



Original article

## Validation of the Burnout Assessment Tool among (inter)national students from a Dutch university

### Validation de l'outil d'évaluation du burnout auprès d'étudiants (inter)nationaux d'une université néerlandaise

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## ABSTRACT

**Introduction:** Burnout impacts academic performance and commitment of university students. It is therefore essential to have an up-to-date and psychometrically sound instrument for detecting burnout symptoms. Although a new valid and reliable instrument, namely the Burnout Assessment Tool (BAT), was developed for workers, it has not yet been established whether the BAT can be used in Dutch and English with Dutch and international university students, respectively.

**Objective:** This study aimed to validate the Dutch and English versions of the BAT for university students. Specifically, the psychometric properties, factorial structure, and measurement invariance of the tool across Dutch and international student populations were examined.

**Method:** The participants were 991 students from a Dutch university. Reliability was assessed using Cronbach's alpha, while convergent and discriminant validity were evaluated by examining correlations with other measures. To assess the factorial validity of the BAT, Multi-group Confirmatory Factor Analysis (MGCFA) was employed. Moreover, measurement invariance was tested to ensure comparability of the tool across Dutch and international students.

**Results:** The BAT demonstrated high reliability and good convergent and discriminant validity. The MGCFA supported a second-order factorial model, while measurement invariance indicated that the instrument can be used comparably across Dutch and international students.

**Conclusion:** The findings of the current study suggest that the BAT is a reliable tool for assessing burnout symptoms among both Dutch and international students. The instrument can help in the early detection of burnout symptoms, ultimately contributing to improved student well-being and academic performance.

## R É S U M É

**Introduction:** Le burn-out influence les résultats et l'engagement académiques des étudiants. Il est donc essentiel de disposer d'un instrument actualisé et psychométriquement fiable pour détecter les symptômes le burn-out. Bien qu'un nouvel instrument valide et fiable, à savoir le Burnout Assessment Tool (BAT), ait été développé pour évaluer l'épuisement professionnel, il n'a pas encore été établi que le BAT peut être utilisé en néerlandais et en anglais avec des étudiants respectivement néerlandais et internationaux.

**Objectif:** Cette étude visait à valider les versions néerlandaise et anglaise du BAT pour les étudiants universitaires. Plus précisément, les propriétés psychométriques, la structure factorielle et l'invariance de la mesure de l'outil dans les populations d'étudiants néerlandais et étrangers ont été examinées.

## Mots-clés:

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*Méthode:* Les participants étaient 991 étudiants d'une université néerlandaise. La fiabilité a été évaluée à l'aide du coefficient alpha de Cronbach, tandis que la validité convergente et discriminante a été évaluée en examinant les corrélations avec d'autres mesures. Pour évaluer la validité factorielle du BAT, une analyse factorielle confirmatoire multigroupe (MGCFA) a été utilisée. En outre, l'invariance des mesures a été testée afin de garantir la comparabilité de l'outil entre les étudiants néerlandais et internationaux.

*Résultats:* Le BAT a démontré une grande fiabilité et une bonne validité convergente et discriminante. La MGCFA a confirmé l'existence d'un modèle factoriel de second ordre, tandis que l'invariance des mesures a indiqué que l'instrument pouvait être utilisé de manière comparable par les étudiants néerlandais et internationaux.

*Conclusion:* Les résultats de la présente étude suggèrent que le BAT est un outil fiable pour évaluer les symptômes d'épuisement professionnel chez les étudiants néerlandais et étrangers. L'instrument peut aider à la détection précoce des symptômes d'épuisement professionnel, contribuant ainsi à l'amélioration du bien-être des étudiants et de leurs performances académiques.

## 1. Introduction

Student burnout refers to “feeling exhausted because of study demands, having a cynical and detached attitude toward one’s study, and feeling incompetent as a student” (Schaufeli et al., 2002, p. 465). Recent findings from around the world, including the Netherlands, showed burnout prevalence varying between 31% and 64.8% (Abreu Alves et al., 2022; Bughi et al., 2017; Kajjimu et al., 2021; van Vreden & Thijssen, 2019). Moreover, burnout results in negative consequences, such as decreased academic performance (Schaufeli et al., 2002), increased suicidal thoughts (Dyrbye et al., 2008), intention to leave the study program (Moneta, 2011), and lower commitment (Neumann et al., 1990). Because previous works have reported a high prevalence and negative consequences of burnout among higher education students, it is essential to have up-to-date and psychometrically sound instruments for detecting burnout symptoms.

