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Psychometric Properties of the MBI-SS for South African university students

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Orientation: Student burnout has become increasingly evident among university students. However, to measure student burnout accurately in the South African context, it is essential to use validated, fair and unbiased instruments.

Research purpose: This study investigates the psychometric properties of the Maslach Burnout Inventory Student Survey (MBI-SS) in a sample of university students, focussing on factorial validity, measurement invariance, item bias and internal consistency.

Motivation for the study: International guidelines on psychometric assessments emphasise the importance of validation to ensure reliable, valid and unbiased measurement across diverse groups.

Research approach/design and method: A quantitative cross-sectional research design was used to validate the psychometric properties of the MBI-SS in a sample of university students (N = 2434) across three campuses of a South African university.

Main findings: The findings support the MBI-SS's three-factor structure and show measurement invariance across participating language and campus groups. While some items exhibited bias, the effects were negligible. The MBI-SS showed high internal consistency, demonstrating its reliability.

Practical/managerial implications: These findings support the reliable, valid and unbiased application of the MBI-SS among South African university students. Universities can use this instrument to measure student burnout, identify causal factors and enhance student well-being and academic success.

Contribution/value-add: This study contributes to the limited literature on the psychometric properties of the MBI-SS among university students in South Africa and could enable comparative analysis across different contexts within the country.

Keywords: burnout; MBI-SS; factorial validity; structural invariance; measurement invariance; strong invariance; item bias; internal consistency; university students.

Introduction

Higher education institutions (HEIs) often provide students with an exciting and fulfilling experience as they transition into a new phase of their lives. However, students can also experience this transition as challenging and stressful because of high academic demands, social adjustment, financial pressures and mental health challenges (Mulaudzi, 2023). The increase in academic expectations, assignments and examinations, and the pressure to manage social and personal obligations exacerbate students' levels of stress (Bresó et al., 2007; Mostert et al., 2007; Schaufeli et al., 2002). Prolonged exposure to these stressors could lead to burnout, leaving students physically and emotionally drained, finding it difficult to recover and often detaching from academic responsibilities (Robins et al., 2018).

Student burnout refers to feelings of exhaustion caused by excessive study demands, disengagement and a sense of academic inefficacy regarding academic expectations (Bresó et al., 2007; Mostert et al., 2007; Schaufeli et al., 2002). Student burnout manifests in three core dimensions, namely exhaustion, cynicism and reduced professional (academic) efficacy (Bresó et al., 2007). In turn, student burnout leads to negative student outcomes such as decreased academic performance, lack of motivation and poor mental health (Dyrbye et al., 2008; Faye-Dumanget et al., 2017). Furthermore, burnout has been associated with decreased student engagement, maladaptive behaviours, absenteeism and lower academic performance among university students specifically (Cilliers et al., 2018), which can potentially impact their long-term professional development (Anurat et al., 2024).

Numerous studies have focussed on the effect of burnout among students pursuing specific professions, such as medical students (Sanchez et al., 2019), dental students (Wilson et al., 2015) and psychiatric trainees (Morar & Marais, 2022). However, psychometric assessments must be accurate, effectively measure intended constructs, produce scores that can be meaningfully interpreted and remain unbiased across diverse groups (Rust et al., 2020). Therefore, this study aims to validate the Maslach Burnout Inventory Student Survey (MBI-SS) within the South African context by examining its psychometric properties.

Literature review

Background and conceptualisation of student burnout

Initially, burnout referred to emotional exhaustion and cynicism primarily experienced by employees in people-centred occupations. (Maslach & Jackson, 1981). However, the term was broadened to include other occupations, including students (Schaufeli et al., 2002). Student burnout consists of three core dimensions: exhaustion, cynicism and reduced professional efficacy (Bresó et al., 2007; Schaufeli et al., 2002). *Exhaustion* refers to fatigue because of prolonged exposure to academic responsibilities and stress that leaves students physically and emotionally tired (Schaufeli et al., 2002). *Cynicism*, also known as depersonalisation, involves a sense of detachment or a pessimistic attitude towards academics that leads to the loss of interest or withdrawal from academic responsibilities (Bresó et al., 2007). Reduced *academic efficacy* refers to a decline in students' belief in their ability to meet their academic demands, resulting in diminished confidence, motivation and performance (Bresó et al., 2007).

In literature, student burnout has been linked to lower academic performance (Fynn, 2022) and decreased engagement (Shih, 2015). It is also associated with reduced self-efficacy (Cong et al., 2024), maladaptive behaviours (Gabola et al., 2021) and a shift in students' motivational orientation from goal mastery to goal avoidance (Jahedizadeh et al., 2016). In addition to academic challenges, burnout also has profound psychological and behavioural implications. Burnout has been associated with diminished self-esteem (Bianchi et al., 2021) as well as physical and psychological detachment from one's studies (Matos & Andrade, 2023). Furthermore, student burnout has also been linked to various maladaptive coping strategies (Tomaszek et al., 2024), substance abuse (Andrade et al., 2021) and, in severe cases, depression and suicidal ideation (Galan et al., 2014).

