La Medicina del Lavoro

Short communication

Med. Lav. 2024; 115 (6):e2024041
DOI: 10.23749/mdl.v115i6.16294

Adapting the HSE-MS Indicator Tool for Academia: A Psychometric Evaluation of the Academic Teacher Stress Indicator Tool for Italian University Teachers

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Keywords: Work-Related Stress; Stress Assessment; Academic Teaching Staff

Abstract

Background: *The assessment of work-related stress is mandatory in Italy, according to Legislative Decree 81/2008. The Academic Teacher Stress Indicator Tool (ATS-IT) was developed to address stress in academic teaching staff by adapting the Health and Safety Executive Management Standards Indicator Tool (HSE-MS IT).* **Methods:** *An online ATS-IT survey was administered to all teaching staff at the University of Trieste, yielding 334 valid responses. The survey also included a measure of psychosomatic complaints and demographic questions. Confirmatory factor analysis (CFA) was performed to test the six-factor structure, and reliability was assessed using Cronbach's alpha.* **Results:** *CFA confirmed an excellent fit for the six-factor structure (CFI = .99; TLI = .99; RMSEA = .034). Reliability analysis mainly showed acceptable values (Cronbach's α ranging from .66 to .91). Significant gender differences were found in the Demands and Control scales, with additional differences based on age and academic role across multiple scales. The ATIS-IT scales were significantly intercorrelated and negatively correlated with psychosomatic complaints.* **Conclusions:** *The ATS-IT demonstrates good potential as a valid and reliable instrument for assessing work-related stress among Italian academic teaching staff. Its use can facilitate better stress management and intervention strategies in educational institutions.*

1. Introduction

In Italy, the assessment of work-related stress is mandatory in every workplace**,** according to Legislative Decree 81/2008 [1]. This emphasizes the importance of reliable and valid tools to evaluate stress levels across professional sectors. The Italian National Institute for Insurance against Accidents at Work (INAIL) in 2010 [2] suggested using the British Health Safety Executive stress model [3] to assess work-related stress. It handled the Italian translation of the Health and Safety Management Standards Indicator Tool (HSE-MS IT) questionnaire [4, 5].

The original HSE-MS IT was designed for broader occupational contexts. Still, specific ad-hoc versions have been developed to assess the risk of work-related stress in particular sectors, such as defense, oil and gas industry, and healthcare [6-8], to represent distinctive stress factors overlooked in the original version but relevant in specific organizational structures. Similarly, in 2015, we adapted the Italian version of the HSE-MS IT to the needs of the Italian academic teaching staff, developing the Academic Teacher Stress Indicator Tool (ATS-IT) [9]. We preliminarily conducted focus groups and interviews with academic teaching staff from Italian

Received 07.08.2024 – Accepted 11.11.2024
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public universities to refine the HSE-MS IT to reflect the specific challenges academic teaching staff encounter in their work environment. In particular, the Manager Support dimension, which does not apply to the typically non-hierarchical structure of academic institutions, has been replaced with Responsibilities, recognizing the critical aspects of decision-making and accountability in academic roles. This dimension, indeed, includes items that highlight the significant responsibilities of academic teachers, such as the need to make crucial decisions that may have substantial implications for others (e.g., students or colleagues) and the possibility that mistakes could cause harm to individuals or their institution [10]. This pressure to perform accurately, coupled with the weight of accountability for one's actions, has been reported as a source of considerable stress for academic staff. Additionally, item wording was adjusted to resonate more accurately with the experiences of academic staff in Italy. The final version of the ATS-IT, as discussed in the previous literature, comprises 27 items that assess six critical areas of work-related stress: Demands, Control, Relationships, Peer support, Responsibilities, and Change [9, 11].

While the ATS-IT conceptual framework and preliminary application have been discussed in previous literature [9], an evaluation of its psychometric properties has not been conducted yet, except from a study published in the gray literature [11], which supported the six-factor structure of the ATS-IT and demonstrated that the six areas are significantly correlated with perceived occupational stress, as well as a set of psychophysical issues commonly associated with stress. The present study attempts to fill this gap by testing the validity and reliability of the ATS-IT as an instrument for assessing work-related stress among Italian academic teaching staff, thus contributing to better stress management and intervention strategies in educational institutions.

2. Methods

2.1. Participants and Procedure

The study was conducted as part of the mandatory periodic work-related stress assessment required by Italian law [1]. Therefore, Ethical Committee approval was not needed. The study adhered to the principles outlined in the Helsinki Declaration and the Italian Association of Psychology (AIP) ethical code. Participants were informed that their participation was voluntary, that they could refuse to participate or withdraw at any time without giving any reason, that all measurement instruments were anonymous, and that only aggregated data would be reported. By completing the questionnaire, participants indicated their acceptance of participating in the work-related stress assessment.