## 2. Why a new burnout assessment tool is needed for international and Dutch students

The instruments that have been used to assess burnout among university students are the Maslach Burnout Inventory-Student Survey (MBI-SS, Schaufeli et al., 2002), the Study Burnout Inventory (SBI) (Salmela-Aro & Read, 2017), the Copenhagen Burnout Inventory (CBI) (e.g., Bolatov et al., 2021; Campos et al., 2013) and the Oldenburg Burnout Inventory (OLBI) (e.g., Campos et al., 2012).

The MBI-SS has been the dominant measure of burnout in medical (Bughi et al., 2017; Fang et al., 2012; Kim et al., 2015; Obregon et al., 2020), (social) science and humanities students (Aguayo et al., 2019; Schaufeli et al., 2002). The MBI-SS allows to assess three components of burnout (Schaufeli et al., 2002): exhaustion, cynicism and reduced personal accomplishment. Exhaustion refers to the feeling of emotional and physical exhaustion due to prolonged stress. Cynicism refers to negative or detached attitudes towards one’s work. Reduced personal fulfilment is characterized by a sense of incompetence or diminished performance in one’s work, resulting in doubts about abilities and a lack of fulfilment. The MBI-SS shows various problems, inherited from the original version developed for the worker population, i.e. the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981). First, the instrument was developed without adopting a theoretical model underlying its three components, but only using an inductive approach consisting of interviews with human services professionals. Later, Schaufeli et al. (2019) criticized the MBI-SS for its lack of a deductive approach, which led to overlooking two fundamental components of burnout: cognitive and emotional impairment. Second, Schaufeli & Salanova (2007) stated that the items of the subscale of reduced personal accomplishment do not capture the essence of burnout as they are positively worded, whereas the subscale items of the exhaustion and cynicism are negatively worded. Additionally, the MBI can only provide three individual scores, one for each component measured with the instrument (Maslach et al., 2017, p. 44). Researchers have recently turned to alternative

measures such as the Study Burnout Inventory (SBI) (Salmela-Aro & Read, 2017), which allows for a single composite burnout score derived from the sum of the three subscales, namely exhaustion, cynicism, and sense of inadequacy as a student. Furthermore, unlike the positively formulated sense of inadequacy scale in the MBI-SS, the SBI’s sense of inadequacy scale is negatively formulated. However, the SBI does not allow for the assessment of relevant components of burnout either, such as cognitive and emotional impairment. The CBI and OLBI are also not exempt from limitations. In particular, the CBI reduces burnout to mere exhaustion, thus neglecting its multifaceted nature. Whereas the OLBI includes positively and negatively worded items to assess exhaustion and disengagement, which introduces a challenge because positively worded “burnout” items may inadvertently capture aspects of its opposite, namely work engagement (González-Romá et al., 2006).