Measurement and psychometric properties of the Maslach Burnout Inventory Student Survey

The MBI-SS is derived from the original Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981), developed by Schaufeli and colleagues (Schaufeli et al., 2002). Although multiple studies have found favourable psychometric properties of the MBI-SS (Aguayo-Estremera et al., 2023; Maslach et al., 2018; Pérez-Fuentes et al., 2020; Pienaar & Sieberhagen, 2005), disagreements with regard to the factor structure and potential item bias exist (Hu & Schaufeli, 2009; Mostert et al., 2007). The disagreements in factor structure and potential bias became prevalent as the MBI-SS has been translated and validated in several countries including Germany, Brazil, France, Hungary, Spain, the Netherlands, Portugal, Italy, Poland, Thailand and South Africa (Campos et al., 2011; Carlotto & Câmara, 2006; Chirkowska-Smolak et al., 2024; Faye-Dumanget et al., 2017; Gumz et al., 2013; Hazag et al., 2010; López-Gómez et al., 2025; Mostert et al., 2007; Portoghese et al., 2018; Schaufeli et al., 2002).

Factorial validity

Initial validation of the MBI-SS found sufficient support for a three-factor structure that captured burnout across three factors, namely *exhaustion*, *cynicism* and *professional efficacy* (Schaufeli et al., 2002). This three-factor structure of the MBI-SS has been replicated across multiple studies (Chirkowska-Smolak et al., 2024; Faye-Dumanget et al., 2017; López-Gómez et al., 2025; Portoghese et al., 2018). However, other studies have found evidence to support a two-factor structure consisting of *exhaustion* and *cynicism* (Mostert et al., 2007; Qiao & Schaufeli, 2011). Moreover, scholars often examined a one-factor model of the MBI-SS; however, they were unable to find evidence to support its validity (Chirkowska-Smolak et al., 2024; Portoghese et al., 2018; Wickramasinghe et al., 2018). Nevertheless, as challenges have been identified with the original three-factor structure, scholars have proposed various modifications, including introducing correlated error terms, allowing cross-loading of items on multiple factors, removing problematic items and reducing factors (Loera et al., 2014).

Measurement invariance

Studies have found the three-factor structure of the MBI-SS to be invariant across genders in Poland and Spain (Chirkowska-Smolak et al., 2024; Pérez-Fuentes et al., 2020). Another study conducted with Italian university students also found the three-factor structure to be invariant across genders; however, they could not support scalar invariance across academic levels (Portoghese et al., 2018). Moreover, a study conducted among Chinese university students found the three-factor structure to be partially invariant across academic settings (Hu & Schaufeli, 2009). In contrast, findings from an earlier study involving university students from multiple European countries revealed that most of the factor loadings of the three-factor structure were not invariant (Schaufeli et al., 2002). Nevertheless, in South Africa, the two-factor structure (*exhaustion* and *cynicism*) was found to have sufficient construct validity after one item (I have become more cynical about the potential usefulness of my studies) was removed (Mostert, 2007).

Item bias

Studies that have tested for item bias using the MBI-SS in the student population are limited. A study conducted at an Australian university did not find bias between various

gender groups (Pérez-Mármol & Brown, 2019). However, various findings have noted potential bias because of item loadings. In a South African study, one problematic *cynicism* item that could be interpreted differently across Afrikaans- and Setswana-speaking university students was found (Mostert et al., 2007). Similarly, a study done among Chinese students reported two ambiguous problematic exhaustion items in their sample (Hu & Schaufeli, 2009).

Internal consistency

A study involving Spanish students found Cronbach's alpha coefficients for the three-factor structure acceptable, ranging between 0.75 and 0.83 (Pérez-Fuentes et al., 2020). Similarly, studies examining internal consistency using McDonald's omega coefficients for the three-factor structure reported acceptable values ranging from 0.84 to 0.87 (Wongtrakul et al., 2023) and 0.90 to 0.97 (López-Gómez et al., 2025) among Thai students. Results from Sri Lanka indicated that Cronbach's alpha coefficients ranged between 0.83 and 0.88 (Wickramasinghe et al., 2018), while in Turkey, they ranged between 0.83 and 0.88 (Yavuz Temel & Doğan, 2014). In the South African context, Mostert et al. (2007) reported acceptable Cronbach's alpha coefficients for the two-factor structure of the MBI-SS ranging from 0.74 to 0.68, whereas Pienaar and Sieberhagen (2005) found acceptable Cronbach's alpha values for the three-factor structure, ranging between 0.73 and 0.79.

Objective

This study aimed to validate the MBI-SS in a sample of university students. The following hypotheses were formulated:

H1: The MBI-SS comprises a three-factor structure (exhaustion, cynicism and professional efficacy).

H2a: The MBI-SS will have configural invariance across language groups (Afrikaans, English, Setswana and Sesotho) and three campuses.

H2b: The MBI-SS will have metric invariance across language groups (Afrikaans, English, Setswana and Sesotho) and three campuses.

