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A further contribution to the Italian validation of the Burnout Assessment Tool: Measurement invariance in teachers and employees

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ABSTRACT. Questo studio aveva l'obiettivo di indagare le caratteristiche psicometriche della versione italiana del *Burnout Assessment Tool* (*BAT*) e di contribuire alla validazione della scala BAT testando l'invarianza di misura tra due campioni italiani (insegnanti e impiegati) e la validità concorrente esaminando la correlazione tra burnout e depressione. I risultati indicano che la versione italiana della BAT presenta buone proprietà psicometriche oltre ad essere valida e affidabile e può quindi essere utilizzata per valutare la sindrome del burnout nel contesto italiano per insegnanti e impiegati.

SUMMARY. The Burnout Assessment Tool proposed by Schaufeli, De Witte and Desart (2019) is a recent instrument for assessing the burnout syndrome. This study aims to investigate the psychometric characteristics of the Italian version of the Burnout Assessment Tool (BAT) and to contribute to the validation of the BAT scale by testing measurement invariance across two Italian samples, teachers and employees and concurrent validity examining the correlation between burnout and depression. Reliability was also examined. Confirmatory factorial analysis (CFA) was used to test factorial validity on a sample of 554 employees and 226 teachers. Measurement invariance was tested using Multi-groups confirmatory factorial analysis (MCGFA). Results supported the factorial validity of the second-order factor model of the BAT. Reliability and concurrent validity were also supported. Finally, the results confirmed that the Italian version of the BAT was invariant across the samples. Results showed that the BAT is a valid and reliable tool to measure the burnout syndrome in the Italian context for teachers and employees. Limitations and suggestions for further research are also discussed.

Keywords: *Burnout Assessment Tool, Psychometric properties, Measurement invariance*

INTRODUCTION

Burnout is defined as a consequence of chronic job-related stress (Maslach, Schaufeli & Leiter, 2001) and it is included in the 11th revision of the International Classification of Diseases (ICD-11; WHO, 2019) as an occupational phenomenon. It is defined in ICD-11 as a syndrome characterized by feelings of energy depletion, increased mental distance from one's work and reduced professional effectiveness. Among the mental health consequences of burnout, depression plays an important role (Armon, Melamed, Toker, Berliner & Shapira, 2014; Bianchi, Schonfeld & Laurent, 2015). The association between depression and burnout can be explained considering the Conservation of Resource Theory (COR; Hobfoll, 2002): the stress occurs when resources are lost, and the loss of resources predicts affective states of anxiety and depression (Lane & Hobfoll, 1992). Another health consequence associated with burnout is insomnia (Armon, Shirom, Shapira & Melamed, 2008): insomnia can reduce resources for coping with stress, exacerbate symptoms of mental and physical fatigue and thus, lead to the development of burnout (Armon et al., 2008). Burnout is also associated with physical complaints, including headaches, gastrointestinal disorders, and respiratory infections (Kim, Ji & Kao, 2011), cardiovascular disease (Toker, Melamed, Berliner, Zeltser & Shapira, 2012), reduced immunity to infectious diseases, type 2 diabetes (Melamed, Shirom, Toker & Shapira, 2006). At the organizational level, burnout causes absenteeism and turnover (Eaton, 2019). In addition, literature showed that burnout is associated with long-term sick leave (Salvagioni, Mesas, Melanda, González & de Andrade, 2022), reduced job satisfaction (Molero Jurado, Pérez-Fuentes, Atria, Oropesa Ruiz & Gázquez Linares, 2019), lower commitment to organizations (Akdemir, 2019), and reduced employee desire to remain in the organization (Cho, Rutherford, Friend, Hamwi & Park, 2017). In conclusion, research over the past few decades (Salvagioni et al., 2017) has shown that burnout has serious negative consequences for workers and organizations.

Typically, burnout was identified as an occupational risk that can occur in people-oriented professions such as human services, teaching, health care (Maslach et al., 2001). Subsequently, other studies have established that burnout also exists in other occupations such as among white-collar workers, blue-collar workers and managers (Schaufeli, Leiter & Maslach, 2009).

Moreover, the recent pandemic exacerbated the occurrence of burnout since workplaces have been characterized by fear of contagion or, in the case of remote working, by social isolation and technostress (Spagnoli, Manuti, Buono & Ghislieri, 2021). In particular, among workers who have been remotely working boundaries between work and private life were often overlapped triggering role-conflict conditions. This conflict requires energy and resource (Bakker, Demerouti & Dollard, 2008) and this, in turn, can increases the likelihood of developing burnout. Considering the diffusion of burnout, there is a clear need for reliable tools able to detect and to prevent this phenomenon. A new *Burnout Assessment Tool* (*BAT*), which conceptualized the burnout as a multidimensional construct, was recently developed by Schaufeli and colleagues (Schaufeli, De Witte & Desart, 2019) to detect burnout and its manifestations. Preliminary Italian studies adaptation and validation of the BAT were provided by Angelini and colleagues (2021) and Consiglio, Mazzetti and Schaufeli (2021). However, despite these studies provided satisfactory results on the psychometric properties of the Italian version of the BAT, the issue related to its validity in different target of workers samples is still open. In particular, since teachers are one of the professional categories where burnout is particularly present, research still need to clarify if the BAT can be properly used on teachers, as well as on other more generic target of workers, which is employees. Thus, a measurement invariance study is needed to robustly examine this issue, and the current study aimed to fill this gap.

