ESTUDOS DE PSICOLOGIA
Psychological Studies

RESEARCH REPORT

Psychological Assessment

Editor
Raquel Souza Lobo Guzzo

Support
Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Processs nº 88882.365262/2019-01).

Conflict of interest
The authors declare that there is no conflict of interest.

Received
October 6, 2022

Approved
December 14, 2023

Teacher Self-efficacy Scale for the use of active methodologies: validity based on external criteria

Escala de Autoeficácia Docente para o uso de metodologias ativas: validade baseada em critério externo

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Article based on the master's thesis of L. S. SOUZA, entitled "*Construção e validação de uma escala de autoeficácia docente para o uso de metodologias ativas de ensino e aprendizagem na educação superior em saúde*". Universidade do Oeste Paulista, 2020.

How to cite ithis article: Souza, L. S., & Murgo, C. S. (2024). Teacher Self-efficacy Scale for the use of active methodologies: validity based on external criteria. *Estudos de Psicologia* (Campinas), *41*, e220098. https://doi.org/10.1590/1982-0275202441e220098

Abstract

Objective
To examine evidence of convergent-divergent validity evidence based on the relationship with external variables for the Teacher Self-Efficacy Scale for the use of Active Methodologies.

Method
This exploratory cross-sectional study investigated correlations between Teacher Self-Efficacy Scale for the use of Active Methodologies and factors from two other instruments: Well-Being at Work Scale and Maslach Burnout Inventory. A total of 317 professors from different public and private Brazilian universities who use active methodologies participated in this study.

Results
Teacher self-efficacy was found to be positively correlated with positive affect, achievement/expressiveness and professional achievement and it was negatively correlated with negative affect and emotional exhaustion, showing a significant but weak correlation. According to the path analysis model, personal and professional achievement was predictive of teachers´ self-efficacy to foster active learning.

Conclusion
The scale is considered to have adequate validity evidence based on the relationship with external variables, and can be used in research in the Brazilian framework.

Keywords: Higher education; Psychological tests; Psychological evaluation; Self efficacy; Teachers.

Resumo

Objetivo

Examinar evidências de validade convergente-divergente com base na relação com variáveis externas para a Escala de Autoeficácia Docente para o uso de Metodologias Ativas.

Método

Estudo transversal exploratório que buscou correlações entre a Escala de Autoeficácia Docente para o uso de Metodologias Ativas e os fatores de outros dois instrumentos: Escala de Bem-Estar no Trabalho e Maslach Burnout Inventory. *Participaram desse estudo 317 professores de diferentes universidades brasileiras públicas e privadas que utilizam metodologias ativas.*

Resultados

A autoeficácia docente se correlacionou positivamente com afetos positivos, realização/expressividade e realização profissional, além de correlacionar-se negativamente com afetos negativos e exaustão emocional, conferindo correlações significativas de magnitude fraca. Pelo modelo de path analysis*, realização pessoal e profissional foram preditoras da autoeficácia docente para promoção de aprendizagem ativa.*

Conclusão

Considera-se que a escala possui evidências adequadas de validade baseadas na relação com variáveis externas, podendo ser utilizada em pesquisas no contexto brasileiro.

Palavras-chave: *Educação superior; Testes psicológicos; Avaliação psicológica; Autoeficácia; Professores.*

Teaching Self-Efficacy (TSE) is a teacher's perception of his/her ability to promote his/her students learning (Ferreira & Azzi, 2010; Silva Jr. et al., 2018). When modulated by direct, vicarious experiences, social persuasion and physiological and emotional indicators (Bandura, 1986; 1997; Nunes, 2008; Rocha, 2009), it constitutes a psychological phenomenon that influences teachers' satisfaction with themselves, with the work carried out and self-confidence in carrying out their teaching tasks, which in turn affects a reflection on the teachers' performance, ability to plan, teach and academic success of their students (Bernardini, 2017; Lorente et al., 2014; Silva et al., 2010).