H2c: The MBI-SS will have strong invariance across language groups (Afrikaans, English, Setswana and Sesotho) and three campuses.

H3a: The 15 items of the MBI-SS will be unbiased for different language groups (Afrikaans, English, Setswana and Sesotho).

H3b: The 15 items of the MBI-SS will be unbiased for the three campuses included in this study.

H4: The MBI-SS shows sufficient reliability ($\alpha > 0.70$; $\omega > 0.70$).

Research design

Research approach

This study followed a quantitative research approach. Moreover, a cross-sectional survey design was selected to align with the study's nature and objectives.

Research participants and procedure

This study was conducted among students enrolled in a South African HEI with three campuses. Stratified convenience sampling was used to gather responses from university students (N = 2434) across all three campuses of the respective university. All enrolled students, regardless of age or language group, were invited to participate in the study. Data were gathered via a secure quick response (QR) code, distributed through electronic and physical pamphlets. The electronic pamphlets were made available on the institution's online portals and shared with faculty staff to circulate among students, inviting voluntary participation. In addition, fieldworkers distributed physical pamphlets across the three campuses, encouraging students to participate. The QR code directed participants to the QuestionPro platform, where they could complete the questionnaire. This questionnaire took between 15 and 20 min to complete.

Most participants, 887 (36.4%), were between the ages of 17 years and 20 years; 558 (22.9%) participants were between the ages of 21 years and 22 years; 282 (11.6%) participants were between the ages of 23 years and 24 years; and 667 (27.4%) participants were older than 25 years. Although there were students from various language groups that participated in the study, our analysis was based on the four primary recognised languages of the university (Afrikaans, English, Setswana and Sesotho). Consequently, 685 (28.1%) participants reported Afrikaans as their primary language, 190 (7.8%) participants reported English, 472 (19.4%) participants reported Setswana and 255 (10.5%) participants reported Sesotho. In terms of campus distribution, 470 (19.3%) participants were from Campus 1, 1641 (67.4%) participants were from Campus 2 and 303 (12.4%) participants were from Campus 3. Regarding gender, the majority of participants, 1779 (73.1%), identified as male, followed by 600 (24.7%) female participants.

Measuring instruments

Participants were asked to complete a biographical questionnaire in accordance with the reporting requirements of the American Psychological Association (2020). The socio-demographic information enables the researcher to generalise findings and explain appropriate samples to prospective readers. Participants were requested to provide their age, gender, ethnicity, native language and campus. In addition, socio-biographical information assists in validating the scale by ensuring that there is adequate representation of the various subgroups that were analysed within this study.

Participants were then asked to complete the MBI-SS (Schaufeli et al., 2002). The MBI-SS comprises three subscales, which include *exhaustion*, which has five items, for example, 'I feel emotionally drained from my studies'; *cynicism*, which consists of four items, for example, 'I have become less interested in my studies since my enrolment at the university'; and *professional efficacy*, which has six items, for example, 'I can effectively solve the problems that arise in my studies'. The questions were measured on a 7-point Likert-type scale ranging from 'never' (0) 'to every day' (6).

Statistical analysis

The statistical modelling programme Mplus 8.11 (Muthén & Muthén, 2024) was used to investigate the psychometric properties of the MBI-SS. The factorial validity of the questionnaire was assessed through confirmatory factor analysis (CFA) to compare the theorised factor structure with the dataset (Brown, 2015). Various fit indices were considered, including Chi-squared statistic (χ^2), comparative fit index (CFI), Tucker–Lewis index (TLI), Standardised Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA). Comparative fit index and TLI values of 0.90 and above indicated an adequate fit (Hu & Bentler, 1998). Standardised Root Mean Square Residual values below 0.05 and RMSEA below 0.08 also indicate an acceptable fit (Hooper et al., 2008).

Measurement invariance was investigated between the language groups (Afrikaans, English, Setswana and Sesotho) and three campuses. Multi-group CFA was used to test for configural, metric and strong invariance. Configural invariance determined whether the factors within a construct differed across subgroups, while metric invariance evaluated whether the items that measured the construct had similar interpretations across subgroups (Chen, 2007). Finally, strong invariance examined the item thresholds or difficulties between subgroups (Morin et al., 2020). Tucker–Lewis index and CFI values above 0.90 are deemed acceptable, with scores exceeding 0.95 considered better, while RMSEA values below 0.08 are acceptable, and those below 0.05 are better (Van de Schoot et al., 2012). Moreover, changes in ΔRMSEA should not exceed 0.015, and the ΔCFI values should not decrease by more than 0.01 (Chen, 2007).