The Burnout Assessment Tool

Most research on burnout (approximately 88%) has used the *Maslach Burnout Inventory* (*MBI*; Maslach & Jackson, 1981) to assess burnout (Schaufeli et al., 2019). The MBI defines burnout as a syndrome characterized by three subdimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment. A high score on emotional exhaustion and depersonalization, and a low score on personal accomplishment, are indicative of burnout. Another tool developed to measure burnout is the *Copenhagen Burnout Inventory* (*CBI*; Kristensen, Hannerz, Høgh & Borg, 2005). It consists of three sub-scales: personal (the personal burnout dimension addresses physical and psychological weakness and emotional exhaustion experienced in daily life, independently from their work

environment), work-related (the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work) and client-related burnout (the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work with clients). The three separate parts of the questionnaire are designed to be applied in different domains. The CBI has been developed with the aim of overcoming some of the problems encountered in the use of MBI. For example, according to Kristensen and colleagues, Maslach's definition focuses on workers engaged in personal services, which makes the model reductive to other categories of workers. In addition, the authors found an inconsistency between the definition of burnout and the MBI, because theoretically burnout would be characterized by the co-presence of the three dimensions, but, in practice, these dimensions in the MBI are measured independently.

Very recently Schaufeli and colleagues (2019) argued other critical points in the conceptualization of burnout, in the psychometric properties of the scale, and the practical application of the BAT. In fact, according to Schaufeli ad colleagues (2019) the MBI does not produce a single burnout score but three separate and distinct scores for each subscale and this indicates that the MBI was created to investigate the three dimensions separately and not burnout as an overall syndrome. Thus, in order to provide a new, update and reliable measure of burnout conceptualized as a syndrome, Schaufeli and colleagues (2019) proposed the BAT considering recent evidence on the complex picture of workers' burnout experience. The BAT conceptualizes burnout as a state of occupational exhaustion that occurs among employees, characterized by exhaustion, emotional and cognitive impairment, and mental distance. These four main dimensions of burnout are associated with secondary symptoms: psychological and psychosomatic complaints (Schaufeli et al., 2019). The following four dimensions constitute the core of burnout:

- exhaustion, assessed with 8 items (example item "I feel mentally exhausted at work"), which refers to a severe loss of energy;
- cognitive impairment, assessed with 5 items (example item "At work, I have difficulty staying focused"), which is manifested by memory problems, attention and concentration deficits, and poor cognitive" performance;
- emotional impairment, measured with 5 items (example item "At work, I feel unable to control my emotions"), which manifested by intense emotional reactions;
- mental distance, measured with 5 items (example item "I struggle to find any enthusiasm for my work"), which refers to a psychological distancing from work.

In addition, BAT includes two secondary symptoms:

- psychological distress, measured with 6 items (example item "I feel anxious and/or suffer from panic attacks"), which refers to non-physical symptoms that are the result of a psychological problem such as sleep problems and anxious;
- psychosomatic complaints, measured with 5 items (example item "I suffer from palpitations or chest pains"), which refer to physical complaints that are consequences of some psychological problem (palpitations and chest pains).

Responses for each dimension are given on a 5-point Likert scale ranging from 1 = never to 5 = always. Schaufeli and colleagues proposed two versions of the BAT: a general version intended to assess those who have not worked for a longer time (for a few months) and a standard version intended to assess those who do work.

The BAT first showed good evidence of validity in Belgium, and the Netherlands (Schaufeli et al., 2019). Then, De Beer and colleagues (2020) tested validity of the BAT in 7 countries (Belgium, the Netherlands, Austria, Germany, Finland, Ireland and Japan) and results showed that it is a valid tool to assess employee's burnout in those countries. Recently, Angelini and colleagues (2021) and Consiglio and colleagues (2021), have translated this instrument into Italian and examined its psychometric properties in the Italian context with good results.

The current study

In the present study, the psychometric characteristics of the Italian version of the BAT will be analyzed by examining its factor structure as proposed by Schaufeli and colleagues (2019), and previous Italian adaptations of the scale (Angelini et al., 2021; Consiglio et al., 2021). Angelini and colleagues (2021) using the confirmatory factorial analysis on a sample of teachers, tested two model: a first-order model with 6 factors correlated and a second-order model in which burnout is considered a syndrome that includes a core and secondary dimension. Authors accepted the second-order model, although the first-order model presented slightly better fit indices.

Consiglio and colleagues (2021) after an exploratory factor analysis, performed a series of confirmatory factor analyses testing 4 models on an heterogenous sample of workers: a unidimensional first-order factorial model, in which all items loaded on a latent factor; a first-order factorial model in which items that assess the main symptoms loaded on the corresponding dimension and items that assess the secondary symptoms loaded on a second dimension; a first-order model with 6 factors correlated and a second-order model. The results of the exploratory factor analysis showed the presence of the 4 factors concerning the main symptoms and the 2 factors concerning the secondary symptom. The confirmative factorial analysis showed that the second-order model was the one that best fits the Italian data. In addition, authors compared the scores obtained with the BAT in the Italian sample to the scores obtained by De Beer and colleagues (2020) in 7 countries: the results showed that the Italian sample reported a higher mean score in the core symptoms of burnout compared to Finland, Austria, Germany and the Netherlands and a lower mean score compared to Belgium, Ireland, and Japan samples.