To overcome the problems and limitations of previous questionnaires, Schaufeli et al. (2019) developed a free-to-use, valid and reliable tool, namely the Burnout Assessment Tool (BAT) using a deductive and inductive approach. The deductive approach used to develop the BAT was based on the theoretical conceptualization of burnout given by Schaufeli & Taris (2005). Burnout is theoretically seen as the inability (i.e., exhaustion) and unwillingness (i.e., cynicism) to spend effort at work. Based on this conceptualization, the results by Schaufeli et al. (2020), showed that exhaustion (i.e., loss of physical and mental energy), cognitive (i.e., memory, attention, concentration problems and inadequate mental performance) and emotional impairment (i.e., emotional dysregulation, resulting in overly intense emotions) capture the essence of inability, while mental distance (i.e., attitude of detachment and aversion towards one’s work) captures unwillingness. The inductive approach consisted of 49 in-depth interviews with practitioners that led to the addition of the following core aspects of burnout: cognitive and emotional impairment. In addition, the BAT allows for the assessment of two other primary symptoms, namely exhaustion and mental distance, which theoretically correspond to the MBI-SS constructs of emotional exhaustion and cynicism. The four facets of burnout assessed by the BAT can also be added to form a single burnout score (Hadžibajramović et al., 2020). A single score, which includes all the facets of burnout, is necessary for screening purposes to differentiate those experiencing severe from mild levels of burnout. During the in-depth interviews, the practitioners also mentioned secondary symptoms such as psychological distress (i.e., non-physical complaints such as anxiety and worry), psychosomatic complaints (i.e., physical problems such as muscle pain and intestinal problems) and depressed mood. Although these symptoms are not included in the conceptual framework by Schaufeli and Taris (2005), they were included in the BAT as they often occur in those suffering from burnout and explain why individuals seek help and support (Schaufeli et al., 2019). Depressive mood was only theoretically included among the secondary symptoms, but not in the BAT itself, as there are many questionnaires available to assess depressive symptoms.

In academic settings, it is also important to take psychological distress and psychosomatic complaints into account as they are common among students. In the Netherlands, Bruls et al. (2013) found that

university students suffer from neck pain problems (31.4%), shoulder pain (30.3%) and hand/wrist pain (17.5%). In the last decades, universities worldwide have seen a surge of students struggling with anxiety (Bayram & Bilgel, 2008), musculoskeletal problems (e.g., Hayes et al., 2009; Obembe et al., 2013), presheadaches (e.g., Khan, 2008), gastrointestinal symptoms (Kim & Ban, 2005; Norton et al., 1999; Shen et al., 2009), and sleep issues (Dopmeijer et al., 2021; Khan, 2008). These insights underscore the importance of validating the BAT for students in (Dutch) higher education, thus detecting all facets of burnout. The BAT was validated across various occupations, including teachers (Angelini et al., 2021) and healthcare workers (Borrelli et al., 2022), and in different countries such as Japan (Sakakibara et al., 2020), Italy (Consiglio et al., 2021) and Poland (Basinska et al., 2021). Existing validations of the BAT have demonstrated good reliability, internal consistency and factorial validity (e.g., Angelini et al., 2021; Sakakibara et al., 2020). Additionally, The BAT showed good convergent and discriminant validity, aligning with established burnout instruments like the Maslach Burnout Inventory-General Survey (MBI-GS) and the Oldenburg Burnout Inventory (OLBI), while also maintaining discriminant validity with respect to constructs such as work engagement and boredom (Schaufeli et al., 2020).

Previous work by de Beer et al. (2020) also confirmed the cultural sensitivity of the instrument by showing that the BAT can be used comparably to measure burnout among workers in Finland, Belgium, Germany, Japan, Ireland, the Netherlands and Austria.

Previous validations of the BAT reported above have shown that, in line with the original version of the instrument (Schaufeli et al., 2020), a second-order model with four first-order factors (i.e., exhaustion, mental distance, emotional and cognitive impairment) loading on a higher-order factor (BAT-C) and two first order-factors (i.e., psychological distress and psychosomatic complaints) loading on a second higher-order factor (BAT-S), fits well to the data. Furthermore, the twenty-three primary symptom items of the BAT (Romano et al., 2022) and a short version of the instrument including twelve primary symptom items (Fiorilli et al., 2022) were recently validated in Italy among middle school and university students, respectively. However, previous studies did not validate the full version of the BAT in higher education. Moreover, the English and Dutch versions of the BAT are not yet available in Dutch higher education. A Dutch version is relevant for the Dutch academic context, and an English version for universities hosting international students. The process of globalisation has led to the creation of international academic environments, as many students move to other countries for their studies. From 1995 to 2012, the number of international students enrolled at universities worldwide increased from 1.35 to 2.75 million (Gürüz, 2011). In 2019, the number reached six million (UNESCO, 2022).

