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An empirical evaluation of the psychometric properties of the Sherer et al. general self-efficacy scale on the Zambian sample

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ABSTRACT

Background: The Sherer general self-efficacy scale (SGSES) is used to evaluate individuals' levels of self-efficacy. With poor low productivity levels among Zambian organisations there is a great need of assessing employee's self-efficacy in that self-efficacy is a predictor of employee performance (Bureau of African Affairs, 2012; Mills, 2010). However, the psychometric properties of the SGSES have not been established on a Zambian sample. This study therefore aimed at evaluating the reliability and construct validity of the SGSES among public service employees in Zambia.

Methods: A survey research design using a quantitative research strategy was used to achieve the research objectives. The factorial structure models underlying SGSES were investigated using item analysis, exploratory factor analysis (EFA) as well as the confirmatory factor analysis (CFA) via structural equation modelling.

Results: Statistical analyses provided acceptable fit of the measurement model with the empirical data.

Conclusion: This study has demonstrated evidence of construct validity for the usage of the SGSES in the Zambian context.

Keywords: Self efficacy, Psychometric properties

INTRODUCTION

Globalization has opened new business markets leading to heightened competition. To maintain a competitive advantage in the marketplace, organizations need to invest in the psychological well-being of its employees. Self-efficacy is one of the most important personal resources in the work context in that it is one of the psychological predictors of improved employee performance and work engagement (Loeb, 2014). Self-efficacy is an employee's belief or confidence that they are capable of performing a particular task successfully (Bandura,1977,1997; Brockner,1988;Kanter, 2006). The higher the level of self-efficacy, the more an individual believes he or she can execute the behaviour necessary to obtain a particular outcome (Bandura, 1997). It is for this reason that organisations need to measure employee's levels of self-efficacy at work.

The general self-efficacy scale is one such instrument that can be used. The Sherer general self-efficacy scale (SGSES) is a seventeen-item scale which was developed by Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs and Rogers (1982). It assesses an individual's belief in his or her own ability in mobilizing the motivation, cognitive responses and courses of action needed to meet given situation demands (Wood & Bandura, 1989; Imam, 2007). The instrument assesses self-efficacy using three subscales namely initiative, effort and persistence (Herrero, Espinoza, Molinari, Etchemendy, Garcia-Palacios, Botelka & Banos (2014). Validation studies on the general self-efficacy scale has been conducted in Holland (Boscher & Smit,1989) Spain (Herrero et al., 2014), Malayasia (Imam, 2007) and South Africa (Nel & Boshoff, 2020). To the researcher's knowledge there is presently little or no empirical evidence of studies done in Zambia regarding the general self-efficacy in the workplace.

Objective

The main objective of the study was to ascertain the reliability and construct validity of the Sherer general self-efficacy scale (SGSES) on the Zambian Sample. The specific objectives for this were to confirm the:

1) Reliability of the SGSES by computing the Cronbach's alpha reliability coefficient.

2) Construct validity of the SGSES by testing the measurement model goodness of fit using the confirmatory factor analyses.

3) To confirm discriminant validity of the SGSES.

The overarching substantive research hypothesis is that the Sherer general self-efficacy Scale provides a construct valid and reliable measure of self as defined by the instrument among Zambian employees. The overarching substantive research hypothesis can be divided into the following specific operational hypotheses:

- The construct referenced inferences derived from the SGESES could be considered valid (i.e. permissible) if: The measurement model implied by the scoring key and the design intention on the manner in which the SGESES items should reflect the latent dimensions of the self-efficacy construct shows close (or at least reasonable) fit;

- The unstandardized factor loadings λij are statistically significant ($p < .05$);

- The completely standardised factor loadings are large ($\lambda ij \geq .50$);

- The unstandardized measurement error variances $\theta_\delta ii$ are statistically significant ($p < .05$);

- The completely standardized measurement error variances are small ($\theta_\delta ii \leq .75$);

- The inter- hidden measurement correlate ϕkj statistically significantly ($p < .05$) but low with each other.