Differential item functioning (DIF) was used to measure the presence of item bias for the language subgroups (Afrikaans, English, Setswana and Sesotho) as well as the different campuses (three campuses of the relevant university). Item bias is categorised into uniform bias, non-uniform bias and total bias. Uniform bias is when an item discriminates across all individuals or groups irrespective of their level of competency, while non-uniform bias is when an item discriminates against individuals or groups based on their competency levels (Kristjansson et al., 2005). The *Lordif* Package in *R* Studio was used to generate three likelihood-ratio statistics and compare the following models (Choi et al., 2011) (Equation 1, Equation 2, Equation 3 and Equation 4):

$$\text{Model 0: logit } P(u_i \geq \kappa) = \alpha_k \quad \text{[Eqn 1]}$$

$$\text{Model 1: logit } P(u_i \geq \kappa) = \alpha_k + \beta_1 * \text{ablity} \quad \text{[Eqn 2]}$$

$$\text{Model 2: logit } P(u_i \geq \kappa) = \alpha_k + \beta_1 * \text{ablity} + \beta_2 * \text{group} \quad \text{[Eqn 3]}$$

$$\text{Model 3: logit } P(u_i \geq \kappa) = \alpha_k + \beta_1 * \text{ablity} + \beta_2 * \text{group} + \beta_2 * \text{ablity} * \text{group}, \quad \text{[Eqn 4]}$$

Bias was detected in items when statistically significant differences ($p < 0.01$) were presented in the log-likelihood values of these models during comparisons. Uniform bias was identified by comparing models 1 and 2, non-uniform bias was detected by comparing models 2 and 3 and total bias was detected by comparing models 1 and 3 (Choi et al., 2011). The practical significance of DIF was measured using the Pseudo-McFadden R^2 statistics, which categorised the magnitude of DIF as negligible for values below 0.13, moderate for values ranging between 0.13 and 0.26 and large for values exceeding 0.26 (Zumbo, 1999). In addition, uniform bias was measured by comparing models 1 and 2 using the β_1 coefficient with a 10% threshold indicating practical significance (Crane et al., 2007).

Internal consistency of the MBI-SS was analysed using both Cronbach's alpha and McDonald's omega coefficient with both metrics expected to exceed the threshold of 0.70 to support reliability (Hoyle, 2023).

Ethical considerations

Ethical approval was obtained from the Ethics Committee of the North-West University (NWU-HS-2014-0165) before commencing with data collection. Participants were informed that participation was voluntary and that an online consent form needed to be signed before access to the questionnaire was given. Participants were further assured that their responses would be kept confidential and that the data would be managed and stored as per ethical approval.

Results

Factorial validity

Hypothesis 1 stated that the MBI-SS has a three-factor structure comprising *exhaustion*, *cynicism* and *professional efficacy*. The factorial validity of the MBI-SS was measured using CFA to evaluate two models, including a three-factor model (*exhaustion*, *cynicism* and *professional efficacy*) and a one-factor model. As can be seen in Table 1, the three-factor structure of the MBI-SS had a superior fit (χ^2 = 1296.552, degrees of freedom [*df*] = 87, CFI = 0.997, TLI = 0.972, RMSEA = 0.076, SRMR = 0.032) when compared to the one-factor structure (χ^2 = 6865.470, *df* = 90, CFI = 0.872, TLI = 0.851, RMSEA = 0.177, SRMR = 0.087). Moreover, the three-factor RMSEA value (0.076) was not found within the 90% confidence interval (CI) model of the one-factor structure, also indicating a superior three-factor structure fit. Therefore, Hypothesis 1 was supported.

Factor loadings and correlation

The standardised factor loadings (λ) for the MBI-SS were measured to indicate the extent to which the items explain the factors. The factor loadings are categorised as large (λ ≥ 0.70), medium (λ ≥ 0.50) or small (λ ≥ 0.30) (Shevlin & Miles, 1998). As indicated in Table 2, the factor loadings of the three-factor MBI-SS were positive and ranged between medium and high.

The correlation between the factors of the three-factor MBI-SS was investigated to identify their relationship. Correlation can be classified as small when it is below 0.10, medium for values below 0.30 and large for values equalling or exceeding 0.50 (Cohen, 2013). As indicated in Table 3, *cynicism* has a strong positive correlation (0.747) with *exhaustion*. Moreover, *professional efficacy* has a strong negative relationship (-0.553) with *exhaustion*. Similarly, *professional efficacy* had a strong negative relationship (-0.629) with *cynicism*.

Measurement invariance

The second set of hypotheses stated that the MBI-SS would show configural, metric and strong invariance across the language and campus groups that participated in this study. The results, as reported in Table 4, support Hypothesis 2. Specifically, TLI and CFI values exceeded 0.90, and ΔCFI did not deteriorate more than 0.01 (Cheung & Rensvold, 2002). In general, the RMSEA values did not exceed the threshold of 0.08 except for configural and metric invariance within the language groups. However, research has shown that RMSEA can misbehave when using categorical data and depending on the *df* (Shi et al., 2022). Furthermore, ΔRMSEA did not increase by more than 0.015 (Chen, 2007). Therefore, strong invariance (threshold) was achieved because of categorical data

As measurement invariance was achieved, latent comparisons were made as illustrated in Figure 1 (language) and Figure 2 (campus). The mean differences were interpreted as small ($d \geq 0.200$), medium ($d \geq 0.500$) and large ($d \geq 0.800$) (Cohen, 2013).