On March 27th, 2023, all teaching staff (full professors, associate professors, and researchers) employed at the University of Trieste received an email briefly introducing the study and its aims, along with a link to an online survey form to be completed before April 30th. A reminder was sent on April 28th: 340 questionnaires were completed, with a response rate of 44% for full professors, 45% for associate professors, and 51% for researchers.

2.2. Measures

The online survey was organized into three sections. The first section presented the ATS-IT, which considers a six-month time window before the assessment and consists of 27 items tapping the following six scales: Demands (7 items), Control (4 items), Relationships (6 items), Peer support (4 items), Responsibilities (3 items), and Change (3 items). Answers were provided on a five-point scale, ranging from 1 (never) to 5 (always). Consistent with the original HSE-MS IT, the ATS-IT is a risk indicator of work-related stress. This means that, unlike other tools that measure stress intensity [12], the ATS-IT measures employees' exposure to a set of organizational dimensions, which, if not correctly managed, could lead to psychological distress [5, 13]. Higher scores on the ATS-IT scales indicate a better performance in organizational dimensions and, therefore, a lower risk of work-related stress and vice-versa. The ATS-IT items are reported in Supplementary Material A.

The second section included seven items measuring the prevalence of psychosomatic complaints commonly associated with work-related stress

(palpitations, sleep disorders, depression, irritability, anxiety, physical and mental tiredness, and headaches) [14, 15]. Participants reported the prevalence of these complaints over the last six months using a five-point scale ranging from 1 (never) to 5 (always). A global measure of psychosomatic complaints was obtained by aggregating the seven items, with higher scores indicating a higher frequency of psychosomatic problems. Cronbach's α for this measure was .82. The final section included demographic questions (gender, age group, and academic role).

2.3. Data Analysis

The factor structure of the ATS-IT items was tested using confirmatory factor analysis (CFA) with diagonally weighted least squares estimation method. The following fit indices were employed: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Values higher than .95 for CFI and TLI and lower than .08 for RMSEA indicated an acceptable fit to the data [16]. Cronbach's α was used to estimate the reliability of the scales, with values ≥ .80 indicating good reliability and values ≥ .70 acceptable reliability. Pearson correlation coefficients were used to examine the association with psychosomatic complaints. Standard inferential tests (t-test and ANOVA) were performed to analyze whether the ATS-IT scales scores differed across the participants' age groups, genders, and academic roles. Statistical analyses were conducted using Jamovi software.

3. Results

Data from six participants were removed from the analyses due to having five or more missing values in the ATS-IT items, leaving a final sample of 334 participants. All remaining missing values were replaced using the EM imputation algorithm.

The results of the CFA showed excellent fit for the hypothesized six-factor structure (CFI = .99; TLI = .99; RMSEA = .034, 95% CI = .026-.042). The factor loadings are reported in Supplementary Material B. Reliability analysis revealed acceptable values. Cronbach's α was .80 for Demands, .79 for Control, .85 for Relationships, .91 for Peer support, .79 for Responsibilities, and .66 for Change.

Descriptive statistics for the whole sample and divided for demographic variables are reported in Table 1.

Table 1. Descriptive statistics of the ATS-IT scales (means, standard deviations in brackets) by demographic variables.

Demographic Variables (N)	Demands	Control	Relationships	Peer Support	Responsibilities	Change
Gender						
M (218)	2.74 (0.57)	3.83[a] (0.64)	3.94 (0.65)	3.54 (0.81)	2.66 (0.77)	3.30 (0.71)
F (112)	2.55 (0.56)	3.65 (0.69)	3.91 (0.62)	3.55 (0.91)	2.70 (0.82)	3.31 (0.59)
Age group						
<30 years (67)	2.63 (0.54)	3.76 (0.61)	3.95 (0.59)	3.67 (0.81)	3.03 (0.76)[a]	3.22 (0.72)
30 – 40 years (84)	2.55 (0.48)[a]	3.72 (0.67)	3.87 (0.64)	3.55 (0.78)	2.60 (0.70)[b]	3.15 (0.60)[a]
41 – 50 years (94)	2.62 (0.64)	3.68 (0.67)	3.84 (0.69)	3.44 (0.93)	2.60 (0.73)[b]	3.31 (0.71)
51 – 60 years (61)	2.85 (0.57)[b]	3.85 (0.64)	4.11 (0.54)	3.57 (0.75)	2.62 (0.85)[b]	3.49 (0.62)[b]
>60 years (25)	2.98 (0.56)[b]	3.96 (0.83)	3.91 (0.79)	3.48 (1.07)	2.44 (0.88)[b]	3.58 (0.68)[b]
Academic role						
Researcher (112)	2.78 (0.55)[a]	3.85 (0.55)	4.03 (0.62)[a]	3.70 (0.86)[a]	3.05 (0.74)[a]	3.31 (0.68)
Associate professor (156)	2.51 (0.57)[b]	3.73 (0.74)	3.81 (0.69)[b]	3.40 (0.88)[b]	2.52 (0.72)[b]	3.20 (0.70)[a]
Full professor (66)	2.86 (0.52)[a]	3.69 (0.66)	4.01 (0.55)	3.55 (0.73)	2.40 (0.77)[b]	3.50 (0.55)[b]