Thus, according to previous Italian validation of the BAT, the present study aims to test two factorial models:

– a first-order model with six correlated factors, corresponding to model 6 of the original study;
– a second-order model including a central and a secondary dimension, corresponding to model 8 of the original study.

In view of the above-mentioned studies, the first hypothesis of the study is:

H_1 - a second-order factorial structure including a central and a secondary dimension will show satisfactory fit indices in the Italian context.

In addition, this study aimed to test measurement invariance in two occupational samples: teachers and employees. Measurement invariance is a statistical technique essential to making comparisons between groups (Vandenberg & Lance, 2000). Measurement invariance implies that the same scale in different groups measures the same construct (Chen, 2008). This second purpose represents the added value of the present study, since previous Italian validation studies did not consider testing measurement invariance between teachers and employees. Burnout among teachers has attracted considerable attention (Kyriacou, 2001). In fact, literature showed that teachers have high levels of burnout and emotional exhaustion (Hakanen, Bakker & Schaufeli, 2006; Maslach et al., 2001). Many authors have studied the negative consequences of burnout on psychological well-being (Hakenen et al., 2006), mental health (Schonfeld & Bianchi, 2016), and job satisfaction (Robinson, Bridges, Rollins & Schumacker, 2019) in the teacher sample. Among teachers, burnout has also been correlated with high rates of absenteeism, and turnover (Ingersoll & May, 2012). However, burnout can occur among all occupational levels (Schaufeli et al., 2009), indeed many studies have also focused on employees (e.g., Dylag, Jaworek, Karwowski, Kożusznik & Marek, 2013; Mäkikangas, Leiter, Kinnunen & Feldt, 2020; Mohren et al., 2003). In addition, today the work is characterized by a role intensification (Kubicek, Paškvan & Korunka, 2015) due to technological acceleration (Rosa, 2010) and the use of work devices that has created the expectation that workers are available all the time, 24 hours a day 7 days a week (Ayyagari, Grover & Purvis, 2011). These factors are correlated positively with burnout and, with emotional exhaustion (Kubicek et al., 2015). It should be noted that the data used for this first study were collected during the Covid-19 period. The Covid-19 pandemic has profoundly changed the work environment and remote work has become a necessary solution to safeguard health. Both employees and teachers have experienced new work conditions caused by the pandemic, with significant consequences. Thus, it is of utmost interest to examine if the BAT can be applied in the same way on these two targets in order to adopt this tool for assessing the burnout syndrome.

Thus, in view of the above, the second hypothesis of the study is:

H_2 - the second-order factorial structure of the BAT is invariant across teachers and employees.

Finally, in order to test concurrent validity, the correlation between burnout and depression will be examined. In fact, many studies showed that there is a positive correlation between burnout and depression (e.g., Bianchi et al., 2015; Schaufeli & Enzmann, 1998) and that they are different but overlapping dimensions. Some studies showed that the burnout and depression can vary together over time (Bianchi et al., 2015): for example, an increase or decrease in burnout levels over time might be associated with an increase or decrease in symptoms of depression. Thus, in view of the above, in the current study concurrent validity was assessed by performing the correlation analysis between burnout and depression.

METHODS

Participants and procedure

The study involved 780 Italian workers: employees (N = 554) and teachers (N = 226). The sub-sample of employees consisted in 292 (52.7%) women and 262 (47.3%) men, age ranging from 19 to 67 years (M = 37.26; SD = 11.92). Education was distributed as follows: 1.8% had a middle school diploma, 38.1% had a high school diploma, 60.1% had a bachelor's or master's degree. They were employed in the private sector (77.1%) and public sector (22.9%). The sub-sample of teachers consisted in 182 (80.5%) women and 44 (19.5%) men. Their ages ranged from 21 to 67 years (M = 46.34; SD = 11.81). Their educational level was distributed as follows: the majority of participants had a bachelor's or master's degree (81%), and the remaining had a high school diploma (19%). Only the 9.4% was employed in the private sector, while the 90.7% was employed in the public sector. The present cross-sectional study was conducted in Italy, using convenience sampling method using the contacts of the bachelor students in work and organizational psychology. Data were collected through an online anonymous questionnaire. All volunteer participants were informed via email about the research objectives and clear instructions for the compilation of the self-report questionnaire was given to them as well as the informed consent to the use of the data for research purpose. The procedure was conducted in line with the Italian data protection law (Legislative Decree no. 196/2003) and in line with the European General Data Protection Regulation (GDPR, 2016/679).