Acknowledging the shortcomings of existing instruments and the growing need for burnout assessment instruments adapted to different student populations, this study aims to fill these gaps by validating the English and Dutch versions of the BAT for international and Dutch students respectively. Specifically, the study aims to assess the applicability and psychometric properties of the BAT among international and Dutch students. Our validation encompassed testing a second-order structure of the English and Dutch versions of the BAT among international and Dutch students, respectively, and to assess whether the instrument is invariant across the two groups. Moreover, we aimed to test the psychometric properties of the English and Dutch versions of the tool by investigating reliability, convergent and discriminant validity. Specifically, convergent validity was assessed by calculating the relations between exhaustion, emotional impairment, mental distance, cognitive impairment, psychological distress, psychosomatic complaints and frustration of the basic psychological needs, anxiety, and emotional exhaustion. Discriminant validity was tested by calculating the association between the sub-dimensions of the BAT and the satisfaction of the psychological needs, engagement and subjective well-being.

### 3. Materials and methods

#### 3.1. Participants

A cross-sectional survey design was used in the present study. An online survey was sent to Bachelor, Pre-master and Master students from a Dutch university between June and November 2022. The sample was comprised of 991 respondents (females = 73.7%; males = 25.1%; prefer not to say = 1.2%) aged between 17 and 30 years old ( $M = 21.15$ ,  $SD = 2.70$ ). Of the sample, 65.5% were Dutch students and 34.4% international students. Respectively 74.6%, 3.4% and 22% were Bachelor, Pre-master and Master students. With regard to faculty, 48.1% was from Social sciences, 10.4% from Humanities, 17.9% from Medical sciences, 22.5% from Spatial sciences, Economics and Business, Science and Engineering and 1.1% from other faculties. Of the students, 51.7% attended the first year of university, 26.6% second year and third year, and 21.7% the fourth year or higher. The research protocol was approved by the Ethical Committee of the faculty and written informed consent was obtained from all participants before taking part in the study.

#### 3.2. Measures

**Burnout.** Student burnout was assessed using the Dutch student version of the BAT, received from the creator of the original instrument, and the English version. To obtain the English version, the tool was translated by a professional translator from Dutch to English and then back-translated from English to Dutch by another translator not involved in the initial translation. Finally, a comparison was made between the original and back-translated version of the tool. The instrument assesses both the primary (i.e., exhaustion, mental distance, cognitive and emotional impairment) and secondary symptoms (i.e., psychological distress and psychosomatic complaints) of burnout. The BAT presents 33 items to be scored on a 5-point Likert scale (1 = Never; 5 = Always). See the Appendix for the complete list of the items.

**Basic Need Satisfaction and Frustration.** The English and Dutch version of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) (Van der Kaap-Deeder et al., 2020) was used to assess the satisfaction and frustration of the basic psychological needs of autonomy, competence and relatedness. The instrument consists of 24 items rated on a 5-Point Likert Scale (1 = not true at all and 5 = Completely true). Example items are "I feel my choices express who I really am" and "I feel excluded from the group I want to belong to" for the subscales need satisfaction and frustration, respectively.

**Emotional exhaustion.** Emotional exhaustion was measured with the English subscale of the Maslach Burnout Inventory-Student Survey (MBI-SS) and its Dutch version, the Utrecht Burnout Scale-Student (UBOS-S) (Schaufeli et al., 2002). The questionnaire presents 5 items on a 7-point Likert scale ranging from 0 = Never to 6 = Always-Every day. An example item is: "I feel burned out from my studies".

**Well-being.** Subjective well-being was assessed using the Dutch and English versions of the World Health Organization Well-Being Index (WHO-5) (Topp et al., 2015). The questionnaire includes 5 items on a 6-point Likert scale (0 = At no time; 5 = All of the time). An example item is: "Over the past 2 weeks I have felt calm and relaxed".

**Anxiety.** The Dutch and English version of the General Anxiety Disorder-7 (GAD-7) (Spitzer et al., 2006) was used to assess anxiety among the sample of students. It includes 7 items on a 4-point Likert scale ranging from 0 = Not at all and 3 = Nearly every day. Participants were asked to indicate how often they were bothered by anxiety problems, such as the inability to stop worrying or control worries in the past two weeks.