Note. Different superscript letters indicate significant differences in the Tukey post-hoc test, all Ps < .05.

Table 2. Pearson correlations among the ATS-IT scales and psychosomatic complaints.

	Demands	Control	Relationships	Peer Support	Responsibilities	Change
Demands	-					
Control	.38***	-				
Relationships	.49***	.38***	-			
Peer Support	.28***	.32***	.62***	-		
Responsibilities	.38***	.24***	.23***	.12*	-	
Change	.56***	.46***	.62***	.44***	.16***	-
Psychosomatic complaints	-.56***	-.42***	-.42***	-.33***	-.14*	-.48***

*Note. * P < .05 ** P < .01 *** P < .001.*

As for gender differences, females were found to be more at risk in the Demands (t(328) = 2.81, P = 0.005) and Control (t(328) = 2.38, P = 0.018) dimensions compared to males. Significant differences between age groups emerged in the Demands (F(4,116) = 4.78, P = 0.001), Responsibilities (F(4,114) = 4.60, P = 0.002), and Change (F(4,116) = 4.00, P = 0.004) dimensions. Significant differences between academic roles were found in the Demands (F(2,174)=12.28, P<0.001), Relationships (F(2,132) = 4.52, P = 0.012), Peer support (F(2,180) = 4.03, P=0.019), Responsibilities (F(2,166)= 22.29, P<0.001), and Change (F(2,184)=5.75, P = 0.004) dimensions. Tukey post-hoc tests (reported in Table 1) revealed that the significant differences were coherent with expected patterns (e.g., less Responsibilities for researchers compared to associate and full professors).

Table 2 reports Pearson correlations between the ATS-IT scales and psychosomatic complaints. The ATS-IT scales were significantly intercorrelated, as in the HSE-MS IT from which they are derived, and significantly negatively correlated with psychosomatic complaints, with Demands, Relationships, and Change displaying the most robust associations (-.56, -.49, and -.48, respectively).

4. Discussion

Confirmatory factor analysis supported the hypothesized six-factor structure [9, 11] with excellent fit indices, corroborating the tool's construct validity. The reliability analysis confirmed the internal consistency, revealing acceptable values for all dimensions except Change. This result aligns with previous research using the HSE-MS IT [5], from which the ATS-IT is derived, where Change emerged as the weakest subscale.

The negative correlations between the ATS-IT scales and psychosomatic complaints validate the tool, showing concurrent associations with expected stress-related health outcomes [17]. Higher scores in organizational dimensions, indicating lower stress, were associated with fewer psychosomatic problems, consistent with the broader literature on the HSE-MS IT, which showed significant associations among its dimensions and stress-related outcomes, such as job satisfaction, anxiety, and depression [18, 19], highlighting the importance of assessing the risk of occupational stress to mitigate these adverse outcomes. Similarly, our results emphasize the practical relevance of the ATS-IT in identifying organizational stressors in the Italian academic environment.

Significant differences among demographic variables underscore the ATS-IT's sensitivity to individual differences, including specific academic roles. This is consistent with recent research [20] that found that organizational factors and demographic differences can influence work-related stress profiles, particularly during times of crisis. Our findings align with this result, showing that academic teaching staff face distinct stressors depending on their role within the institution, and interventions should be designed accordingly.

Overall, the results of this study are consistent with previous studies validating the HSE-MS IT in occupational settings [18, 21], and indicate that the ATS-IT shows good potential as a valid and reliable instrument for assessing work-related stress among Italian academic teaching staff.

This study has several limitations that should be acknowledged. First, the sample was drawn from a single university with relatively few participants. Second, the overall low response rate may limit the generalizability of the findings. Moreover, we adopted a cross-sectional design, which does not allow for the assessment of causality, and there is a risk that negative affectivity could have influenced the self-reported data. Furthermore, while the Responsibilities dimension was included to capture academic teaching roles' decision-making and accountability aspects, it showed the weakest association with psychosomatic complaints. A possible explanation for this finding is that the relationship between responsibility and stress may not be linear. For example, both low levels of responsibility (which may reduce work engagement and meaning) and high levels (which may increase stress due to the weight of accountability) could contribute to adverse outcomes. Future research should investigate the role of responsibilities, exploring how different levels impact strain and work engagement in academic settings.