Measures

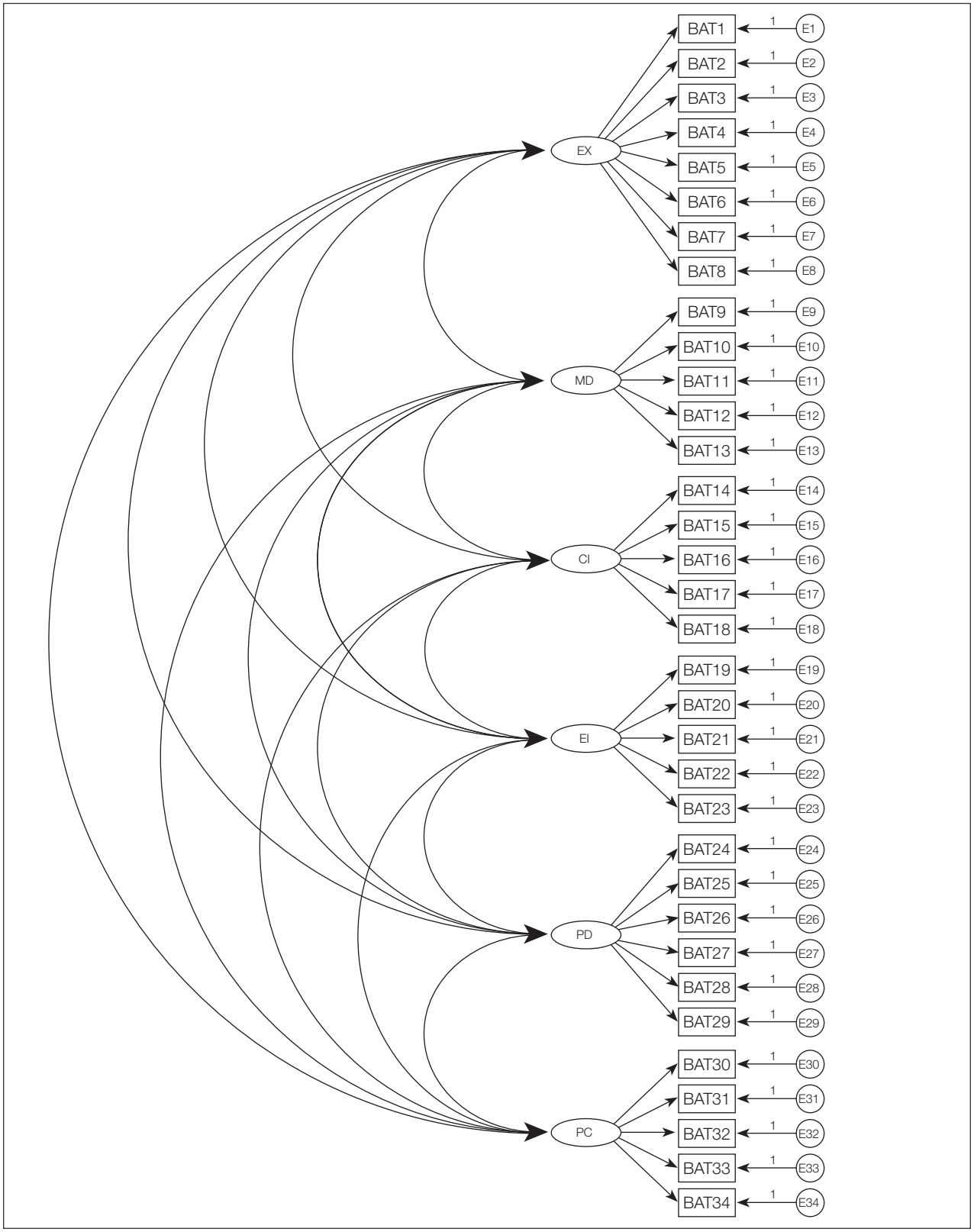
We used the *Burnout Assessment Tool* (*BAT*) by Schaufeli and colleagues (2019). The BAT includes 34 items: 23 items measuring four core dimensions (exhaustion with 8 items, mental distance with 5 items, emotional impairment with 5 items and cognitive impairment with 5 items) and 11 items measuring two secondary dimensions (psychological distress with 6 items and psychosomatic complaints with 5 items). All items were scored on a five-point Likert scale, ranging from "never" (1) to "always" (5). For the Italian version of BAT, we considered the version proposed by Consiglio and colleagues (2021).

To test the concurrent validity, the *Depression Anxiety Stress Scale-21* (*DASS*) by Lovibond and Lovibond (1995) was used. The DASS measured the levels of depression, anxiety and stress with 7 items each. In the current study, only the depression scale (a sample of item is "I felt wasn't worth much as a person") was considered. Responses to items are recorded on a 4-point Likert scale from 1 = Did not apply to me at all, to 4 = Applied to me very much, or most of the time.