**Engagement.** The Dutch and English version of the Utrecht Work Engagement Scale-Student-9 (UWES-S-9) (Schaufeli & Bakker, 2004) was used to assess engagement. It consists of 9 items that are rated on a 7-point Likert scale (0 = Never; 6 = Always-Every day). An example item is: "I feel energetic and capable when I'm studying or going to

class”.

The Cronbach’s alphas found in this work for all measures are reported in Table 1.

### 3.3. Data analyses

First, IBM SPSS Statistics for Windows, Version 26, was used to calculate means, standard deviations, skewness, kurtosis, Cronbach’s alphas and correlations between the sub-dimensions of the BAT and the other variables. The analyses were performed for the sample of international students and separately for the sample of Dutch students. Multi-group Confirmatory Factor Analysis (MGCFA) was performed using AMOS 23 software to confirm the factorial structure of the second-order model. The model fit was tested considering the following fit indices: Chi-square ( $\chi^2$ ), Comparative Fit Index ( $CFI \geq .90$ ), Tucker Lewis Index ( $TLI \geq .90$ ), Root Mean Square Error of Approximation ( $RMSEA < .08$ ) and Standardized Root Mean Square Residual ( $SRMR < .08$ ) (Hu & Bentler, 1999). Finally, measurement invariance was tested in four steps (Wu et al., 2007): configural, metric, scalar and strict invariance. The comparison between the invariance steps was made considering the changes in CFI ( $\Delta CFI$ ) as this index is independent of sample size and model complexity (Cheung & Rensvold, 2002). A  $\Delta CFI \geq -0.01$  indicates that the model fit does not deteriorate considerably when additional constraints are added.

## 4. Results

Values for skewness and kurtosis were between  $-.66$  and  $+.96$  for the Dutch sample and between  $-.92$  and  $+.67$  for the international sample, indicating no deviations from normality.

Table 2 shows significant correlations between primary, secondary symptoms of burnout and the frustration of the psychological needs, anxiety, emotional exhaustion, thus confirming convergent validity in both samples. Moreover, discriminant validity was confirmed because the symptoms of the BAT showed a significant and negative association with the satisfaction of the basic psychological needs, subjective well-being and engagement.

Fig. 1 shows a graphical representation of the second-order model,

**Table 1**  
Means and standard deviations for the Dutch and international samples.

Dimension	Dutch sample		International sample	
	M (SD)	$\alpha$	M (SD)	$\alpha$
BAT				
- BAT-C	2.56 (.64)	.94	2.75 (.67)	.93
- Exhaustion	2.88 (.73)	.88	3.09 (.74)	.86
- Mental distance	2.00 (.71)	.82	2.13 (.77)	.80
- Emotional impairment	2.45 (.87)	.88	2.72 (.99)	.88
- Cognitive impairment	2.70 (.82)	.89	2.86 (.88)	.91
- BAT-S	2.54 (.78)	.86	2.73 (.84)	.86
- Psychological distress	2.76 (.90)	.81	2.94 (.96)	.81
- Psychosomatic complaints	2.31 (.81)	.77	2.52 (.90)	.77
BPNSFS				
- Need satisfaction	3.67 (.59)	.87	3.62 (.63)	.87
- Need frustration	2.42 (.71)	.89	2.62 (.76)	.88
MBI-SS				
- Emotional exhaustion	3.82 (1.36)	.89	4.02 (1.31)	.88
GAD-7				
- Anxiety	2.24 (.71)	.88	2.40 (.79)	.90
UWES-S-9				
- Engagement	4.55 (1.08)	.91	4.67 (1.08)	.90
WHO-5				
- Well-being	3.48 (.92)	.85	3.32 (.91)	.81

Note. BAT, Burnout Assessment Tool; BAT-C, Burnout Assessment Tool-Core complaints total score; BAT-S, Burnout Assessment Tool-Secondary complaints total score; BPNSFS, Basic Psychological Need Satisfaction and Frustration Scale; MBI-SS, Maslach Burnout Inventory-Student Survey; GAD-7, General Anxiety Disorder-7; UWES-S-9, Utrecht Work Engagement Scale-Student-9; WHO-5, World Health Organization Well-Being Index.