Higher education teachers have experienced suggestions aiming at triggering active learning by their students considering the positive results reported in the literature; in fact, a diversity of active methods and strategies have provided greater student autonomy, a relationship between theory and practice, opportunity to train skills close to the actual context, receiving feedback about their practice, actively counting on the tutor's help in identifying training gaps (Bacich & Moran, 2018; Bressa et al., 2021).

In this connection, teaching self-efficacy for the use of active methodologies encompasses the teachers' perception of their ability to promote meaningful learning conditions for their students through a pedagogical practice based on active strategies or methodologies. This, in turn, demands from the teacher the ability to plan, critically reflect on teaching action, continuous and procedural evaluation, as well as the ability to supervise, guide and provide feedback to their students so that they can construct innovative solutions to the problems they are faced with (Bandura, 1997; Bressa et al., 2021; Quilici et al., 2012; Sousa & Souza, 2019).

The teacher's perception will influence his/her satisfaction, security and success in implementing active methodologies in his/her pedagogical practice, which in turn should influence student learning and engagement, as well as the educational climate (Bressa et al., 2021). In this connection, the work context also influences the teachers' self-efficacy beliefs, as well as their teaching action (Ferreira & Azzi, 2011).

Teachers who have high levels of self-efficacy persist more in the face of adversity, are more willing to implement new teaching modalities and methodologies that facilitate their students' learning (Bandura et al., 2008; Rocha, 2009); they also exhibit greater subjective well-being in the work context, showing lower rates of absenteeism and sick leave due to mental illnesses, such as the burnout syndrome (Bernardini, 2017; Ferreira & Azzi, 2010, 2011; Paschoal & Tamayo, 2008; Silva Jr. et al., 2018).

It is worth noting that the burnout syndrome, based on the triadic model, is the result of a process of cumulative work stress that involves emotional exhaustion, depersonalization and deficits in the workers' personal achievement, in which the individual's health and quality of life is affected, preventing him/her from effectively carrying out his/her activities in the face of the progression of the illness (Bernardini, 2017; Baptista, Soares, et al., 2019). Emotional exhaustion refers to a lowering of the individuals' coping strategies to deal with the demands required by the position they occupy, which, associated with a weakening of professional achievement – negative and critical self-evaluation of their abilities –, depersonalization – affective social distancing – and dehumanization of the individuals towards the people who are involved with their work, characterize their illness as being some degree of burnout (Bernardini, 2017; Baptista, Soares, et al., 2019; Massa et al., 2016).

Some authors have correlated teaching self-efficacy instruments with instruments that measure the burnout syndrome, as was the case of Bernardini (2017), who used the Teacher Self-Efficacy Scale (Polydoro et al., 2004) together with the Brazilian version of the Maslach Burnout Inventory [MBI] (Benevides-Pereira, 2001) with 356 university professors from public and private Brazilian institutions. The author identified moderate inverse correlations ($p = 0.034$) between the two instruments, indicating that the lower the teachers' perceived self-efficacy, the greater the intensity of their burnout syndrome (Bernardini, 2017).

Analyses by Silva Jr. et al. (2018) with 395 Brazilian teachers revealed that high levels of teacher self-efficacy (NTSES, Norwegian Teacher Self-Efficacy Scale), showed high positive correlations ($r = 0.47; 0.55; 0.58; 0.57; 0.36, 0.61; p < 0.001$) with General Self-Efficacy (GSE), moderate with work engagement (UWES-9), moderate ($r = 0.15; 0.32; 0.27; 0.30; 0.15; 0.30; p < 0.001$) with job satisfaction (GSWS) and weak negative correlations ($r = - 0.06; - 0.17; - 0.14; - 0.25; - 0.01; - 0.16; p < 0.001$) with emotional exhaustion assessed by the MBI (Silva Jr. et al., 2018).

With regard to the study of well-being in teaching work using measuring instruments, Traldi and Demo (2012) when applying the Well-Being at Work, Organizational Commitment and Job Satisfaction scales to 81 business administration courses' teachers from a federal university, identified that commitment was mainly associated with the affective dimension ($M = 3.79$); this was a predictor of well-being, which proved to be high based on the Achievement dimensions ($M = 4.05$; $\beta = 0.438$) and Positive Affects ($M = 3.75$; $\beta = 0.531$) prevalent in relation to Negative Affects ($M = 1.71$; $\beta = 0.246$); those individuals stated they were satisfied at work in relation to management ($M = 4.23$) and Nature of Work ($M = 4.02$).