Data analysis

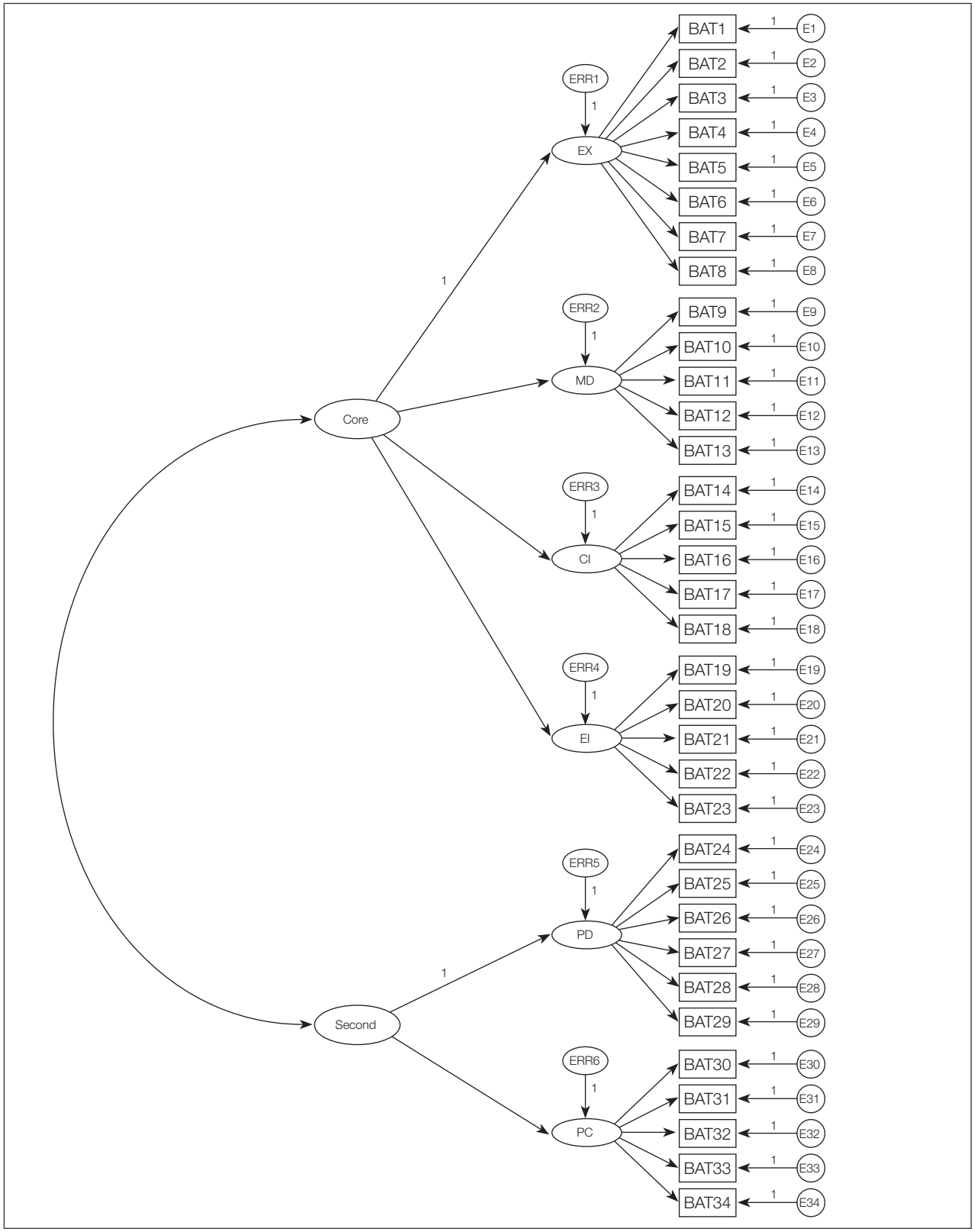
Statistical analyses were conducted using the SPSS 21 and AMOS 22 software. First, an item analysis using SPSS 21 was performed to examine the normality of the BAT items distributions. Then, the factorial structure of the Italian version of BAT was assessed using AMOS 22 through a confirmatory factorial analysis (CFA) on the total sample of the 780 subjects (we used the Maximum Likelihood as an estimation method). As indices of the model fit, the following fit indices were considered: CFI (Comparative Fit Index); RMSEA (Root Mean Square Error of Approximation); χ^2 (chi-square test); Tucker-Lewis Index (TLI) e SRMR (Standardized Root Mean Square Residual). Values higher than .90 for CFI and TLI and lower than .08 for SRMR and RMSEA indicated an acceptable fit to the data. Concerning the chi-square, many researchers tend to ignore this index if the sample size exceeds 200 subjects, because the chi-square is extremely sensitive to sample size (Bentler & Bonett, 1980). Since the number of subjects exceeded 200 in the current study, chi-square was considered as a less relevant fit index. The models that showed better fit indices in the original study by Schaufeli and colleagues (2019) were tested: Model 1 (first-order model), which assumed 6 distinct and correlated latent factors (exhaustion, mental distance, emotional and cognitive impairment, psychological distress and psychosomatic complaints), thus reproducing Model 6 in the original paper; and the Model 2 (second-order model), for which the four core factors refer to a latent construct (the core of burnout) and the secondary symptoms refer to a second and distinct latent factor, thus reproducing Model 8 in the original study. In the second-order model, both core and secondary symptoms refer to burnout as a latent psychological condition. Figure 1 and Figure 2 show a graphical representation of the two models (Model 1 and Model 2). According to Schaufeli and colleagues (2019), the

Figure 1 – The first-order model of burnout based on the conceptualization of BAT



Legenda. EX = Exhaustion; MD = Mental Distance; CI = Cognitive Impairment; EI = Emotional Impairment; PD = Psychological distress; PC = Psychosomatic complaints.

