positive relationships (see also Cable, Gino, & Staats, 2013). Possibly, deficit correction may lead to acceptable performance in aspects of the job that are initially problematic but may not lead to excellent overall job performance, as reflected in formal yearly performance appraisals. In other words, overcoming deficits may be a “hygiene factor” that prevents underperformance in specific job tasks, while using strengths may function as a “satisfier” that brings about higher levels of self-efficacy and positive affect, resulting in an excellent overall performance. While the effect of using strengths may initially be limited to specific job tasks, overtime it may have a snowball effect on overall job performance. An employee who capitalizes on her strengths may over time become visible and recognized by others, including managers, leading to the creation of an idiosyncratic job (Miner, 1987, 1991) around her strengths, making excellent job performance more feasible. Our finding that both strengths use behaviour and deficit correction behaviour were negatively related to cynicism and positively related to vigour and dedication indicates that remediating weaknesses may also have the potential to energize and activate employees. This finding confirms the idea that positive psychology should concern itself with nurturing strengths and repairing weakness, instead of having an exclusive focus on strengths (Linley et al., 2006; Seligman et al., 2004).

Our findings do however put into perspective the dominant focus on ‘gaps’ as the ideal starting point for performance improvement (Aguinis, Gottfredson, & Joo,

2012; Luthans, 2002). The choice for such a focus is understandable because human beings are preprogrammed to attend to and mitigate the effects of negative events that may create adverse outcomes (Taylor, 1991). Yet, our results suggest that it might be more worthwhile to attend to positive events (Judge & Hurst, 2007; Langston, 1994), because these may inform us about opportunities on which to capitalize. While a focus on employee deficits strives towards uniformity comparing employees from the same function to the same set of competencies, a focus on employee strengths allows for more diversity in the way employees execute their job, in line with theories that acknowledge the active role that employee play in the design of their job and in the negotiation of their idiosyncratic employment arrangement (Berg, Wrzesniewski, & Dutton, 2010; Black & Ashford, 1995; Miner, 1987; Rousseau, Ho, & Greenberg, 2006).

Our findings contribute to the debate in the literature about whether positive psychology should be about an exclusive focus on strengths (Hodges & Clifton, 2004) or about equal attention for strengths and weaknesses (Linley et al., 2006). Surely, many employees are expected to work on their deficits and many organizations still make large investments in training and developing employees to remediate their weaknesses. Possibly, deficit correction will lead to effective performance when combined with strengths-based approach (Bouskila-Yam & Kluger, 2011) and when focused on knowledge and skills that can be learned and improved, rather than mainly innately recurring patterns of thought, feeling, and behaviour (Aguinis et al., 2012). Also, setting realistic goals aimed at only minor improvement might be an important boundary condition for the effectiveness of deficit correction (Buckingham & Clifton, 2001). Furthermore, deficit correction might be more effective for individuals who set learning goals and who plan, monitor, and evaluate their progress as compared to individuals who set more distal outcome goals (Latham & Brown, 2006; Locke & Latham, 2006).

Our studies also add to the literature on personal growth and need satisfaction (Deci & Ryan, 2000; Porath, Spreitzer, Gibson, & Garnett, 2012). Personal growth refers to individuals expanding themselves in ways that reflect enhanced self-knowledge and effectiveness (Ryff, 1989), but the most effective starting point for personal development is yet unclear; one’s deficits or one’s strengths? Similarly, it is unclear what leads to a more powerful satisfaction of the need for competence (Deci & Moller, 2005), overcoming weaknesses or using strengths? On the one hand strengths use may lead to positive feedback, bringing about higher levels of perceived competence and intrinsic motivation (Harackiewicz & Larson, 1986), while deficit correction entails the danger of decreasing perceived competence, leaving people a-motivated and helpless (Deci,

Vallerand, Pelletier, & Ryan, 1991). On the other hand, overcoming deficits may satisfy peoples need for novelty and challenge, facilitating intrinsic motivation (Ryan & Deci, 2000). Strangely, theories on personal growth never explicitly address this issue. Maintaining a balance in using strengths and repairing weaknesses may be an answer to the question how people can become protean, but not purely reactive and ill-connected to their own identities (Hall, 2004).