**Table 2**  
Pearson’s correlations for the Dutch (below the diagonal) and international samples (above the diagonal).

Dimension	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. BAT-C	—													
2. Exhaustion	.91***	—												
3. Mental distance	.76***	.58***	—											
4. Emotional impairment	.78***	.62***	.41***	—										
5. Cognitive impairment	.85***	.70***	.61***	.51***	—									
6. BAT-S	.66***	.62***	.32***	.67***	.67***	—								
7. Psychological distress	.67***	.61***	.35***	.68***	.52***	.90***	—							
8. Psychosomatic complaints	.52***	.51***	.23***	.53***	.40***	.90***	.66***	—						
9. Need satisfaction	.62***	.56***	.49***	.62***	.58***	.50***	.54***	.38***	—					
10. Need frustration	.71***	.65***	.47***	.62***	.58***	.64***	.68***	.47***	.77***	—				
11. Emotional exhaustion	.73***	.78***	.41***	.57***	.56***	.63***	.65***	.48***	.57***	.66***	—			
12. Anxiety	.66***	.59***	.36***	.68***	.51***	.74***	.75***	.59***	.56***	.69***	.65***	—		
13. Engagement	.60***	.52***	.66***	.30***	.54***	.30***	.30***	.24***	.53***	.42***	.41***	.31***	—	
14. Well-being	.68***	.66***	.43***	.56***	.54***	.65***	.67***	.50***	.65***	.69***	.66***	.67***	.52***	—

Note. \* =  $p < .05$ ; \*\* =  $p < .01$ ; \*\*\* =  $p < .001$ ; BAT-C, Burnout Assessment Tool-Core complaints total score; BAT-S, Burnout Assessment Tool-Secondary complaints total score.