Figure 2 – The second-order model of burnout based on the conceptualization of BAT



Legenda. EX = Exhaustion; MD = Mental Distance; CI = Cognitive Impairment; EI = Emotional Impairment; PD = Psychological distress; PC = Psychosomatic complaints.

Model 8 was closest to the conceptualization of burnout proposed in the BAT, therefore in this study measurement invariance of the second-order model between teachers and employees was tested. To test measurement invariance, a series of multiple-group confirmatory factorial analyses (Brown, 2015; Byrne, 2004) were carried out. Multiple-group confirmatory factorial analyses (MGCFA) consists of simultaneous confirmatory analysis in two or more groups to test the equivalence of measurement models across distinct groups (Brown & Moore, 2012). Configural invariance is achieved when the model fits in all groups included in the analysis. After measurement invariance was tested, which includes both metric and scalar invariance. Metric invariance means that each item contributes to the latent construct to a similar degree across groups, while scalar invariance means that mean differences in the latent construct capture all mean differences in the shared variance of the items. The marker method (Little, Slegers & Card, 2006) was considered to test metric and scalar invariance of second-order model, whereas in order to test the scalar invariance of second-order model, the latent means where fixed to zero, but in the case of the current study, latent means were at the same time intercepts for the second-order factor (see Rudnev, Lytkina, Davidov, Schmidt & Zick, 2017). Therefore, the model was identified by fixing one indicator intercept per first-order factor to 0. We followed modified cut-off values to confirm metric and scalar invariance: if $\Delta CFA \leq .01$ and $\Delta RMSEA \leq .15$ metric and scalar invariance were confirmed (Chen, 2007). Finally, correlation analysis between depression and burnout was carried out to test concurrent validity.

RESULTS

Preliminary results of item analysis showed that all skewness and kurtosis values were between −2.0 and +2.0, demonstrating univariate normality (Gravetter & Wallnau, 2014). Then, we assessed the multivariate normality and deleting 57 cases. Reliability analysis showed acceptable values. Cronbach alphas was: .92 for emotional exhaustion, .86 for emotional impairment, .92 for cognitive impairment, .88 for mental distance, .79 for psychosomatic complaints and .85 for psychological distress. Cronbach alpha for the overall BAT score was .96. Cronbach alpha for the DASS was .92.

Factorial validity

The load factors for each item in the second-order model are shown in Appendix.

Result of CFA for both models tested showed a good fit to the data as reported in the Table 1. The fit indices of first-order model (M_1) on the overall sample were acceptable ($\chi^2_{(512)} = 1671.057$, $p = .000$; CFI = .93; TLI = .92; RMSEA = .056; SRMR = .048; AIC = 1837.057) as well as those of the second order Model 2 ($\chi^2_{(520)} = 1787.651$, $p = .000$; CFI = .92; TLI = .91; RMSEA = .058; SRMR = .056; AIC = 1937.651). The first-order model showed a better fit to the data but, according to Schaufeli and colleagues (2019), the second-order model to test the measurement invariance was accepted for two reasons: 1) the second-order model is closest to the conceptualization of burnout as suggested by Schaufeli and colleagues (2019); 2) the factorial validity of the second-order model has been demonstrated internationally by De Beer and colleagues in their 2020 study and in the Italian context by Angelini and colleagues (2021) and Consiglio and colleagues (2021).

The fit of the second-order model was separately tested on the group of employees and teachers. Results reported satisfactory fit for the two sub-samples as showed in the Table 1: teachers ($N = 217$; Model 3 and 4) and employees ($N = 506$; Model 5 and 6). The fit of the first-order model (Model 3) on the sub-sample of teachers are satisfactory (CFI = .92; TLI = .91; RMSEA = .059; SRMR = .051; AIC = 1059.266) as well as those of second-order model (Model 4) (CFI = .91; TLI = .90; RMSEA = .060; SRMR = .057; AIC = 1080.658). For the employees, both the first order (Model 5) and second order (Model 6) models showed satisfactory fit indices: first-order model (CFI = .92; TLI = .91; RMSEA = .060; SRMR = .06; AIC = 1668.441) and second-order model (CFI = .91; TLI = .90; RMSEA = .061; SRMR = .07; AIC = 1657.715).

The first step of measurement invariance is to evaluate the configural invariance though MGCFA (Byrne, 2004). Result of configural invariance reported in the Table 1 (Model 7) showed adequate fit indices (CFI = .91; TLI = .90; RMSEA = .043; SRMR = .057) and thus, configural invariance was established. The next step was to evaluate the scalar invariance. To assess the metric invariance of first-order model, Model 7 was compared to the constraint model where all the factor loadings were fixed to 1 (Model 8). The constraint model provided an acceptable fit (CFI = .89; TLI = .89; RMSEA = .046; SRMR = .064). The difference between the RMSEA values suggested that the full metric invariance