DATA AND METHODOLOGY

Study design

A quantitative ex post facto research design through structural equation modelling (SEM) was used to test the substantive research hypotheses

Study population

A sample of 224 employees in the public sector participated via an online survey. Of the respondents 53.1% were females while 34.8 % were females. 43,3% of the participants were aged between 18 -25, 55.4% between 26-35, 1.3 between 36-45. In terms of education 7.6 % were certificate holders, 9.8% had a diploma, 66.5 degree, 11.2% masters and 0.9% had Phd's.

Sampling

Convenient non-probability sampling method was used due to large numbers of sample sizes required by SEM.

Measuring Instrument

Data was collected using a shorter version (11 item) of the Sherer general self-efficacy scale (Bosscher & Smit, 1998). This scale has good psychometric properties warranting its usage. In Imam(2007) the scale obtained a cronbach alpha 0.85 while in Sherer et al.,(1982) a cronbach alpha of .86 was obtained.

Data analysis

Missing Values

Self-report instruments are often plagued by missing values (Mahembe & Engelbrecht, 2014). Treating missing values is the process of dealing with data sets with incomplete responses. In this study the problem of missing values was to be addressed through multiple imputation. The multiple imputation method conducts several imputations for each missing value (Smuts, 2011).

Test of Multivariate Normality

The default method used to estimate model parameters when fitting a measurement model to continous data is maximum likelihood estimation (Moyo, 2009). This method assumes that the data follows a multivariate normal distribution (Chikampa,2013). In this study Robust maximum likelihood (RML) estimation method was utilised to normalise the data (Mels, 2003).

Structural equation modelling

Structural equation modelling is a multivariate statistical analysis tool that explains the patterns of covariances found amongst the observed variables in terms of the relationships hypothesised by the measurement and structural models (Hair, Anderson,Tatham & Black,1995;Mahembe & Engelbrecht, 2014). The measurement model describes how each latent variable is measured by corresponding latent variables while the structural model describes the relationships between the latent variables (Diamantopoulos & Siguaw,2000) For this reason structural equation modelling was utilised because it enables the implementation of the logic underpinning the research design via confirmatory factor analysis.

Evaluating the measurement model

The evaluation of the SGSES CFA model was based on various goodness of fit indices (Bollen, 1989) such as the root mean square error of approximation (RMSEA), root mean squared residual (RMR), standardised root mean square residual (SRMR) goodness-of-fit index (GFI), adjusted GFI, normed fit index (NFI), non-normed Fit Index (NNFI), comparative fit index (CFI), incremental fit index (IFI), and relative fit index (RFI).

The RMSEA is one of the most informative fit indices for it tests for the closeness of fit in the null hypothesis (Diamantopoulos & Siguaw, 2000; Schumacker & Lomax, 2016). According to Browne & Cudeck (1993) as well as Diamantopoulos and Siguaw (2000) values below 0.05 suggest good model fit, those between 0.05 and under 0.08 suggest reasonable fit, values between 0.08 and 0.10 denote mediocre fit and values >0.10 indicate poor fit.

The root mean square residual RMR represents the average value of the residual matrix. According to Diamantopoulos & Siguaw (2000) RMR refers to a summary measure of fitted residuals.

The GFI is an indication of the relative amount of variance and covariances explained by the model (Diamantopoulos & Siguaw, 2000). Values greater than .90 would indicate that the model fits the data well (Diamantopoulos & Siguaw, 2000).

Other recommended comparative fit statistics include the CFI, NFI, NNFI, IFI and the RFI (Schumacker & Lomax, 2016). Values of the comparative fit statistics should range between 0 and 1, with values greater than .90 indicating that the model fits the data well (Diamantopoulos & Siguaw, 2000).

RESULTS

Missing Values

There were no missing values. The SGSES was administered via web based google forms hence reducing the likelihood of missing values because responses to all items were treated as mandatory by the system.

Reliability analysis

Reliability Coefficients results are shown in table 1. Two subscales namely the initiative and the effort subscales returned a high internal consistency of .73 and .75 respectively. The persistence sub scale did not meet the benchmark reliability standard of greater than 0.70 (Pallant, 2010). The relatively low cronbach alpha coefficient of .53 for the persistence subscale is noted as a limitation for this study.