Considering the validation of an instrument as a cumulative process (American Educational Research Association [AERA] et al., 2014; Baptista, Muniz, et al., 2019) associated with the incipient use and production of instruments that assess teaching self-efficacy in higher education mediated by active methodologies (Souza, 2020), this study examined the validity evidence based on the relationship with external variables (AERA et al., 2014; Baptista, Muniz et al., 2019) for the Escala de Autoeficácia Docente para o uso de Metodologias Ativas [EADOMA, Teacher Self-Efficacy Scale for the use of Active Methodologies] (Souza, 2020; Souza & Murgo, 2023).

To obtain such evidence, a convergent-divergent process was used (Baptista, Muniz, et al., 2019) in relation to two other instruments that have evaluated related constructs, namely: Well-Being at Work Scale (Paschoal & Tamayo, 2008) and Maslach Burnout Inventory-form ED (Benevides-Pereira, 2001), with the aim of increasing the reliability and stability of the psychometric properties of the EADOMA, which showed good breadth in its initial validation process with university professors from different areas of knowledge.

Method

This was an exploratory cross-sectional study with 317 university professors who use active methodologies in different regions of Brazil.

Participants

Out of a total of 317 university professors 56.5% were female, aged between 36 and 50 years (42.6%). At the time of collection, the teachers were doctors (39.1%) associated with public universities (61.5%), located in the southeast (48.3%), south (22.7%), central-west (12, 3%), northeast (12%) and north (4.7%) regions of Brazil, respectively. The participants' initial training was mainly in Psychology (12.6%), Nursing (10.7%), Biological Sciences (8.5%), Medicine (7.9%), Pedagogy (6.6%), Business Administration (5.7%) and taught one (51.1%) or two undergraduate courses (23.7%), teaching between 9 and 12 classes (28.4%) and between 5 and 8 classes (24 .9%) weekly. In relation to the length of professional experience, most teachers had over 18 years (32.5%) teaching experience, followed by 25.6% who had between 5 and 10 years, 22.7% up to 4 years and 19, 2% who had between 11 and 17 years experience.

Instruments

Teacher Self-Efficacy Scale for the use of Active Methodologies: This instrument assesses the teacher's perception of self-efficacy for the use of active methodologies based on 32 items arranged in a 7-point Likert-type scale, which ranges from 0 (unable) to 6 (extremely capable) allocated in a unidimensional structure, with Cronbach's alpha (α) = 0.96. The higher the respondent's score, the higher their teaching self-efficacy (Souza, 2020; Souza & Murgo, 2023).

Maslach Burnout Inventory-Educators Survey [MBI-Ed]: The scale, composed of 22 items, assesses how the teacher relates to work based on three dimensions: 1) Emotional exhaustion (EE) (9 items; (α) = 0.88); 2) Professional Achievement (PA) (8 items; (α) = 0.82) and Depersonalization (DE) (5 items; (α) = 0.58). The answer key is a 7-point Likert-type scale, with point allocation ranging from 0 (never) to 6 (every day) (Benevides-Pereira, 2001). A person who reveals a high score in EE and/or DE, associated with low values in PF, is considered to fall within some degree of the burnout spectrum.

Well-Being at Work Scale [WBWS]: This instrument consists of 30 items, divided into 3 factors: 1) Positive Affect (which includes 9 items; (α) = 0.93); 2) Negative Affect (12 items; (α) = 0.91), and 3) Achievement/Expressiveness (9 items; (α) = 0.88). The total score range is 1 to 150 points and the higher the score, the higher the individual's level of work well-being (Paschoal & Tamayo, 2008).

Procedures

After approval of the study by the Research Ethics Committee (CAAE protocol no. 03020818.8.0000.5515), the authors of the aforementioned instruments were asked for permission

to convert them into electronic format for online data collection via Google-forms, considering the greater possibility of sample generality and successful data collection in this format experienced in previous studies on teacher self-efficacy (Bernardini, 2017; Rocha, 2009).