Table 1 – Fit indices for the CFA e MGCFA of the Italian version of BAT

Models	χ^2 *(df)*	CFI	TLI	RMSEA	SRMR
Model 1 (I order): Overall sample	1671.057 (512)	.927	.920	.056	.048
Model 2 (II order): Overall sample	1787.651 (520)	.920	.913	.058	.056
Model 3 (I order): Teachers	893.266 (512)	.916	.908	.059	.064
Model 4 (II order): Teachers	930.658 (520)	.909	.902	.060	.069
Model 5 (I order): Employees	1434.441 (512)	.918	.910	.060	.0511
Model 6 (II order): Employees	1507.715 (520)	.912	.905	.061	.0574
Model 7: Configural invariance	2438.902 (1040)	.911	.904	.043	.0574
Model 8 (I order): Full metric invariance	2768.340 (1098)	.894	.892	.046	.0639
Model 9 (I order): Partial metric invariance	2648.160 (1094)	.902	.899	.044	.0619
Model 10 (II order): Full metric invariance	2733.116 (1102)	.897	.895	.045	.0685
Model 11 (I order): Scalar invariance	2765.784 (1127)	.896	.897	.045	.0681
Model 12 (II order): Scalar invariance	2662.897 (1094)	.901	.898	.045	.0682

Legenda. df = degree of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual.

could be accepted, but the difference of the CFI exceeded the cut-off values (ΔRMSEA = –.003; ΔCFI = .017). In line with Dimitrov (2010), partial scalar metric invariance was evaluated. According to modification indexes, factor loadings related to the items BAT18 e BAT34 were released to be freely estimate (Model 9). Results presented in Table 1 show that partial metric invariance could be established (ΔRMSEA = .000; ΔCFI = .009). In the third step metric invariance of second-order factors was assessed and results showed adequate fit indices (model 10; CFI = .90; TLI = .89; RMSEA = .045; SRMR = .068). The comparison between Models 10 and 9 showed that the differences of RMSEA and CFI were smaller than suggested cut-off values (ΔRMSEA = –.001; ΔCFI = .005) and, therefore, the full metric invariance of the second-order factors was accepted. Full scalar invariance of the first-order factors was assessed through the comparison of the Model 10 and the constraint model (Model 11) where 32 factor loadings and all intercepts were fixed. The results of Model 11 showed fit indices adequate (CFI = .90; TLI = .90; RMSEA = .045; SRMR = .068) and the comparison

between model 10 and 11 showed that the difference in CFI and RMSEA are within the cut off values (ΔRMSEA = .001; ΔCFI = .000). The full scalar invariance of the first-order factors was accepted. Finally, we tested the scalar invariance of second-order factors. The result of Model 12 was adequate (CFI = .90; TLI = .90; RMSEA = .045; SRMR = .068) and the comparison between model 11 and 12 showed that the full scalar invariance of the second-order factors was accepted (ΔRMSEA = .000; ΔCFI = −.005).

Concurrent validity

To test concurrent validity the correlation analysis between burnout and depression was carried out. Results supported concurrent validity since a significant correlation between depression and exhaustion (r = .62, p<.001), mental distance (r = .33, p<.001), cognitive (r = .55, p<.001) and emotive (r = .59, p<.001) impairment, psychological distress (r = .68, p<.001) and psychosomatic complaints (r = .53, p<.001), were found.

DISCUSSION

The purpose of this study was to test the psychometric characteristics of the Italian version of the BAT (Schaufeli et al., 2019). Specifically, the psychometric properties were assessed through item analysis, factorial validity, measurement invariance, reliability, and concurrent validity. For factorial validity, confirmatory factorial analyses were conducted, focusing on the two models: Model 1 (equivalent to Model 6 in the original study) with 6-factors correlated (exhaustion, mental distance, emotion and cognitive impairment, psychological distress and psychosomatic complaints); Model 2 (equivalent to Model 8 in the original study) which was a second-order model. According to authors of BAT, the second-order model is compatible with the theory of burnout as a syndrome. Both models tested showed good fit indices. Although the fit indices of the first model were slightly better than the second, we proceeded to test the invariance on Model 2 following Schaufeli and colleagues. Results of CFA and MGCFA analysis confirmed hypotheses 1 and 2, supporting the validity of the Italian version of the BAT. The overall scale and subscales were found to be reliable. To confirm criterion validity, we considered the relationship between burnout and depression. Our results show that the BAT is a valid and reliable tool to measure the burnout in the Italian context as well as in the international context (De Beer et al., 2020). In conclusion, this study supported and confirmed the factorial validity, reliability, and criterion validity of the BAT in the Italian context. Our results are in line with those of Schaufeli and colleagues.

This study has some limitations that should be taken in consideration. One of the limitations of this study concerns the selection of subjects because we used a convenience sample, and the two samples may not be representative of the Italian population. In addition, this study considered only self-assessment data, and this implies the possibility of methodological bias related to self-report questionnaires (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). A further limitation is the cross-sectional nature of the study, longitudinal study studies should be conducted in the future to test predictive validity. Finally, comparison of the BAT with popular scales on burnout such as the *Maslach Burnout Inventory* was not conducted. However, previous Italian BAT adaptation addressed this issue.