As shown in Figure 1, compared to the Afrikaans group (comparison group 0.000), the English and Setswana groups showed small mean differences ($d \geq 0.200$) across *exhaustion*, *cynicism* and *professional efficacy*. However, the Setswana group exhibited medium mean differences ($d \geq 0.500$) across the same factors.

Figure 2 shows that when comparing campus groups (C1 comparison group 0.000), the mean differences were small ($d \geq 0.200$) across the three campuses.

TABLE 1: Confirmatory factor analysis.

Model	χ^2	*df*	CFI	TLI	RMSEA	90% CI	SRMR
Overall							
One-factor CFA	6865.470	90	0.872	0.851	0.177	0.173, 0.180	0.087
Three-factor CFA	1296.552	87	0.977	0.972	0.076	0.072, 0.080	0.032
Language							
One-factor CFA	5106.986	624	0.900	0.933	0.134	0.131, 0.138	0.106
Three-factor CFA	2051.884	600	0.968	0.977	0.078	0.074, 0.082	0.052
Campus							
One-factor CFA	5637.906	446	0.907	0.934	0.121	0.118, 0.124	0.089
Three-factor CFA	1354.796	429	0.983	0.988	0.052	0.049, 0.055	0.037

df, degrees of freedom; CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square error of approximation; CI, confidence interval; SRMR, standardised root mean squared residual; CFA, confirmatory factor analysis.

TABLE 2: Standardised factor loadings.

Factors	Item	Loading (λ)	SE	p*
Exhaustion	1	0.792	0.009	0.000
	2	0.796	0.009	0.000
	3	0.839	0.008	0.000
	4	0.829	0.008	0.000
	5	0.885	0.007	0.000
Cynicism	1	0.943	0.005	0.000
	2	0.939	0.005	0.000
	3	0.663	0.013	0.000
	4	0.826	0.010	0.000
Professional efficacy	1	0.557	0.017	0.000
	2	0.645	0.015	0.000
	3	0.752	0.014	0.000
	4	0.691	0.017	0.000
	5	0.751	0.015	0.000
	6	0.841	0.012	0.000

SE, standard error.
*, All p-values < 0.001.

Item bias

The third set of hypotheses stated that the MBI-SS is unbiased across the language and campus groups. Item bias was assessed across the different languages (Afrikaans, English, Sesotho and Setswana) and three campuses. The results on item bias are discussed next.

Differential item functioning bias for language

As can be seen in Table 5, multiple items exhibited bias across the language groups. Within the *exhaustion* factor, item 1 exhibited uniform bias; total bias was present for items 1 and 2, and non-uniform bias was present for item 1. Similarly, within the *cynicism* factor, item 3 showed uniform bias, total bias and non-uniform bias. Moreover, the *professional efficacy* factor had three items (items 1, 2 and 3) that display uniform bias, total

TABLE 3: Estimated correlation matrix.

Variables	Exhaustion	Cynicism	Professional efficacy
Exhaustion	1.000	-	-
Cynicism	0.747	1.000	-
Professional efficacy	-0.553	–0.629	1.000

TABLE 4: Results of the measurement invariance models across the language and campuses.

Language	χ^2	*df*	CFI	TLI	RMSEA	CM	ΔCFI	ΔTLI	ΔRMSEA
M1: Configural	1665.476	348	0.971	0.965	0.097 [0.093, 0.102]	-	-	-	-
M2 Metric	1709.922	384	0.970	0.968	0.093 [0.089, 0.098]	M1	–0.001	+0.003	–0.004
M3 Strong	2051.883	600	0.968	0.977	0.078 [0.074, 0.082]	M2	–0.002	+0.009	–0.015
Campus									
M1: Configural	1418.040	261	0.979	0.975	0.075 [0.071, 0.078]	-	-	-	-
M2 Metric	1358.287	285	0.981	0.979	0.069 [0.065, 0.072]	N1	+0.002	+0.004	–0.600
M3 Strong	1354.799	429	0.983	0.988	0.052 [0.049, 0.055]	N2	+0.002	+0.009	–0.017

Note: ΔCFI = delta (change in) CFI; ΔTLI = delta (change in) TLI; ΔRMSEA = delta (change in) RMSEA.
df, degrees of freedom; CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square error of approximation; CM, comparison model.

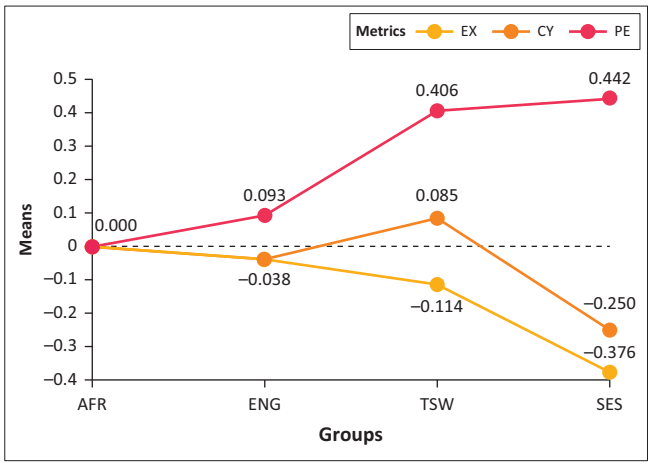

FIGURE 1: Mean for language groups.