Hence, higher education teachers from different Brazilian regions were contacted by email using the email addresses available on the websites of educational institutions, associated with the snowball technique, during the period between June and November 2019. Teachers who used active methodologies and agreed to participate in this survey completed the Free and Informed Consent Form (FICF); they further responded individually to the instruments' questionnaires entering their answers in the Google electronic form. The estimated time for answering the questions was 25 minutes.

Data Analysis

The data were reviewed with descriptive statistics to characterize the sample and inferential statistics using the IBM®SPSS® version 23.0. In order to compare the means according to the demographic variables, the Student's t test and MANOVA with Tukey's post hoc test were used. The correlations between the instrument factors were carried out using the Pearson Correlation; linear regression analyses were carried out with teaching self-efficacy as the dependent variable and the use of active methodologies and sociodemographic variables as the independent variable (Tabachnick & Fidell, 2001).

Finally, the path analysis was carried out using the free software Mplus (Muthén & Muthén, 2011) using the Maximum Likelihood Robust (MLR) estimator. Two path analysis models were tested, the first – saturated model – in which the WBWS and MBI factors were specified as predictors of self-efficacy and the WBWS factors as predictors of the MBI factors. In the second model – restricted – the non-significant prediction regression coefficients were set to zero, with only the significant coefficients being presented. The Confirmatory Fit Index (CFI) and Tucker-Lewis Index (TLI) fit indices were considered, and should be equal to or greater than 0.95; as well as the Root Mean Square Error of Approximation (RMSEA) which should be equal to or less than 0.08 (Hu & Bentler, 1999).

Results and Discussion

The survey participants showed high teaching self-efficacy for the use of active methodologies, as well as achievement/expressiveness at work (Table 1). They experienced moderate levels of professional achievement, positive and negative affects in the work context, with low levels of depersonalization and a significant rate of emotional exhaustion. It is noteworthy that no missing items were recorded in the database.

Table 1
Descriptive statistics of the instruments applied

Instruments and Factors	*n*	Min	Max	*M*	*SD*
TSE - EADOMA	317	16	192	149.37	27.756
WBWS positive affects	317	9	45	31.33	7.721
WBWS negative affects	317	12	60	31.05	11.352
WBWS achievement	317	14	45	36.69	5.872
MBI Exhaust	317	0	51	19.99	11.784
MBI Prof. Achievement	317	6	48	31.31	6.501
MBI Depersonalization	317	0	24	5.50	5.417
Total	100.0				

Note: EADOMA: Teacher Self-Efficacy Scale for the use of Active Methodologies; MBI: Maslach Burnout Inventory; TSE: Teacher Self-efficacy; WBWS: Well-Being at Work Scale.

The comparative analyses of the means using MANOVA did not identify significant differences depending on the variables age group, length of professional experience, affiliation, region and income in the instrument factors. The variables education, training, number of courses and number of classes were not included due to the lack of balanced distribution. Despite the high teaching self-efficacy for the use of active methodologies in the participants of this study, many of them could be considered affected by the burnout syndrome, since they presented high levels of emotional exhaustion (43.8%) and depersonalization (67.2%), associated with low professional achievement (44.8%) in the MBI.

Along this line, the study developed by Bressa et al. (2021) identified that medical courses' teachers who were more committed to the use of active learning methodologies and formative assessment, felt more prepared to carry out teaching activities, enhancing their beliefs about the ability to manage daily life in the classroom and mobilize students to carry out their tasks. Furthermore, teachers with a high feeling of self-efficacy showed greater openness to new ideas, as well as showing great enthusiasm for teaching and being more committed to their profession (Rocha, 2009). However, some authors believe that the use of active methodologies requires teachers with skills, training and an institutional infrastructure that is not always offered by the highly precarious Brazilian higher education set up (Abonizio, 2012; Ferreira, 2014; Souza et al., 2020).

The stressors associated with insufficient working conditions already mentioned could justify the average values found in these results, especially with regard to positive affects, negative affects and achievement/expressiveness, as in Traldi and Demo (2012) who also used the Wellbeing at work in their studies.