CONCLUSION

The current work aimed to provide a contribution to the validation of the *Burnout Assessment Tool* (Schaufeli et al., 2019) using data obtained in two samples, teachers and employees. Our findings showed that the *Burnout Assessment Tool* is a valid and reliable scale for measuring burnout in the Italian context. The BAT studies the burnout in a comprehensive way and assesses various burnout manifestations. Therefore, both the total score on the BAT and the scores on the six dimensions can be used to assess the burnout. Schaufeli and colleagues in the original study (2019) suggested that the total score is useful for screening in the organization while the single scores are useful for the individual assessment. Schaufeli and colleagues also provide the cut-off scores showing different levels of severity of the phenomenon. The assessment and management of stress is a legal duty of employers, established by the Framework Directive 89/391/EEC. Organizations that are able to identify and detect the presence of burnout can propose interventions to contain the phenomenon, for example, focusing on the importance of recovering energy from work activities (Schabracq, 2005).

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APPENDIX

Items and factor loadings of the second-order model of the BAT

Items	Factor loadings
Exhaustion	
1. At work, I feel mentally exhausted	
1. Al lavoro mi sento mentalmente esausto/a	.74
2. Everything I do at work requires a great deal of effort	
2. Ogni cosa che faccio al lavoro mi richiede un grande sforzo	.73
3. After a day at work, I find it hard to recover my energy	
3. Dopo una giornata di lavoro, per me è difficile recuperare le energie	.80
4. At work, I feel physically exhausted	
4. Al lavoro mi sento fisicamente esausto/a	.79
5. When I get up in the morning, I lack the energy to start a new day at work	
5. La mattina, quando mi alzo, mi mancano le energie per cominciare una nuova giornata di lavoro	.81
6. I want to be active at work, but somehow I am unable to manage	
6. Vorrei essere più attivo/a sul lavoro, ma per qualche ragione non ci riesco	.76
7. When I exert myself at work, I quickly get tired	
7. Se faccio uno sforzo sul lavoro, mi stanco più velocemente del consueto	.82
8. At the end of my working day, I feel mentally exhausted and drained	
8. Alla fine della mia giornata lavorativa, mi sento mentalmente esausto/a e svuotato/a	.77
Mental distance	
9. I struggle to find any enthusiasm for my work	
9. Ho difficoltà a provare un qualche entusiasmo verso il mio lavoro	.84
10. At work, I do not think much about what I am doing and I function on autopilot	
10. Al lavoro non penso molto a quello che faccio e agisco in modo meccanico	.73
11. I feel a strong aversion towards my job	
11. Provo una forte avversione nei confronti del mio lavoro	.86
12. I feel indifferent about my job	
12. Mi sento indifferente rispetto al mio lavoro	.79
13. I'm cynical about what my work means to others	
13. Sono scettico/a rispetto al significato che il mio lavoro può avere per gli altri	.66

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Items	Factor loadings
Cognitive impairment	
14. At work, I have trouble staying focused	
14. Al lavoro faccio fatica a mantenere l'attenzione	.87
15. At work, I struggle to think clearly	
15. Quando lavoro ho difficoltà a pensare con lucidità	.86
16. I'm forgetful and distracted at work	
16. Sul lavoro sono distratto/a e ho difficoltà a tenere a mente le cose	.90
17. When I'm working, I have trouble concentrating	
17. Quando lavoro fatico a rimanere concentrato	.90
18. I make mistakes in my work because I have my mind on other things	
18. Mi capita di commettere degli errori nel mio lavoro perché sto pensando ad altro	.66
Emotional impairment	
19. At work, I feel unable to control my emotions	
19. Al lavoro non mi sento in grado di controllare le mie emozioni	.70
20. I do not recognize myself in the way I react emotionally at work	
20. Sul lavoro ho delle reazioni emotive che non mi appartengono	.79
21. During my work, I become irritable when things don't go my way	
21. Mentre lavoro divento irritabile se le cose non vanno come vorrei	.66
22. I get upset or sad at work without knowing why	
22. Quando lavoro mi capita di diventare agitato o triste senza saperne il motivo	.81
23. At work I may overreact unintentionally	
23. Al lavoro mi capita involontariamente di avere delle reazioni esagerate	.76
Psychological distress	
24. My weight fluctuates without being on a diet	
24. Il mio peso varia anche se non sono a dieta	.51
25. I have trouble falling or staying asleep	
25. Faccio fatica ad addormentarmi o a mantenere il sonno	.70
26. I tend to worry	
26. Tendo a preoccuparmi	.78
27. I feel tense and stressed	
27. Mi sento teso/a e stressato/a	.84

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Items	Factor loadings
28. I feel anxious and/or suffer from panic attacks	
28. Mi sento ansioso/a e/o soffro di attacchi di panico	.77
29. Noise and crowds disturb me	
29. Il rumore e la folla mi disturbano	.64
Psychosomatic complaints	
30. I suffer from palpitations or chest pain	
30. Soffro di palpitazioni o dolori al petto	.69
31. I suffer from stomach and/or intestinal complaints	
31. Soffro di mal di stomaco e/o disturbi intestinali	.69
32. I suffer from headaches	
32. Soffro di mal di testa	.66
33. I suffer from muscle pain, for example in the neck, shoulder or back	
33. Soffro di dolori muscolari, ad esempio al collo, alle spalle o alla schiena	.67
34. I often get sick	
34. Tendo ad ammalarmi facilmente	.55