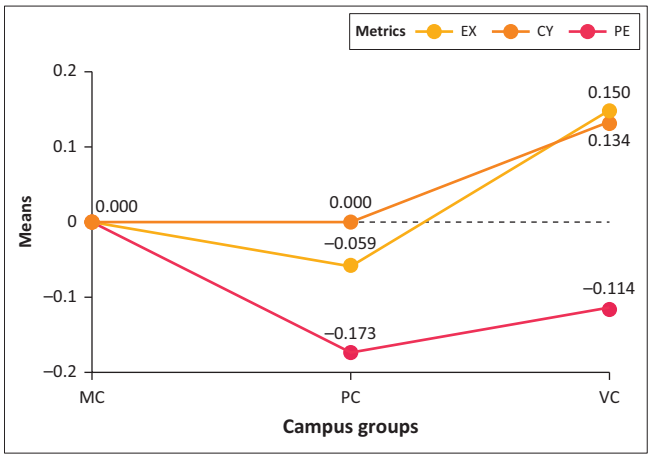

FIGURE 2: Mean for campus groups.

TABLE 5: Differential item functioning for language.

Group	Item	$\chi^2_{12}u$	$\chi^2_{13}t$	$\chi^2_{23}n$	$\Delta\beta_1$	R^2_{12}	R^2_{13}	R^2_{23}
Exhaustion	1	**0.0000**	**0.0000**	**0.0036**	0.0346	0.0101	0.0127	0.0025
	2	0.0590	**0.0082**	0.0196	0.0028	0.0013	0.0030	0.0017
	3	0.1360	0.0551	0.0792	0.0022	0.0010	0.0021	0.0012
	4	0.3750	0.3479	0.3072	0.0017	0.0005	0.0011	0.0006
	5	0.0125	0.0641	0.7900	0.0022	0.0018	0.0020	0.0002
Cynicism	1	0.234	0.370	0.5275	0.0026	0.0008	0.0012	0.0004
	2	0.463	0.259	0.1604	0.0016	0.0005	0.0014	0.0009
	3	**0.000**	**0.000**	**0.0001**	0.0150	0.0056	0.0094	0.0038
	4	0.292	0.602	0.8433	0.0014	0.0007	0.0009	0.0002
Professional efficacy	1	0.0604	**0.0014**	0.0025	0.0100	0.0013	0.0039	0.0026
	2	**0.0000**	**0.0000**	**0.0021**	0.0212	0.0057	0.0082	0.0026
	3	0.7299	**0.0000**	**0.0000**	0.0019	0.0003	0.0102	0.0099
	4	**0.0000**	**0.0000**	0.0954	0.0103	0.0087	0.0102	0.0016
	5	**0.0000**	**0.0000**	**0.0005**	0.0059	0.0065	0.0107	0.0042
	6	0.2189	**0.0000**	**0.0000**	0.0013	0.0008	0.0055	0.0047

Note: Values are indicated in bold if the log-likelihood values of the models are compared and statistically significant ($p < 0.01$). χ^2_{12}, Chi-square of model 1 is compared to model 2; χ^2_{23}, Chi-square of model 2 is compared to model 3; χ^2_{13}, Chi-square of model 1 is compared to model 3; β_1 change in beta coefficient; pseudo-Mcfadden R^2 of model 1 is compared to model 2; R^2_{23}, pseudo-Mcfadden R^2 of model 1 is compared to model 3; R^2_{23}, pseudo-Mcfadden R^2 of model 2 is compared to model 3.
u, uniform bias; *t*, total bias; *n*, non-uniform bias.

bias was detected in all six items (items 1 to 6) and all items except item 4 demonstrated non-uniform bias. Although multiple items were identified as biased across language groups, the effects of the bias were negligible as the pseudo-McFadden R^2 values were less than 0.13 (Zumbo, 1999), and Δβ1 coefficients were smaller than 0.1 (10%) (Crane et al., 2007).

Differential item functioning bias for campus

As can be seen in Table 6, multiple items exhibited bias across campus groups. In the *exhaustion* factor, three items exhibited uniform bias and total bias (items 1, 2 and 5), and non-uniform bias was present for item 5. Similarly, for the *cynicism* factor, two items showed uniform bias and total bias (items 1 and 3), and non-uniform bias was identified for item 3. However, it should be noted that no bias was detected for the *professional efficacy* factor across campus groups. Nevertheless, multiple items were identified as biased across language groups; however, the effects of the bias were negligible as the pseudo-McFadden R_2 values were less than 0.13 (Zumbo, 1999), and Δβ1 coefficients were smaller than 0.1 (10%) (Crane et al., 2007). Therefore, the results of the differential item function across language and campus groups support Hypothesis 3.

Internal consistency

Hypothesis 4 stated that the MBI-SS would demonstrate reliability across all three factors. As shown in Table 7, Cronbach's alpha (α) and McDonald's omega (ω) coefficients exceeded the threshold of 0.70 (Hoyle, 2023), providing support for Hypothesis 4.