Given those results, it becomes important to investigate the possible impacts of frequent exposure to the different stressors that Brazilian teachers are subjected to; among the most current stressors is the challenge of inserting active methodologies into their pedagogical practice in the face of a traditionalist curricular and institutional context. In this connection we should emphasize that educational reforms and the implementation of guidelines require persistence, continuous innovation and deep cognitive involvement of the teachers with their tasks (Ferreira & Azzi, 2011; Souza et al., 2020).

The rates of emotional exhaustion and depersonalization dimensions which were considered high were actually twice as high as those found by Bernardini (2017). In contrast, the professional achievement results according to our study were much lower than those of the aforementioned author. Furthermore, all the values yielded in our investigation were much higher than those of Ferreira (2014), who identified a predominance of low professional achievement (M = 2.64) associated with significant emotional exhaustion (M = 2.45) in his study's participants. Thus, these data reveal a worrying reality that requires greater understanding of Brazilian teachers who promote active learning and the corresponding interventions.

Pearson's correlation analysis of the results obtained in EADOMA and the WBWS and MBI dimensions reported in Table 2, indicates that the correlations, which were mostly negative and with a weak magnitude, presented statistical significance, with the exception of the correlations between achievement and exhaustion and depersonalization and self-efficacy. The largest coefficients obtained were between depersonalization and exhaustion in a positive sense, as well as between exhaustion and negative affects. Self-efficacy correlated positively with positive affects, achievement/expressiveness and professional achievement and negatively with negative affects and emotional exhaustion.

Table 2
Pearson correlations between instrument factors

Instruments and Factors	TSE – EADO-MA	Positive affects WBWS	Negative affects WBWS	Achievement/ Expression WBWS	Emotional Exhaustion MBI	Professional Achievement MBI	Depersonalization MBI
TSE - EADOMA	1						
Positive affects WBWS	0.30**	1					
Negative affects WBWS	-0.16**	-0.64**	1				
Achievement WBWS	0.36**	0.56**	-0.39**	1			
Emotional Exhaustion MBI	-0.15**	-0.57**	0.73**	-0.45**	1		
Professional Achievement MBI	0.39**	0.35**	-0.18**	0.37**	-0.06	1	
Depersonalization MBI	-0.10	-0.43**	0.51**	-0.35**	0.58**	-0.29**	1

Note: **$p < 0.001$. EADOMA: Teacher Self-Efficacy Scale for the use of Active Methodologies; MBI: Maslach Burnout Inventory; TSE: Teacher Self-efficacy; WBWS: Well-Being at Work Scale.

These results, reported in Table 2, corroborate the literature in the sense that high teaching self-efficacy beliefs produce higher levels of satisfaction and well-being at work (Bandura, 1997; Bernardini, 2017; Bressa et al., 2021; Lorente et al., 2014; Silva et al., 2010), especially on the affective component of well-being (Traldi & Demo, 2012), which, in turn, is inversely proportional to the development of the burnout syndrome (Bernardini, 2017; Ferreira, 2014; Ferreira & Azzi, 2010, 2011; Paschoal & Tamayo, 2008; Silva Jr. et al., 2018).

In this connection, Ferreira (2014) also showed negative correlations of moderate magnitude between lack of professional achievement and total teaching self-efficacy, as well as between all dimensions corresponding to teaching self-efficacy and the total burnout score. Achievement is one of the key elements for promoting efficient learning conditions, considering that the less the teacher perceives himself to be professionally accomplished, the greater the chances of him/her failing to use teaching methodologies that motivate students to learn (Ferreira, 2014).

It is worth noting that although teachers had high teaching self-efficacy, they were not free from experiencing a high incidence of the burnout syndrome, which also occurred in the study by Bernardini (2017) and Ferreira (2014). Considering that there are several variables that can interfere with the constructs assessed, another objective of this investigation was to seek explanatory variables related to teaching self-efficacy, well-being at work and burnout. To this end, regression analyses were carried out for the construct (Table 3).