Exploratory factor analysis

Exploratory factor analysis (EFA) was used to investigate the unidimensionality assumption with regards to each of the three subscales.

All three subscales were found to be uni-dimensional (Table 2). The items comprising the three scales all reflect a single underlying factor. All factor loadings except one were acceptable (> 0.50) and variance explained in each factor was satisfactory (> 40%) except for the persistence sub scale. According to Tabachinick and Fidel (2007) when the KMO approaches unity, or it achieves a value bigger than .60 the correlational matrix is deemed factor analysable. All KMO values were bigger than .60. The correlation matrix showed that all correlations were larger than .30 and all were significant (p<.05).

Multivariate normality

Robust maximum likelihood (RML) estimation method was performed to normalise the data.

Confirmatory factor analysis (CFA) results

Goodness-of-fit: The measurement model

The goodness of fit statistics for the measurement model are presented in Table 3. The RMSEA value of 0.0885 is just slightly above reasonable fit but falling into mediocre fit. The NFI (0.858), NNFI (0.875 and the RFI (0.816) values missed the 0.90 cut off while the GFI (0.919), CFI (0.903), IFI (0.905), exceeded .90 which represent good fit (Diamantopoulos & Siguaw, 2000; Kelloway, 1998). Overall, the goodness of fit indices for the SGSES measurement model are generally within acceptable fit cut off levels.

Measurement model factor loadings

The completely standardised factor loading for the SGSES items in the overall measurement model as shown in table 4 are generally satisfactorily large >.50 (Hair, Black, Babin, & Anderson, 2010) except for three items namely EFT1 (0.336), EFT2 (0.388), EFT5 (0.271) and PER1 (0.391) whose values had relatively low loading on the hypothesized latent factor.

TABLE 1: Reliability of the measurement scales

Scale	Number of items	Cronbach alpha (α)
Initiative	**3**	**.73**
Effort	**5**	**.75**
Persistence	**4**	**.53**

Measurement error variance

The completely standardised measurement error variances are shown in table 5. All the measurement error variances are satisfactorily small (≤ .75) except for item EFT1 (0.887), EFT2 (0.850), EFT5 (0.927), and PER1(0.847).

TABLE 2: Exploratory factor analysis output

Dimension	Number of items	Factor loadings	% Variance explained
Initiative	3	0.636 – 0.835	51.03
Effort	5	0.504 - 0.903	51.03
Persistence	4	0.403-0.580	23.58

TABLE 3: Goodness-of-fit indices for the measurement model

Model	RMSEA	PClose Fit	SRMR	GFI	NFI	NNFI	CFI	IFI	RFI
Measurement	0.08885	0.000262	0.0364	0.919	0.86	0.875	0.903	0.905	0.816

Note: RMSEA, root mean square error of approximation; Pclose fit, *P*-Value for test of close fit (RMSEA < 0.05); SRMR, standardised root mean residual; GFI, goodness-of-fit index; NFI, normed fit index;NNFI,non-normed fit index; CFI, comparative fit index; IFI, incremental fit index; RFI,relative fit index

Table 4 - Completely standardised lambda-X factor loading matrix of the SGSES measurement model**.**

ITEM	SGSES
INT1	**0.624**
INT2	**0.754**
INT3	**0.718**
EFT1	**0.336**
EFT2	**0.388**
EFT3	**1,000***
EFT4	**1.000***
EFT5	**0.271**
PER1	**0.391**
PER2	**0.584**
PER3	**0.532**
PER4	**0.517**

Note: INT refers to initiative, EFT refers to effort, PER refers to persistence * ($p < .05$)

Table 5- Completely standardized measurement error variances

INT1	INT2	INT3	EFT1	EFT2	EFT3	EFT4	EFT5	PER1	PER2	PER3	PER4
0.611	**0.431**	**0.485**	**0.887**	**0.850**	**0.001**	**0.001**	**0.927**	**0.847**	**0.659**	**0.717**	**0.733**

Squared Multiple Correlations

The squared multiple correlations (R2) of the indicators depict the extent to which the measurement model is adequately represented by the observed variables (Byrne, 1998). According to Diamantopoulos and Siguaw (2000) a high R2 value would indicate that variance in the indicator under discussion reflects variance in the latent variable to which it has been linked to a large degree. An examination of the R2 values shown in table 6 reveals below average correlations except for variables INT2, INT3,EFT3,EFT4 which were falling above (> .50).