Discussion

This study aimed to assess the psychometric properties of the MBI-SS on a sample of South African university students. Consequently, the MBI-SS' factorial validity, measurement invariance, item bias and internal consistency were assessed.

In terms of factorial validity, we used CFA to evaluate a three-factor structure (*exhaustion*, *cynicism* and *professional efficacy*) and a one-factor structure. However, the results supported the three-factor structure of the MBI-SS. In addition, correlations between the three factors indicated that all relationships had a large effect size ($r \geq 0.50$) (Cohen, 2013), and factor loadings were positive, ranging between medium ($\lambda \geq 0.50$) to large

TABLE 6: Differential item functioning for the campus.

Group	Item	$\chi^2_{12}u$	$\chi^2_{13}t$	$\chi^2_{23}n$	$\Delta\beta_1$	R^2_{12}	R^2_{13}	R^2_{23}
Exhaustion	1	**0.0000**	**0.0000**	0.0305	0.0046	0.0026	0.0034	0.0008
	2	0.6693	0.8938	0.8606	0.0002	0.0001	0.0001	0.0000
	3	**0.0000**	**0.0000**	0.2596	0.0055	0.0028	0.0031	0.0003
	4	0.9323	0.9724	0.8308	0.0002	0.0000	0.0001	0.0000
	5	**0.0025**	**0.0001**	**0.0038**	0.0039	0.0013	0.0026	0.0012
Cynicism	1	**0.0000**	**0.000**	0.190	0.0105	0.0031	0.0036	0.0004
	2	0.9150	0.890	0.622	0.0000	0.0000	0.0001	0.0001
	3	**0.0062**	**0.000**	**0.000**	0.0024	0.0012	0.0037	0.0025
	4	0.2743	0.508	0.699	0.0008	0.0004	0.0005	0.0001

Note: Values are indicated in bold if the log-likelihood values of the models are compared and statistically significant ($p < 0.01$). χ^2_{12}, Chi-square of model 1 is compared to model 2; χ^2_{23}, Chi-square of model 2 is compared to model 3; χ^2_{13}, Chi-square of model 1 is compared to model 3; β_1 change in beta coefficient; pseudo-Mcfadden R^2_{12}, of model 1 is compared to model 2; pseudo-Mcfadden R^2 of model 1 is compared to model 3; R^2_{13}, pseudo-Mcfadden R^2 of model 2 is compared to model 3.

u, uniform bias; *t*, total bias; *n*, non-uniform bias.

TABLE 7: Internal consistency.

Factors	Cronbach's alpha	McDonald's omega
Exhaustion	0.891	0.892
Cynicism	0.871	0.872
Professional efficacy	0.792	0.799

($\lambda \geq 0.30$) (Shevlin & Miles, 1998). These findings are supported by several studies conducted in other countries, which also found the three-factor structure as a sufficient measure of student burnout among university students, specifically in Germany (Gumz et al., 2013), Brazil (Carlotto & Câmara, 2006), France (Faye-Dumanget et al., 2017), Hungary (Hazag et al., 2010), Spain, the Netherlands (Schaufeli et al., 2002) and Portugal (Schaufeli et al., 2002).

With regard to measurement invariance, configural invariance (testing whether the structure can be replicated in all subgroups), metric invariance (testing whether the factors have equal loading across the subgroups) and strong invariance (testing whether the items have similar thresholds across the subgroups) were evaluated across different language and campus groups. Results found sufficient evidence to support configural invariance, metric invariance and strong invariance across the language and campus groups that participated in the study. These findings are in contrast with the initial analysis of the MBI-SS, which found the three-factor MBI-SS to be non-invariant across samples in Spain, Portugal and the Netherlands (Schaufeli et al., 2002). Similarly, another study conducted on various Chinese students across different academic settings only partially supported invariance (Hu & Schaufeli, 2009). Nevertheless, the three-factor MBI-SS has been shown to be invariant across genders and academic levels in samples of Italian university students (Portoghese et al., 2018). Moreover, another study conducted with students in Brazil found the MBI-SS to be invariant between different formats (paper and pencil and online) (Campos et al., 2011). Within South Africa, the core dimensions of burnout (*exhaustion* and *cynicism*) were also deemed invariant among Afrikaans and Setswana-speaking students (Mostert et al., 2007).