Table 3
Regression analysis - Self-efficacy as a dependent variable

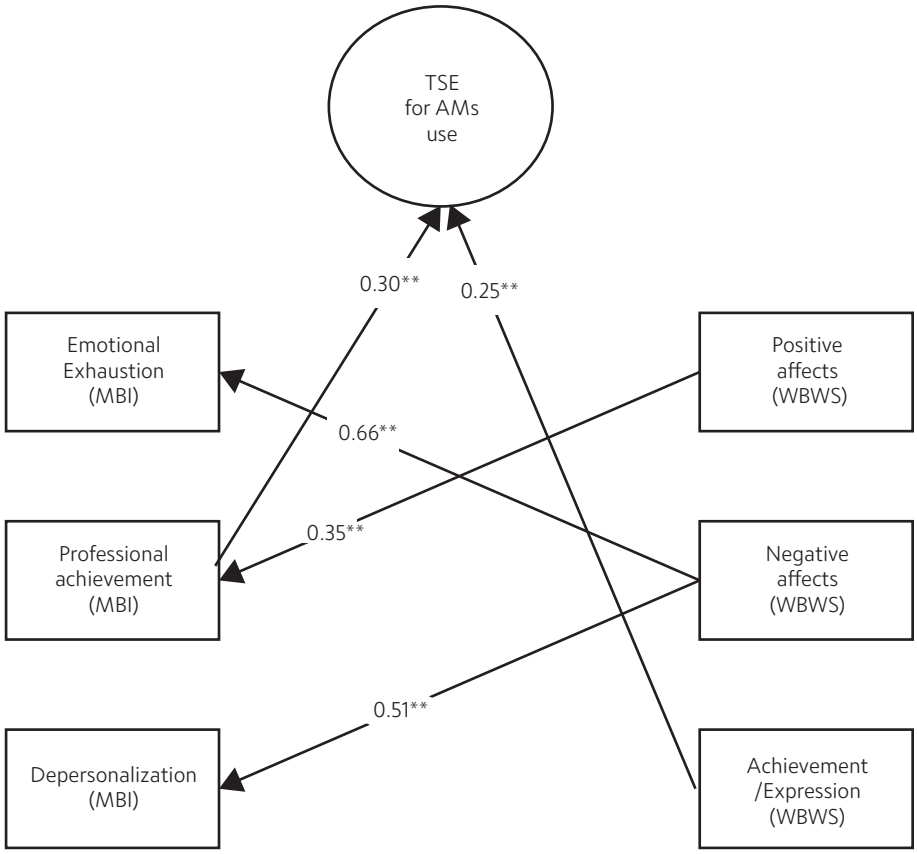
Model	Standardized beta (β)	*t*	Sig
Constant		6.835	0.00
Gender	-0.044	-0.788	0.43
Age range	0.111	1.403	0.16
Education	-0.169	-2.574	0.01
Professional experience	0.139	1.633	0.10
Affiliation	0.038	0.683	0.49
Income	-0.044	-0.617	0.53
Daily journey	0.088	1.630	0.10
Professional situation	0.082	1.433	0.15
Health rating	0.173	2.959	0.00
Physical activities	0.056	0.964	0.33
Leisure	-0.002	-0.030	0.97
Use of AM	-0.180	-3.186	0.00
Thinks AMs are important	0.087	1.514	0.13
R^2 adjusted 12%			

Note: The standardized correlation coefficient, the Beta parameter (β), in the multiple regression equation, represents the magnitude and direction of the relationship between each of the predictors and the dependent variable; the coefficient of determination R^2 represents the amount of variance of the dependent variable explained jointly by the independent variables. MAs: Active Methodologies.

In this connection, when reviewing teaching self-efficacy for the use of active methodologies as a dependent variable in linear regression analyses, the data indicated that only the variables education and use of active methodology predict TSE. In general, education negatively predicts TSE, implying that the higher level of education, the lower the TSE levels tend to be. The use of active methodologies predicts positively, as the greater the frequency of their use, the higher the levels of perceived teaching self-efficacy, explaining 12% of the variance.