5. Conclusion

The ATS-IT shows promise as a valuable tool for assessing work-related stress in Italian academic teaching staff. Its six dimensions provide a focused measure of key stressors relevant to the academic teaching context. Thus, the ATS-IT can serve as a valuable instrument for developing tailored stress management strategies, contributing to the well-being and productivity of academic teaching staff. Further research should investigate longitudinal applications of the ATS-IT to assess its effectiveness over time and explore the role of the Responsibilities dimension.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted following the Declaration of Helsinki guidelines and the Italian Association of Psychology (AIP) ethical code. Ethics committee approval was not required, as the study was part of the mandatory work-related stress assessment (Legislative Decree 81/2008). Data were handled in compliance with privacy laws and under European Union Regulation 679/2016 (GDPR).

Informed Consent Statement: Participants indicated their informed consent by returning the questionnaire.

Declaration of Interest: The authors declare no conflict of interest.

Author Contribution Statement: F.M., D.F. and L.D.B. and contributed to the design of the research; F.M. and F.L.F. contributed to the implementation of the research; F.M. contributed to the analysis of the results; all the authors contributed to the writing of the manuscript.

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Supplementary material A

Academic Teacher Stress Indicator Tool – Italian version

Di seguito le verranno presentate delle affermazioni che descrivono possibili situazioni lavorative, indichi quanto frequentemente le ha vissute negli ultimi sei mesi.						
1	Ricevo delle richeste che mi è difficile soddisfare*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
2	Le relazioni sul lavoro sono tese e difficili*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
3	Sono soggetto a prepotenze e vessazioni*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
4	Posso scegliere i miei ritmi di lavoro	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
5	Il mio lavoro è soggetto a cambiamenti che non dipendono da me*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
6	Ricevo dai miei colleghi l'aiuto e il sostegno che mi servono	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
7	Mi ritrovo ad affrontare sgraditi cambiamenti lavorativi*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
8	Devo lavorare molto intensamente*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
9	Posso decidere quando fare una pausa	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
10	Devo svolgere più attività contemporaneamente*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
11	Il mio ruolo prevede molte responsabilità*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
12	Nel mio lavoro posso scegliere cosa fare	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
13	Vengo trattato/a con rispetto	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
14	Ricevo pressanti richieste che mi costringono a rivedere le mie priorità lavorative*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
15	Riesco a rispettare le scadenze	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
16	Devo prendere decisioni che hanni implicazioni importanti per le altre persone*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
17	Mi capita di essere trattato in modo ingiusto*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
18	Un mio errore potrebbe causare danni ad altri/alla struttura*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
19	Nelle situazioni difficili mi sento supportato/a dei miei colleghi	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
20	Ho a che fare con persone irritanti*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐

(*Continued*)

21	Mi capita di trascurare alcune attività perché ho troppo da fare*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
22	Comprendo e condivido le ragioni alla base dei cambiamenti a cui è soggetto il mio lavoro	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
23	Posso decidere in che modo svolgere il mio lavoro	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
24	Se emergono difficoltà sul lavoro posso contare sull'aiuto dei miei colleghi	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
25	Mi capita di discutere animatamente con le altre persone*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
26	I miei colleghi mi ascoltano quando parlo dei miei problemi di lavoro	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐
27	Mi capita di dedicare al lavoro più tempo di quanto avevo previsto*	mai ☐	raramente ☐	qualche volta ☐	spesso ☐	sempre ☐

*Note. Items marked with an * must be reverse-scored.*

Supplementary material B

Academic Teacher Stress Indicator Tool – CFA factor loadings.

ATIS-IT items	Demands	Control	Relationships	Peer Support	Responsibilities	Change
Item1	0.788					
Item8	0.576					
Item10	0.560					
Item14	0.779					
Item15	0.252					
Item21	0.662					
Item27	0.577					
Item4		0.788				
Item9		0.576				
Item12		0.560				
Item23		0.779				
Item2			0.815			
Item3			0.738			
Item13			0.674			
Item17			0.788			
Item20			0.748			
Item25			0.381			
Item6				0.855		
Item19				0.936		
Item24				0.900		
Item26				0.702		
Item11					0.878	
Item16					0.785	
Item18					0.626	
Item5						0.670
Item7						0.643
Item22						0.555

Note. All factor loadings P < 0.001.