In terms of the dissected overarching substantive research hypothesis, the SGSES to a limited degree met this evidentiary burden. Only three of the measurement error variances $\theta_{\delta ii}$ (INT2, EFT3, EFT4) were statistically significant ($p < .05$).

Table 6 –Squared multiple correlations for the items of the SGSES

INT1	INT2	INT3	EFT1	EFT2	EFT3	EFT4	EFT5	PER1	PER2	PER3	PER4
0.389	**0.569**	**0.515**	**0.113**	**0.150**	**0.999**	**0.999**	**0.073**	**0.153**	**0.341**	**0.283**	**0.267**

Discriminant Validity

The Phi matrix of the SGSES model as seen in table 6 revealed low to moderate correlations between the dimensions of the SGSES. Discriminant validity therefore did not present a problem. As stated by Chikampa (2013) evidence for lack of discriminant validity occurs when there are excessive high correlations between the latent variables in the phi matrix. More sophisticated analyses of the discriminant validity with which the SGSES measures the three latent dimensions of the Sherer general self-efficacy construct (i.e., calculating the 95% confidence intervals for ϕ_{kj} and calculating the average variance extracted (AVE) for each latent dimension of the SGSES construct and comparing AVE_k and AVE_j with ϕ^2_{kj}) was not considered necessary.

Table 7-Inter latent SGSES dimension correlations

	INTIATIVE	EFFORT	PERSISTENCE
INT	1.000		
EFF	-0.225 (0.080) -2.821	1.000	
PER	0.500 (0.097) 5.166	-0.251 (0.097) 5.166	1,000

DISCUSSION

This study aimed at assessing the psychometric properties of the SGSES on the Zambian Sample. Internal consistency was established except for one subscale. Results under exploratory factor analysis were generally satisfactory except for one low factor loading and low variance under the persistence subscale. Acceptable fit with the data was attained for the measurement model. These results are in line with those of Imam (2007) and Nel & Boshoff (2020). Theoretically the study makes a significant contribution to industrial psychology, human resource management literature by providing empirical support for the usage of the instrument in Zambia. Practically human resource practitioners can therefore make use of the SGSES for selection, training as well as performance management purposes.

Limitations of the study and suggestions for future research

Small sample size could have had a huge effect on the result. Future studies should replicate the study using bigger and culturally diverse samples.

CONCLUSION

The results of this study have provided limited empirical evidence of good psychometric properties of the measure on the Zambian sample. Caution should however be taken due to some limitations noted above which could have been perpetuated by the small sample size. Structural Equation Modelling (SEM) requires huge sample sizes if good results are to be obtained. Future studies should replicate the study using bigger and culturally diverse samples.

Availability of data and materials

The data used and analysed during the current study is available from the corresponding author on reasonable request.

Abbreviations

SGSES: Sherer General Self Efficacy Scale

RMSEA: Root Mean Square Error of Approximation

SRMR: Standardised Root Mean Residual

GFI: Goodness of Fit Index

NFI: Normed Fit Index

CFI: Comparative Fit Index

APPENDICES

None

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J.K. was responsible for Data collection and writing of the article

V.C. was responsible for Statistical analyses, interpretation of results and writing of the article.

I.M. was responsible for writing the article

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All respondents in this study consented before attempting items from the three measures. Ethical clearance was obtained from Mulungushi University ethical clearance committee.

Consent for publication

No images, individual details or videos for clients' data are part of this paper.

Competing interests

The authors declare that they have no financial or personal relationships which may have inappropriately influenced them in writing this article.

Declaration of interests

Not applicable

Submission declaration and verification

We declare that this paper has not been submitted to any journal besides this one

Use of inclusive language

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