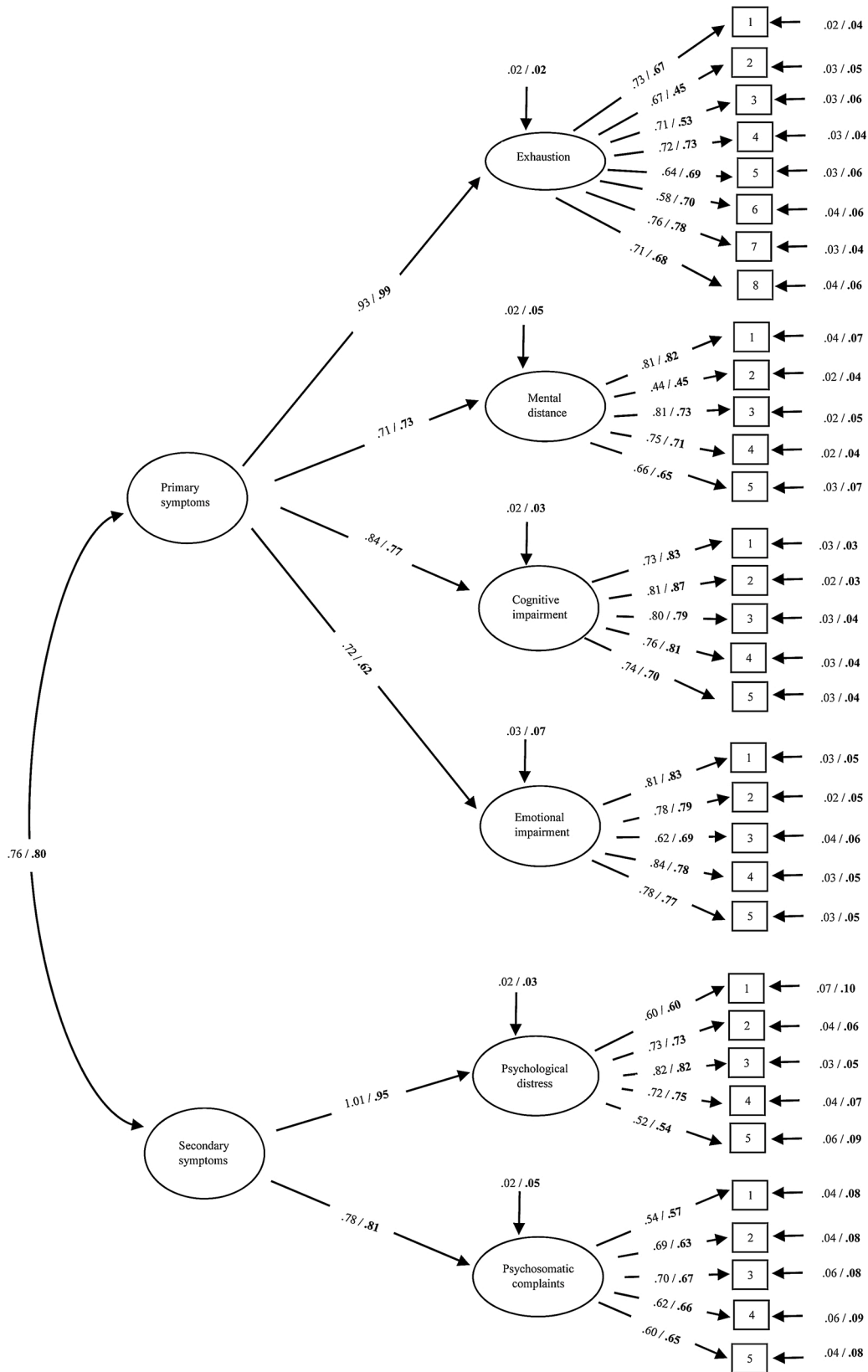


Fig. 1. Results of the Multi-group Confirmatory Factor Analysis for the groups of Dutch and international students (in bold).

with loadings ranging from .44 to 1.01 for the sample of Dutch students and .45-.99 for the sample of international students. The fit indices yielded by the multi-group CFA were acceptable for both the Dutch [ $\chi^2 = 1510.94$  ( $df = 484$ ),  $p < .001$ ;  $\chi^2/df = 3.12$ ; CFI = .91; TLI = .90;

RMSEA = .06; SRMR = .06] and international samples [ $\chi^2 = 882.50$  ( $df = 484$ ),  $p < .001$ ;  $\chi^2/df = 1.82$ ; CFI = .93; TLI = .92; RMSEA = .05; SRMR = .05].

Finally, as shown in Table 3, the testing of measurement invariance

**Table 3**  
Results of invariance analysis across Dutch and international students.

Model	$\chi^2$ (df)	TLI	CFI	RMSEA	SRMR	Model comparison	$\Delta\chi^2$	$\Delta df$	p-value	$\Delta CFI$
Model 1. Configural invariance	2393.52 (968)	.9091	.9167	.0383	.0549	—	—	—	—	—
Model 2. Metric invariance	2462.96 (995)	.9090	.9142	.0383	.0624	M2-M1	69.44	27	<.001	-.002
Model 3. Scalar invariance	2468.25 (1002)	.9097	.9143	.0382	.0633	M3-M2	5.29	7	<.001	.0001
Model 4. Strict invariance	2677.63 (1045)	.9036	.9046	.0396	.0646	M4-M3	209.38	43	<.001	-.01

revealed that the main index ( $\Delta CFI$ ) was  $\geq -.01$  in each step of the invariance analysis, suggesting good fit.

## 5. Discussion

The aim of this study was to validate the Dutch and English version of the BAT for Dutch and international students, respectively, and to test whether the instrument is invariant across the two groups. Particularly, psychometric properties, factorial structure and measurement invariance were investigated.

First, the Cronbach's alphas of this work are satisfactory and in line with those of the original version of the instrument (Schaufeli et al., 2020). Second, correlations used to test convergent and discriminant validity are in line with those of previous studies. Particularly, a significant negative correlation was found between the satisfaction of the basic psychological need and primary and secondary symptoms of burnout. These results are in line with those obtained by Sulea et al. (2015), who found that satisfaction of psychological needs was negatively correlated with burnout in a sample of university students. Conversely, when students do not feel competent, connected with others and experience a lack of freedom, they are likely to experience low levels of well-being (Deci & Ryan, 2000). This is consistent with the results obtained in the present study, as the frustration of basic psychological needs for autonomy, competence and relatedness showed a positive and significant correlation with primary and secondary symptoms of burnout.