To verify the path analysis regarding the dimensions of the three instruments used (EADOMA, WBWS and MBI), a direct extension of multiple regression models was carried out, adopting path analysis to investigate the results in an integrated manner with a better visual representation of the data (Figure 1).

Figure 1
Restricted path analysis model



Note: ** $p < 0.001$. RMSEA: 0.14; CFI: 0.81; TLI: 0.71; R^2 self-efficacy: 0.18; R^2 Exhaustion: 0.56; R^2 Professional achievement: 0.12; R^2 Depersonalization: 0.26. Ams: Active Methodologies; EADOMA: Teacher Self-Efficacy Scale for the use of Active Methodologies; MBI: Maslach Burnout Inventory.
TSE: Teacher Self-efficacy; WBWS: Well-Being at Work Scale.

As illustrated in Figure 1, teaching self-efficacy for the use of active methodologies was explained by Personal Achievement/Expressiveness and Professional Achievement, which in turn was explained by positive affects. Negative affects explained emotional exhaustion and depersonalization, corroborating the literature related to self-efficacy from a social cognitive perspective.

The graphical representation in the path analysis allowed us to identify that personal and professional achievement are predictors of teaching self-efficacy for the use of active methodologies. Positive affects are predictors of professional achievement and negative affects are predictors of emotional exhaustion and depersonalization. Expanding the discussions about predictive variables for well-being at work, Traldi and Demo (2012) identified that organizational commitment from an affective basis explained the well-being of the participants, since the more the teacher had affective commitment the higher the experience of positive affect in the work environment, as well as the lower the affective commitment to work, the greater the prevalence of negative affect.

For interventions on teacher health to be efficient, a better characterization of the variables influencing the construct is necessary. In this connection, recent studies reaffirm that teachers who worked in public institutions with a high workload (Carlotto & Câmara, 2017) had greater psychological exhaustion and risk of burnout (Baptista, Soares, et al., 2019; Carlotto & Câmara, 2017). The regression analyses conducted by Baptista, Soares, et al. (2019) demonstrated that the total burnout score was explained by the variables depression ($\beta = 0.27$; $t = 2.96$) and stressful events at work ($\beta = 0.41$; $t = 4.01$), predicting 32.6% of the tested model. Furthermore, stressors at work mediated the relationship between lower perception of work support and higher prevalence of burnout (Baptista, Soares, et al., 2019; Baptista & Cardoso, 2021).

Although the path analysis presented in figure 1 corroborates the literature with regard to the correlations between the constructs investigated here, it is worth highlighting the prevalence of identified burnout syndrome, even with high teaching self-efficacy. Such data seem to differ from what is proposed by social cognitive theory regarding self-efficacy beliefs (Bandura, 1986, 1997; Bernardini, 2017; Ferreira & Azzi, 2010, 2011; Rocha, 2009; Silva Jr. et al., 2018).

Given the scenario described above, it is suggested that new studies focus on explanatory variables associated with the high presence of these constructs pre and post Coronavirus Disease 2019 (COVID-19) pandemic in teachers in the specific framework of higher education in which teaching action is mediated by active learning methodologies (Bacich & Moran, 2018), considering that the literature has suggested a divergent relationship between teaching self-efficacy and burnout.

The limitations of our study involve the survey design adopted to search for validity based on external variables for the instrument. It would be interesting for new studies to further investigate the relationship between teacher self-efficacy and well-being at work and burnout in order to understand the low-magnitude correlations and investigate potential seasonal interferences on the constructs.

Conclusion

Regarding the contributions of this study, we have an unprecedented self-report scale that assessed teaching self-efficacy for the use of active methodologies, with a single-factor structure, associated with estimates of precision and evidence based on the relationship with favorable external variables. However, the need for studies with new samples is emphasized in order to possibly generate greater evidence for the EADOMA structure besides enabling the evaluation of the effect of intervention programs that promote teacher self-efficacy in this specific teaching and learning framework mediated by methodologies. Furthermore, future research with robust samples could also review the sources of self-efficacy of teachers who promote learning through active methodologies, employing the item characteristic analysis using the Item Response Theory and the response difficulty analysis.

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