Limitations and future research

Even though it is quite common for the purpose of scale development, a limitation of our findings is that these were all based on cross-sectional data, making it impossible to draw conclusions about causality. In our third study, the performance appraisal by the manager was already available before the time of data collection, making the causal order of the relation between strengths use and performance unclear. It is conceivable that employees who get a favourable performance appraisal start to rely more heavily on their strengths, because of the confirmation they get. It is also possible that reciprocal relationships exist, with strengths use influencing performance and the other way around. However, the most important aspect of criterion-related validity is not the time relationship between the measure and the criterion, but, rather, the strength of the empirical relationship between the two events (DeVellis, 2011). The aim of our studies was not to find evidence for the causal relationships of strengths use and deficit correction with other constructs, but to develop reliable and valid scales to measure these phenomena. Future studies with a longitudinal design should throw more light on the causal relationships with potential outcomes. Moreover, future studies could also further investigate the relationships with a construct such as job crafting (Tims, Bakker, & Derks, 2012), that also includes developmental activities, although not explicitly focused on strengths on deficits.

A limitation regarding the behavioural scales is that we did not address the dispositional bases of these types of behaviour. Future research may attempt to develop trait-like and state-like versions of these scales, in line with similar constructs such as learning goal orientation (Steele-Johnson, Heintz, & Miller, 2008). These measures could help to clarify whether some individuals are more inclined than others to focus on either their strengths or their deficits across a broad range of situations. Future research could also examine to what extent POS for strengths use and deficit correction may stimulate strengths use behaviour and deficit correction behaviour.

A limitation regarding the scales for deficit correction is that we do not have evidence for their criterion validity regarding performance, since both scales were, as expected, unrelated to performance. However, proving that a

relationship does not exist is problematic with the existing statistical techniques. Future studies would therefore need to include outcomes that are specifically related to deficit correction and the area of specific deficits. Moreover, it would be worthwhile to explore possible moderators in the relation between deficit correction and possible outcomes like performance or satisfaction. For example, deficit correction behaviour may only be related to performance under the condition of high levels of strengths use support, or under the condition of high levels of engagement.

Practical implications

The developed scales may assist practitioners in examining the optimal approach to performance improvement in a specific context. By measuring the type of organizational support that is perceived by employees, and their behaviour regarding strengths use and deficit correction, as well as possible outcomes like performance and well-being, it is possible to determine the most successful approach to employee development. Building on these findings, HR practices, such as performance appraisals and personal development plans may be designed in such a way that they contain the optimal mix of support for strengths use and deficit correction. For instance, instruments like the Values in Action Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004), feed-forward interviews (Bouskila-Yam & Kluger, 2011), and reflected best self-exercises (Roberts et al., 2005), may be included in performance appraisals, as a counterbalance to assessments against pre-determined criteria that are more deficit based. Also, in addition to training aimed at the remediation of deficits, a training that helps employees to identify, develop, and use their strengths (Quinlan, Swain, & Vella-Brodrick, 2011) may be an effective tool for enhancing personal growth initiative (Meyers et al., 2015) and employee performance (van Woerkom, Dirksen, Meyers, Spruyt, & Timmermans, 2015).

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Additionally, we test the robustness of the four scales by investigating to what extent men and women, and young and older respondents interpret the individual questions and the underlying latent factors in the same way (Van De Schoot, Lugtig, & Hox, 2012). We conducted a test for measurement invariance by running a set of increasingly constrained models, testing whether the differences between these models are significant (Van De Schoot et al., 2012). This included configural, metric, and scalar models for tests of invariance (Preti et al., 2013), based on age and gender in a multi-group analysis framework (see Table 3). For gender, 152 males were in the first group and 200 females were in the remaining group. For age, we made two groups, namely aged 35 or younger ($n = 185$), and aged 36 and older ($n = 167$). The configural invariance model serves as a baseline model for the more constrained models and investigates whether a similar underlying latent factor is evident in the different groups; the metric invariance model assumes the equivalence of the factor loadings in the applicable groups; while the scalar invariance model investigates whether the factor loadings and item intercepts are equivalent in the groups. The configural, metric, and scalar models are compared against each

other by mean of chi-square difference testing. As can be seen in [Table 3](#), the fit of all the invariance models can be considered adequate for its purpose when considering that the root mean square error of approximation (RMSEA) cut-off can be problematic in smaller samples and that the standardized root mean square residual (SRMR) should be preferred in these instances (Chen, Curran, Bollen, Kirby, & Paxton, 2008). Furthermore, [Table 3](#)

shows that when comparing the three models against each other with chi-square difference testing, there were no significant model differences ($p > .05$). Thus, the results indicate that there is strong measurement invariance based on gender and age. This indicates that males and females, as well as employees from the different age groups perceive the items of the SUDCO in a similar way.