Item bias was detected using DIF across the language and campus groups. In terms of language groups, uniform bias was detected for one *exhaustion* item (item 1), one *cynicism* item (item 3) and three *professional efficacy* items (items 2, 4 and 5). In addition, total bias was identified for two *exhaustion* items (items 1 and 2), one *cynicism* item (item 3) and all the *professional efficacy* items (items 1 to 6). Moreover, non-uniform bias was detected in one *exhaustion* item (item 1), one *cynicism* item (item 3) and four *professional efficacy* items (items 2, 3, 5 and 6). Similar results were observed in terms of campus groups. However, no bias was identified regarding the *professional efficacy* factor. Uniform bias was present in three *exhaustion* items (items 1, 3 and 5) and two *cynicism* items (items 1 and 3). Total bias was also present for three *exhaustion* items (items 1, 3 and 5) and two *cynicism* items (items 1 and 3). Non-uniform bias was detected for one *exhaustion* item (item 5) and one cynicism item (item 3). Although bias was detected across multiple items, the effect size was negligible with the pseudo-McFadden R^2 values lower than 0.13 (Zumbo, 1999), and $\Delta\beta 1$ coefficients were less than 0.1 (10%) (Crane et al., 2007). Studies on item bias are limited. One study conducted on Australian students found no evidence of bias between gender groups. In contrast, a South African study identified a *cynicism* item (I have become more cynical about the potential usefulness of my studies) to have different meanings across Afrikaans and Setswana-speaking students (Mostert et al., 2007).

Internal consistency was measured using Cronbach's alpha (α) and McDonald's omega (ω) to evaluate the reliability of the MBI-SS. Results indicated acceptable internal consistency across all three factors with Cronbach's alpha (α) and McDonald's omega (ω) coefficient exceeding the threshold of 0.70 (Hoyle, 2023). These results correspond with previous validation studies that also found internal consistency in the three-factor structure among university students. Wongtrakul et al. (2023) conducted their study among Thai students and found high internal consistency across the three-factor structure of the MBI-SS. Moreover, Pérez-Fuentes et al. (2020) found robust internal consistency in their research study among Spanish nursing students, while Wickramasinghe et al. (2018) found strong internal consistency in their study among Sri Lankan medical students.

Limitations and recommendations

The findings of this study provide insightful and valuable information on the psychometric properties of the MBI-SS. However, some limitations need to be accounted for. This

study included only four of South Africa's 12 official languages (English, Afrikaans, Sesotho, and Setswana) and was limited to three campuses within the same university, which restricts the generalisability of the findings. Future research should aim to include more of the recognised South African languages and compare results across tertiary institutions. Furthermore, the study identified multiple items that were biased across language and campus groups. Although the effect of the bias was negligible, future studies should attempt to replicate the findings to identify if our findings are sample-specific.

The 15-item MBI-SS was validated in this study. Building on prior research that found the 9-item MBI-GS to have strong psychometric properties in the working population (Wang et al., 2024), future studies might consider testing the shorter version. This could reduce assessment fatigue and minimise assessment time, especially when coupled with other psychometric assessments. Considering the adverse impact of student burnout on student performance and well-being, future research could focus on identifying interventions and skills to curtail its adverse effects. In addition, exploring the cost-effectiveness of these interventions would provide valuable insights into their practical implementation and sustainability in educational settings (Madigan et al., 2024).

Practical implications

The findings of this study provide preliminary evidence that supports the reliable, valid and unbiased application of the MBI-SS among university students in South Africa. As such, the MBI-SS can serve as an effective diagnostic tool to help universities identify students at risk of academic burnout, including exhaustion, cynicism and a lack of professional efficacy. This identification, in turn, can inform and guide the development of targeted intervention strategies and enable the efficient allocation of resources to reduce student burnout. Furthermore, the findings might contribute to understanding the causes and repercussions of student burnout, potentially leading to adaptations in teaching methods and student workload management and provide preliminary evidence that it is possible for management and practitioners to make fair comparisons between diverse groups regarding students' burnout levels.

Conclusion

This study aimed to determine the psychometric properties of the MBI-SS among South African students in a HEI. The psychometric properties examined were factorial validity, measurement invariance, item bias and internal consistency. This study's findings supported the three-factor (*exhaustion*, *cynicism* and *professional efficacy*) structure of the MBI-SS. Configural invariance, metric invariance and strong invariance were detected across the language and campus groups. Threshold invariance (strong) could be achieved because of the categorical data that allowed latent comparisons. Item bias was detected on multiple items across the different language and campus groups. However, the effects of the statistical significance of these biases were negligible. Sufficient internal consistency supported the reliability of the three-factor MBI-SS. Consequently, this study finds initial support for the valid, reliable and unbiased application of the MBI-SS among university students in South Africa.

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Competing interests

The author, L.D.B., serves as an editorial board member of this journal. The peer-review process for this submission was handled independently, and the author had no involvement in the editorial decision-making process for this manuscript. The authors have no other competing interests to declare.

Authors' contributions

J.S. conducted the literature review, collected data and wrote the initial draft of the manuscript. K.M. conceptualised and supervised the study, verified the analytical methods, assisted with the reviewing and editing of the manuscript, and provided the necessary resources and secured funding for the project. C.d.T. assisted with the reviewing and editing of the manuscript. L.D.B. conducted the formal statistical analyses and assisted with interpreting the results. A.B.B. was a critical reader of the final draft. All the authors, J.S., K.M., C.d.T., L.D.B. and A.B.B., discussed the results and contributed to the final manuscript.

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Data availability

The data that support the findings of this study are available from the corresponding author, K.M., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. The article does not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this study's results, findings and content.

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