Our results also showed that primary and secondary symptoms of the BAT were associated with the exhaustion subscale of the MBI-SS. In line with Romano et al. (2022), convergent validity was confirmed as the strongest correlation was found between the BAT and MBI-SS exhaustion subscales. In contrast, the correlation coefficients between the MBI-SS emotional exhaustion subscale and the other subscales of the BAT were lower. Convergent validity was further demonstrated by the statistically significant relationships found between the primary and secondary symptoms of burnout and anxiety.

These findings are in agreement with previous research (e.g., Shankland et al., 2019), which found a significant and positive relation between university students' burnout and anxiety. Moreover, the significant negative correlations between subjective well-being and burnout symptoms corroborate that they are discriminant measures assessing positive and negative indicators of wellbeing, respectively. Likewise, significant negative associations were found between engagement and burnout symptoms, further confirming discriminant validity. Third, Multi-group Confirmatory Factor Analysis confirmed the factor structure of the second-order model for the sample of Dutch and international students. This is in line with previous validations (e.g., Angelini et al., 2021; Basinska et al., 2021; Consiglio et al., 2021) and the original version of the instrument (Schaufeli et al., 2020). Finally, the invariance of the instrument was confirmed in the current study. In particular, the comparison between the Dutch and English versions of the BAT showed that Dutch and international students interpret the items of the instrument similarly. Our results are consistent with those reported by de Beer et al. (2020), who found that the BAT was invariant across seven representative samples of workers from various countries.

Our findings have implications for both researchers and practitioners. By establishing the reliability, validity, and measurement invariance of the instrument across different student populations, our

study provides researchers with a robust tool for accurately assessing the risk of experiencing burnout symptoms among Dutch and international students. Furthermore, the screening capabilities of the BAT are particularly valuable as they allow differentiating students who experience severe from mild burnout symptoms. This is especially important in educational settings, where understanding and addressing burnout is essential to promote academic success and overall well-being.

## 6. Limitations and future avenues

Some limitations should be addressed. Firstly, we only considered Dutch and international students at one Dutch university. Further studies using representative samples from different Dutch universities would help to determine whether the BAT can be used in the entire Dutch academic context.

Secondly, test-retest reliability was not tested as our data are based on a single measurement wave. Future research should consider addressing this limitation.

Although the BAT allows to have a single burnout score, which appears useful to discriminate between students with severe burnout and those who only experience mild symptoms, future studies are needed to validate clinical cut-offs values for Dutch and international students in the academic setting. Indeed, burnout levels may vary across countries and cultures (Savicki, 2002). Therefore, suitable cut-off points are needed to distinguish between different levels of burnout symptom severity (Schaufeli & Van Dierendonck, 1995). Future research should also investigate whether international and domestic students from countries other than Netherlands interpret the BAT items similarly.

Finally, although this study focused on validating an instrument for assessing burnout symptoms, it is relevant to recognize the potential overlap between burnout and depression (for a review see Bianchi et al., 2015). In this regard, previous works suggested that individuals experiencing burnout may also exhibit symptoms of depression (e.g., Glise et al., 2012; Hättinen et al., 2009). Therefore, future validations of instruments or methodological studies should consider incorporating measures of depression alongside burnout assessments to provide a more comprehensive understanding of the differences between these two constructs.

## 7. Conclusions

This study provided evidence of the psychometric properties, factorial structure and invariance of the Dutch and English version of the BAT across Dutch and international students. The results of the study showed that the English version of the BAT can be used in Dutch higher education with international students and the Dutch version with Dutch students. Moreover, as the invariance of the instrument was confirmed, the responses of the two groups can be added or analysed together. This is useful in light of the monitoring of burnout symptoms in an international academic environment. This work presented a novel approach to the validation of well-being assessment tools as it takes into account the internationalisation of the current academic system. Taken together, these findings suggest that the BAT is a valid and reliable tool that can be used with (inter)national students in Dutch academic settings, with the advantage of providing a single burnout score. A single score can be particularly useful in practical applications, such as the evaluation and development of interventions to reduce burnout symptoms experienced

by university students.

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## Declaration of competing interest

The authors have no conflict of interest to declare.

## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.erap.2025.101079>.

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